Tips and Tricks When Doing a Family Medicine Resident Research Project

Conducting research for your resident project can be rewarding and challenging. The following is intended to provide guidance and suggest resources to help with the research endeavor so you can competently complete your project with the time and resources you are prepared to expend. This guide is divided into 5 Steps:

Step 1: Select a topic, identify the research problem, and state a clear research question.
Step 2: Choose a research method.
Step 3: Find an appropriate supervisor.
Step 4: Write a research proposal.
Step 5: Ask the expert.

Step 1: Select a topic, identify the research problem, and state a clear research question.

Topic requirements are:

- It needs a strong relationship to family medicine
- You need to be curious/passionate about it
- It needs to address a gap in the research literature
- It needs to be doable within the allotted time and your skill set

Identifying your research problem/research question:
Selecting your research question can be one of the most agonizing and critical steps in developing a solid research study. It defines your whole process, from what background literature you need to read, guiding what method you should use, analysis required, and the findings to report in order to answer the question. Your question should be clear, focused, concise, complex and arguable. This will take time. Step away from your computer; consider what drew you to your topic. What about it animates and matters to you? Listen to yourself and start formulating your question by following your own interests. Remember, you will spend a lot of time researching and writing about the proposed project: if it does not interest you in the beginning, it will certainly become very difficult to write about in the end.

Next, extensively research your topic. What have experts published in peer reviewed journals? How have they framed their research? What gaps, contradictions, or concerns arise for you as you read, talk to people, and visit places? Would doing a local project using existing studies enhance knowledge? Consult the literature! If you aren't sure how to do this, consult a subject librarian: http://util.library.dal.ca/Subspecialists/ and/or a subject matter expert.

Formulating your Research Question

- Conduct a preliminary literature review of the topic area to help frame the research question
- The question needs to be specific and answerable within your time frame
- Is your question adding something new to what is already known? Is it addressing local relevance?
- Formulate two or three research objectives that will answer the question

Think, Consider and Estimate

- be sure of the feasibility of your study

Edit Your Writing

- choose your words carefully
- rewrite, rewrite, rewrite
- keep your sentences short

Too broad: *How are doctors addressing diabetes in Canada.?*

Appropriately Specific *What are common traits of those suffering from diabetes in Canada, and how can these commonalities be used to aid the medical community in prevention of the disease?*

The simple version of this question can be looked up online and answered in a few factual sentences; it leaves no room for analysis. The more complex version is written in two parts; it is thought provoking and requires both significant investigation and evaluation from the writer. As a general rule of thumb, if a quick Google search can answer a research question, it's likely not very effective.

Step 2: Choose a research method.

There are several methods to choose from for conducting research. They broadly group into qualitative studies, quantitative studies and evidence review. Mixed methods studies draw on both qualitative and quantitative methodologies because they are complementary.

Qualitative Research

- Qualitative research focuses on the interpretation of a situation, a set of behaviors, or a setting.
- Collects large amount of data from a small number of individuals, usually through interviews, analyzed to identify themes.
- Used to understand people's experiences in much greater depth than is possible with quantitative research.
- Qualitative data is analyzed using thematic techniques.
- Methodology examples include: ethnography, narrative, phenomenological, grounded theory and case studies.
- Examples include: interviewing patients to understand how they experience a disorder or health system approach, or interviewing health care providers to understand how they view a clinical tool or their experience of medical education, or describing a series of cases with a similar type of health issue.

Quantitative Research

- Quantitative research measures characteristics of a population or phenomenon of interest.
- Collects data from larger number of individuals through surveys or existing or prospectively collected data sets.
- Quantitative data is analyzed using statistical analyses with tests of statistical significance.
- Methodology examples include: population surveys to measure prevalence of a disorder or implementation of a clinical tool, observational studies using clinical or administrative data sets, or randomized controlled trials of the efficacy and safety of treatments.
- Examples include: Identifying correlates of suicide, evaluating measures to prevent suicide, or determining the benefit/risk of a medication to treat a disorder.

