EDUCATION

Fundamentals of clinical research 1: Selection of a suitable and workable research proposal

Logan Danielson

ABSTRACT

St. John's Hospital and Medical Center, Detroit, Michigan (USA)
St. George's School of Medicine, Grenada, West Indies

Correspondence: Logan Danielson, St. John's Hospital and Medical Center, Detroit, Michigan (USA);
E-mail: logandanielson@gmail.com

This is the second of a series of papers on research and research paper writing. The first paper was published in the September 2017 issue of the journal as an editorial view. Every paper of this series will offer salient features of a single topic of research and will be published in the successive issues of the journal.

The selection of a suitable and workable research proposal is not an uncomplicated task. In this article, we will provide a different framework for thinking about the process of developing a research proposal by redefining the task at hand and then using that definition to guide our actions in a more intuitive sense. We will then conclude with a discussion regarding the development of your research question.

Key words: Clinical Research; Research Proposal; Evidence-based Medicine

This article will cover what I refer to as the "Step Zero" of research. This name is important because, normally, when someone thinks about the steps they go through to perform some task, they start with step one and proceed from there. Today, I will draw your attention to the part of performing research that occurs before most would consider the research to have started. Our goal will be to change how we think of about research on a very basic level so that we can go about it more efficiently. If research was like cutting down a tree, then this "Step Zero" represents the time that you spend sharpening your axe. While it's obvious that cutting down a tree with a dull axe would be difficult, one must still consciously remember to sharpen their axe before they set out to take the tree down and it is this conscious thought that we hope to instill today.

To begin, we must redefine what it is that we're doing. We know our goal, it's to get published and influence others in the practice of medicine so as to bring about a better world. Our question thus becomes: how can we redefine "getting published and having an impact"? Well, we can think of that process like a conversation with the research community, where the words we speak (i.e. publish) affect (i.e. impact) the individual listening (i.e. reading) in a positive manner. Now that we've reoriented our definition of research to think of it like a conversation, we can use the similarities and differences between them to help identify that which could easily elude conscious awareness.

Speaking and Listening

Conversations involve both speaking and listening. The "listening" in this context is accomplished by critically appraising the currently published literature. The first step to conducting a literature review involves performing a literature search. Ideally, one has a research question in mind when they perform their literature search. If you don't, then you'll just have to search the database for a given topic and, as you review the literature, hopefully you'll formulate a specific research question that enables you to perform a more specific search. More on the development of a research question will be covered later in this article. This research question can then be used to produce a list of key terms that will act

as your search's keywords. For your search to be as inclusive as possible, your list of keywords should include each keyword's: synonyms, alternative spellings (e.g. anemia vs. anaemia), layman & medical terminology counterparts, and drug brand & generic names. Restricting your search may be something that you want to do but be careful because restricting your search results can add bias to your understanding of the research precedent. There are many databases and tools available to perform literature reviews. A long list of databases has been curated by the SATH libraries and it can be found at the referenced link.[1] If you feel that your search skills are in need of improvement, then PubMed's Online Training resources may be of interest to you.[2] And if you feel that your critical appraisal skills are a bit rusty, then this list of critical appraisal skill building resources is available.[3] For most researchers, myself included, it is useful to start one's literature search with a database that specializes in clinical knowledge summaries and practice guidelines made from high-quality evidence, one example of this type of database is the National Institute for Health and Care Excellence (NICE) database. Once one has a strong base of knowledge for a subject, then they can more easily assess the quality of information found via searching a more general database, like Pubmed.

Given that you plan to publish something related to the research that you are appraising, you should take many notes as you look over the available literature. Your notes should include the "Five Ws and One H", i.e. your notes should be able to answers the questions: Who?, What?, Why?, When?, Where? and How? Knowing "Who" wrote it will make the citing their work easier when you do so in your manuscript later. Knowing the "What" and "Why" will help guide your literature review as well as your research project. Knowing the "When" and "Where" is important as a reminder of the socioeconomic variables of research. All research is performed in a particular context, this context should influence your interpretation of the results. If the population they studied is vastly different to your study population, the results may not apply to your study population. If two studies performed twenty years apart present conflicting conclusions, then it could be that the older study was conducted with less accurate equipment. Neither of these examples are meant to be interpreted as being true in every situation, on the contrary, these examples are only meant to serve as fuel for your own critical thinking skills as you evaluate the research precedent. Knowing the "How" is important because every research project will involve collecting, analyzing and presenting data, and if you know how everyone else has chosen to do this, then you can better plan how you will do it.

Say something worth listening to

A speaker should say something worth listening to. To be able to do this, the speaker should have a certain level of mastery over the subject that has been derived from both knowledge and experience and they must have something to say that provides value to the listener. In the context of our research conversation, having the requisite level of mastery comes from knowledge gained by performing a thorough literature review and having something of value to say rests on the experience gained by performing the actual research. To be able to say something that provides value to the listener, one must pursue a research question whose answer translates to some change that will bring about a real clinical value. It should also be noted that some questions only bring about a small clinical value and that these questions can still be worth investigating.

To assess whether a research question will provide a real clinical value, you can follow this algorithm of questions: Has this question been asked before? If it hasn't, then skip the next three questions. If it has, then did they find an answer? If they didn't, why not? Has anything changed that would allow you to find that answer now? If you found the answer to your question, what would change? Is this expected change enough to justify pursuing this research question right now? If so, then you've found your research question. If not, could the change be worth pursuing later? If so, what would have to happen for it to be worth pursuing later?