Step 3: Find an appropriate supervisor.

A supervisor should be interested in your project and available to guide you. If you are having trouble finding one, talk to your resident project site coordinator.

***Step 4: Write a research proposal. This will also be required for ethics REB approval*.**

A research proposal is a study plan that is to be followed in the course of a research study. It is important for you to understand your objectives, method, analysis plan, any budgetary requirements, as well as how prepared you are to do the work required and if you have the needed skills. From this you can identify where you will need assistance.

Research proposal sections:

1. One paragraph **introduction** to your research question/problem, why this is important to study, relevance to family medicine. A good first line of a research proposal begins: "The research objective of this proposal is…"

2. Write a **more in-depth introduction**. After you have identified a pertinent problem and framed a purpose statement, then you need to craft an introduction. Among other things, the introduction to the proposal will include:
    a. The problem statement
    b. A brief summary of the literature
    c. A brief description of any gaps in the literature
    d. A Purpose statement as to why you are proposing the study and why others should care about the subject matter of your research proposal.

3. **Background/literature review**. Frame your project around the work of others. Remember that research builds on the extant knowledge base, that is, upon the **peer reviewed published work of others**. Be sure to frame your project appropriately, acknowledging the current limits of knowledge and making clear your contribution to the extension of these limits. Be sure that you include references to the work of others. Also frame your study in terms of its broader impact to the field and to society. Ex. "If successful, the benefits of this research will be…"

4. **Methods**. Determine the Method of Investigation. The method section is the second of the two main parts of the research proposal. In good academic writing it is important to include a method section that outlines the procedures you will follow to complete your proposed study. Many scholars have written about the different types of research methods in articles and textbooks. It is a good idea to site the method and provide a reference. The method section generally includes sections on the following:
    a. Research design;
    b. Sample size and characteristics of the proposed sample;
    c. Data collection and data analysis procedures

5. **Determine the Research Design**
    a. The next step in good academic writing is to outline the research design of the research proposal. For each part of the design, it is highly advised that you describe two or three possible alternatives and then tell why you propose the particular design you chose. For instance, you might describe the differences between experimental, quasi-experimental, and non-experimental designs before you elaborate on why you propose a non-experimental design.
    b. Determine the Sample Size and the Characteristics of the Sample. There are several free online sample size calculators, though you will need a basic understand of statistics to know how to use and interpret them. Some sites include:

http://www.stat.ubc.ca/~rollin/stats/ssize/
http://www.raosoft.com/samplesize.html
http://homepage.stat.uiowa.edu/~rlenth/Power/

c. In this section of your research proposal, you will describe the sample size and the characteristics of the participants in the sample size. Describe how you determined how many people to include in the study and what attributes they have which make them uniquely suitable for the study.

6. **Determine the Data Collection and Data Analysis Procedures**
   a. In this section you will describe how you propose to collect your data e.g. through a questionnaire survey if you are performing a quantitative analysis or through one-on-one interviews if you are performing a qualitative or mixed methods study.
   b. After you collect the data, you also need to follow a scheme as how to analyze the data and report the results. In a quantitative study you might run the data through Mintab, Excel or better yet SPSS, and if you are proposing a qualitative study you might use a certain computer program like ATLAS.to to perform your analysis using a specific qualitative approach such as a narrative study, grounded theory study, or framework analysis, that exposes the main themes from the proposed interviews (see Tips and Tricks on Statistics).

7. **Software and analysis: There are several options for creating a database, cleaning your data and conducting your analysis.**
   Free analysis software is available through Dalhousie. Minitab and SPSS for quantitative analyses and NVivo is used for qualitative analyses. They are found here: https://software.library.dal.ca/index.php . User guides and tutorials can be found here: http://www.minitab.com/en-CA/training/ . Additionally, students familiar with conducting statistics in Excel can download the free add-on package to a windows suite. However, reviews demonstrate that Excel has many issues handling data correctly for analysis and is not as user-friendly as Minitab.

8. **Ethics.** You will need to address any ethical considerations and how they will be dealt with including confidentiality, data storage etc. If Research Ethics Board (REB) approval is required for your study, you should check the website for the relevant REB review. Each site has its own REB process.

Step 5: Ask the experts.

Review your proposal with your supervisor and resident project site coordinator. Depending on your research needs, you may also consult with the Research Methods Unit (RMU) at Dalhousie University. An initial consultation is free, although there may be a fee if further assistance is required. Early consultation can help you avoid costly mistakes.

Tips and Tricks when Applying to a Research Ethics Board (REB) for a Family Medicine Resident Project

- When collecting data for a resident (research) project involving human beings, an ethics review from a recognized **Research Ethics Board (REB)** is required**.**

- This application requires a proposal with a brief background, methods and data analysis section. In addition, the REB is particularly interested in the **consent process** regarding research participants. It is paramount that research participants are volunteers, who are fully aware to what they consenting.

- The Tri-Council - Canadian Institutes for Health Research (CIHR), Social Science and Humanities (SSHRC) and National Science and Engineering Research Council (NSERC) – has developed a joint research ethics policy. See this link for the entire policy:
  http://www.pre.ethics.gc.ca/pdf/eng/tcps2/TCPS_2_FINAL_Web.pdf

  The Tri-Council states:
  REBs shall consider whether information is identifiable or non- identifiable. Information is identifiable if it, alone or when combined with other available information, may reasonably be expected to identify an individual. The term "personal information" generally denotes identifiable information about an individual.

  However, there are some exceptions. The Tri-Council states:
  Research that relies exclusively on publicly available information does not require an REB review when: (a) the information is legally accessible to the public and appropriately protected by law; or (b) the information is publicly accessible and there is no reasonable expectation of privacy.

- Chart reviews, or chart audits, usually require REB approval when the resident is planning to discuss the results publicly (Resident Project Day).

- Many resident projects are considered "minimally invasive" and they may qualify for an "expedited review." An expedited review usually takes between 3 to 4 weeks, while a full review may take up to 2 months.

- After REB approval has been obtained, no changes to the research instruments or recruitment strategy can be made. If that is required, the REB needs to be informed.

- Each family medicine resident, who requires REB approval, needs to obtain it in the province, or hospital, of their residency.

- Here are some links for REB websites in various provinces that residents can access for a specific REB application information and forms (each institute has a different process).

  New Brunswick
  https://en.horizonnb.ca/home/research/research-ethics-board.aspx

  http://www.mta.ca/reb/Vitalite%20Guide%20Feb%202011%20English.pdf

  Prince Edward Island
  http://www.healthpei.ca/reb

Nova Scotia
https://www.cdha.nshealth.ca/discovery-innovation/ethics

https://www.dal.ca/dept/research-services/responsible-conduct-/research-ethics-.html

- Please consult with your **resident project site coordinator** regarding the need for an REB application and how to go about it.

Tips and Tricks When Doing Statistics
Family Medicine Resident Project

If you want to do a resident project that involves collecting data and requires statistical analysis, here are some tips of how you can go about that. Keep in mind that you are responsible for doing the work, and should be prepared to know how to collect data, enter data, run your own analysis and interpret your findings, though some resources are available to assist you.

ASSISTANCE RESOURCES:

BEFORE you start collecting data, find somebody you can discuss your plan and statistical needs with. It could be your project supervisor, your resident project site coordinator and/or somebody else who can help you who is experienced with statistics. Resident project site coordinators can help you find someone to assist you. Also, the Dalhousie University Research Methods Unit (see below) can be consulted. There will likely be a cost associated with receiving assistance, and these should be appropriately budgeted. Each resident has access to $50 towards their resident project. Additional funds would require an application with proposal and budget to your resident project site coordinator. Funding is at the discretion of the Department.

Dalhousie Research Methods Unit
If you need more sophisticated help you can consult with the Dalhousie Research Methods Unit http://www.cdha.nshealth.ca/discovery-innovation/research-methods-unit. The initial consultation with them is free.