This algorithm's last two questions are important. All research is performed within a context and contexts can change. New technology is developed, laws change and our underlying assumptions of research expectations can be swayed. All of this means that a research question that may have been previously infeasible is now worth the effort. As such, it is important to go through the whole algorithm so that you know when a particular research question is worth revisiting later.

To reiterate, the merit of a research question cannot be determined simply by the question being currently unanswered or of the question being fancied by the researcher for one reason or another. To have merit, the question's answer must translate to some change that brings about clinical value.

Speak to your audience

When speaking, one should tailor their words to their audience. In the context of the research conversation, there are three levels of non-mutually exclusive audiences. The largest of these audiences is the general research population, these are the people that will find your manuscript in their own literature search as well as the people that are subscribed to the journal that has published your manuscript. The second group is smaller, it contains the researchers that are actively publishing on your topic. And the smallest group is the group of peer reviewers who will be evaluating your manuscript on behalf of your chosen journal. As far as getting published, it's this last group that is the most influential. While this is important to note, one would never tailor their words to just please the peer reviewers at the cost of value to the other groups, instead the goal is to tailor your words to all three groups and expect each group to know how to read your manuscript in the way that produces the most value for them. Now we haven't performed our research at this point so we can't write about it yet, but there is a "Step Zero" equivalent to this. As you perform your literature search, you'd be wise to keep track of what journals have published on your topic before and you'd be wiser still to notice what characteristics are similar and or different across similar articles associated with different journals and fields. This is because the more you can fit your research within the pattern established by others, the easier it becomes for your reader to accept the change that your research advocates. To be clear, there's a difference between structure and content and I'm advocating that you take note of the structure used by other researchers so that you can design your study in a manner that is consistent with their work. Note, being consistent with previous research is not meant to imply featuring the same limitations. If previous research included an inherent limitation, then you should structure your research to exclude this limitation.

Speaking with impact

To speak with impact, one must captivate their audience and they must not lose their audience as they lead them to the appropriate conclusion. As far as our "Step Zero", this is meant to imply that your chosen research question should be able to captivate an audience. If your research question can be summed up as "Group X proved Y in their research population X and we, Group Z, seek to prove Y in our research population Z.", then your research is unlikely to captivate anyone. That said, you could potentially have a captivating reason as to why the research needs to be repeated by your group even if the question itself was otherwise bland, but that'd be an exception to the rule. To state this differently: Not all art belongs in a gallery, some is just meant to be stuck to the fridge for a week. As the artist of your own research, you should aim to publish in the gallery, not on the fridge.

When research is not a conversation

There are important differences between our idea of the "research conversation" and a regular conversation. The most important difference is that the "research conversation" involves a speaker and listener that are disjointed in time. In a prototypical conversation, a listener can ask for clarification as needed. But in this "research conversation," the speaker is unable to fully clarify any perceived ambiguity. This fact has important consequences that will be elucidated in a subsequent article of this series.

Step Zero

I previously mentioned Step Zero and told you what it represents, what I did not tell you is what it is. Step Zero is the right question and what you learn by the process of developing it. The first question you think of for a given topic is unlikely to be the "right" question. That's not to say that it is the wrong question, it's just to say that having a process by which we develop our research question is more likely to generate an effective question. One method is to start with our first question and then make a list of related secondary questions. With this list, you can begin to look for a theme among the questions and restructure your primary question around that. Next, you'll assess how your question is phrased to see if it contains any unwarranted assumptions. If your question seems to imply a certain result or a certain reasoning for a result, then your question is probably a hypothesis in disguise and that makes it not a question. The right research question is open-ended, does not lead to a preconceived result, and it looks for causation, not association. The right research question's answer is unknown but it is expected to bring about a clinical value from its discovery. Another method to help formulate your right question is the PICO framework, as described by Richardson et al., in this method a question is created by identifying the Patient or Population of interest, the Intervention (i.e. the therapeutic or diagnostic procedure) being studied, the Comparator (i.e. the control) and the Outcome expected.[4] It should be noted that having an expected outcome does not count as an unwarranted assumption that could bias our understanding of our question, because it is understood by us to be

something that we have to verify, not something that is assumed to be true. Price and Christenson delineated some variants of the PICO framework: PICOS, where the S identifies the clinical Setting; PPICO, where the additional P represents the Pre-test probability when a test result is used to diagnose; PICOT, where the T stresses the significance of Time/Timing to the question; and PICCO, where the extra C represents the Change in practice that occurred in an outcome study.[5] Some types of studies are better addressed by particular question frameworks, but all frameworks will have limitations, and this is why you must remain cognizant of the limitations that a particular framework can impose upon your research. The ECLIPSE framework, by Wildridge & Bell, is well suited for questions that relate to health policy and management.[6] Here, a question is formulated with respect to the Expectation, Client group, Location, Impact, Professionals involved, and the Service. The PECODR framework, by Dawes et al, is suitable for questions meant for case control or cohort studies. PECODR stands for: Population, Exposure, Comparison, Outcome, Duration, and Results.[6]

Research questions that focus on qualitative factors may be best asked with the SPIDER framework.[7] SPIDER stands for: Sample, Phenomenon of Interest, study Design, Evaluation, and Research type.

Now that we've developed the right question, and have used it to perform a thorough literature review, we can begin to plan our research project with the formulation of our hypothesis. And this is where we'll continue in the next article of this series.

Key points

- Research is participation in a conversation with the scientific community

- Good research should bring about clinical value

- Research should share structure with similar publications that have preceded it

- Taking the time to formulate the right question helps one's research proceed smoothly

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