Software Resources
Several software packages are available to assist with statistical analysis and they often have helpful tutorials. Here are some examples:

MINITAB
Minitab is likely the easiest solution to your statistical software needs. You can directly enter your data in Minitab or import from excel. This program is free of charge from the Dalhousie website; http://its.dal.ca/helpdesk/licences.html (not for MAC users). Minitab is useful for basic statistics, regression, ANOVA, reliability and survival analysis.

Here is a YouTube getting started video: http://www.youtube.com/watch?v=Ql88ytNBNgw
Or tutorials from Minitab: http://www.minitab.com/en-GB/training/tutorials/default.aspx

SPSS
Statistical Package for Social Sciences (SPSS) is a popular statistical analysis program that is fairly easy to learn with several resources available. All Dalhousie University faculty and learners can download SPSS programs. Resident project site coordinators can sometimes assist in finding access to a computer with SPSS.

Microsoft Excel
Microsoft Excel is included in most MS office suites and can be used to conduct some basic statistics and creates attractive charts and graphs. However, a quick Google search will provide concerns as the reliability of its statistical analysis accuracy, so use with caution. You can use Microsoft Excel sheets to enter data. These Excel sheets can be easily imported to the statistical package Minitab. In theory you can also import the Excel data sheet in SPSS but it has caused some problems in the past.

There are several videos and other supports found online.

Statistical Analysis Software (SAS)
If you require more advanced statistical techniques than the above options provide, you may want to use SAS or STATA, and unless you have advanced training and experience, you will likely need to hire assistance. It is recommended you consult with your supervisor, resident project site coordinator and/or the Research Methods Unit.

R
R is free software for statistical computing and graphics. It compiles and runs on a wide variety of platforms such as Windows and MacOS. You can download from http://www.r-project.org/

Tips and Tricks When Creating an Educational Tool
Family Medicine Resident Project

Before you start thinking about developing an educational tool, you need to consult the literature to find out the following:

- Does a tool already exist?
- Could you revise an existing tool?
- Could you adopt an existing tool to local conditions?

If no educational tool exists for what you want to do, go back to the literature. Remember, an educational tool's information has to be grounded in the scientific literature.

Also, if you select an educational tool as your resident project, it needs to be accompanied by a literature review paper. The purpose of this is that the reviewer can assess that the information in the educational tool is scientifically sound.

Once you have determined that you want to create your own educational tool, you need to consider the following:

- Who is your audience?
- What is the message you want to provide?
- What is the medium you want to use for the educational tool?
    - Paper, Internet, Video etc.
        - Do you have easy access to such mediums?
- What reading level should you aim for? (readability)
- Should the tool be interactive, passive?
- Consider the cost of an educational tool?
    - Do you need professionals to help with the design and what is the cost?
    - Are you going to distribute the tool and how many copies and what is the cost?

Also, you need to consider if you will test your tool on the target audience. Even a small pilot test may inform you about the readability and validity of the educational tool.

An educational tool should be

- Fun
- Visually compelling
- Use images
- Limit text
- Make your material easy to understand
- Create a "story" plot

Some references that may be of interest:

http://www.ncbi.nlm.nih.gov/pubmed/23044857

http://www.ncbi.nlm.nih.gov/pubmed/22720382

http://www.ncbi.nlm.nih.gov/pubmed/21070533

Tips and Tricks When Doing a Health Humanities Family Medicine Resident Project

This stream involves two main components:

1) **A paper:** including a Cover Page, Abstract, Introduction, Methods, Results and Discussion, Strength and Limitations, Conclusion
2) **The artistic piece**: included in the results section

The health humanities are a burgeoning stream of scholarship that involve areas connected to, but not limited to, the field of medicine. Your project may explore themes such as compassion, ethics or lived experience. It will involve the creation of an original piece of work, which may take the form of writing, audio, film, visual art, or music, for example. In the Introduction, you may choose to describe your inspiration for the project. This is optional.

EXAMPLES:

- Exploring the social determinants of health using photography
- Podcast about understanding patient values in diagnosis and recommending therapy
- The use of the visual arts to affect public health policy
- A multimedia project (e.g., video or blog) about women's health
- Create a musical composition based on prior published evidence for using therapy in the treatment of children with autism spectrum disorder
- The use of visual art in understanding the patient experience with mental illness, then creates a visual art piece reflecting their understanding.

These are just a few examples to launch your creativity.

For the methodology section, be sure to include the steps taken in creation of your final piece. If, for example, you are making a podcast, describe the steps involved in the production process (e.g., arranging interviews, construction of interview questions, recording technique, use of editing software). For music, the process of songwriting and what influenced your choice of musical style and lyrics could be explained. For a piece of visual art, you could explain the art-making process, your choice of media and colour and what they hope to portray by making these choices.

Sharing humanities projects publicly would be encouraged, whether as an art installation, publication in the Humanities section of a medical journal or live reading of a short story.

Your methodology section also needs to explain the rationale for your choice of medium of expression.

Ethics and Confidentiality. Humanities projects are not exempt from ethics review. If your scholarship involves human subjects, you must propose your project to the appropriate Research Ethics Board for your site.

As within clinical practice, protecting confidentiality is paramount. It is key when considering a humanities-related project. If writing a story based on an actual patient experience, for example, you would change the name, gender and clinical scenario so that the patient cannot be identified. If pursuing a photography-based project, capturing identifying images without an individual's consent is not permitted.

The following websites may help you learn more about the health humanities:

Art for the Sake of Medicine (an article by Dr. Sarah Fraser about why the health humanities are important) https://www.cfp.ca/content/64/10/760

Canadian Association of Health Humanities: https://www.cahh.ca/

Tips and Tricks When Doing a Literature Review
Family Medicine Resident Project

Literature reviews are used to systematically and critically evaluate available evidence as a basis for practice or further research. Examples include reviewing evidence for the effectiveness of a drug, the causes of a physical or mental health problem, or barriers and facilitators that patients experience in accessing health care. When doing a literature review project, you need to adhere to some conventions. Before you start you may find it helpful to consult with a university/hospital librarian or a subject matter expert on how best to access resources for the literature review.

1) Research question has to be relevant to family medicine.
2) Search for original primary papers (not reviews) published in peer-reviewed journals. If you include other types of evidence, provide a rationale. Obtain and review whole papers, not just abstracts.
3) Assess the strength of evidence of the studies you are reviewing, using an approach appropriate to the type of research question (see Basic Evidence Levels for Treatments).
4) Create a table to summarize your findings with respect to the research question and objectives (see Sample Table).
5) Do not repeat word for word in the text what you have in the tables: they should be complementary
6) Use the same outline as a regular scientific study.
    a. Introduction: why did you want to do this project
    b. Background: set up the research question by reviewing what has been published on the topic and explain the rationale for your review.
        i. Finish the section with a clear research question and 1-3 objectives designed to answer the question.
    c. Methods need to include the following:
        i. Search terms
        ii. Inclusion and exclusion criteria.
        iii. Citation databases searched - e.g. PubMed. List other sources if used.
        iv. Number of articles pulled and ultimately reviewed.
        vii. Method of analyzing the literature collected. Examples include narrative review pointing out findings, level of evidence and basic strengths and limitations for each study; or systematic review using formal procedures to categorize strength of evidence and certainty of conclusions (e.g. GRADE); or statistical meta-analyses of data obtained from published studies combined with formal assessment of strength of evidence and certainty of conclusions.
    a. In the discussion, describe the strengths and limitations of each article and synthesize the data in the context of published literature. Use subtitles to help the reader. Answer the objectives to answer the research question.
    b. In the conclusion pull it all together. No new information should be added. Draw conclusions and point out implications for practice and further research. Make an overall statement regarding strength of evidence and certainty of conclusions.
    c. Acknowledgments: supervisor and others that may have helped you.
    d. Use a standard bibliography format and do not mix bibliography styles.