Research Process, Steps and Timeline

The figure below provides a schematic overview of the research process. It gives an idea of the steps to take and the sequence in which these are to be taken. This illustration seems to imply a unidirectional process. In reality this process is not always this “clean”. At times you may feel like you have taken a step forward but two back; that is OK and to be expected. For example, after reviewing the literature you may conclude that the research project you had planned has already been done or that another researcher mentioned limitations you never thought about and now you need to “rethink” your project. You then take a couple of steps backwards and start the process again in a slightly different direction (i.e. using a different instrument, recruiting different subjects, etc.).

The end result of research, sharing your results with others (i.e. a research report, a publication, poster presentation), is also missing an arrow in the graph below; the arrow back to the theory. Research results either confirm a theory or contribute to evidence that a theory needs to be changed.

Figure 1. Steps in the Research Process

Each step of the research process consists of a variety of tasks which need to be completed. The table below gives an overview of these tasks. A table more specific to your residency (i.e. Emergency medicine, Family Medicine) can be found in the section on Research Requirements and Timelines by Specialty. Appendix 1 also provides a generic overview of steps in designing a clinical research project.

What you should plan on doing:

<table>
<thead>
<tr>
<th>START</th>
<th>NEXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Start thinking about your research question: generate a list of possible topics, find out what is of interests to you, what would you like to investigate further?</td>
<td>• Continue to keep up to date with relevant literature on your selected topic</td>
</tr>
<tr>
<td>• Preliminary literature review(s) on potential topic(s)</td>
<td>• Refine study design</td>
</tr>
<tr>
<td>• Find a faculty mentor (Very important)</td>
<td>• Funding resources</td>
</tr>
<tr>
<td>• Complete on-line course for protection of human and/or animal research participants as appropriate (<a href="http://phrp.nihtraining.com/users/login.php">http://phrp.nihtraining.com/users/login.php</a>)</td>
<td>• Have study reviewed by colleagues, other clinicians</td>
</tr>
<tr>
<td>• Narrow down your topic selection, prepare a 2-5 page project proposal (containing concise review of relevant literature and research methods) and submit this for approval.</td>
<td>• Apply for IRB approval (typically performed by resident with faculty mentor serving as the principal investigator)</td>
</tr>
<tr>
<td></td>
<td>• Begin study implementation, i.e. recruiting, data collection (allow at least 12 months from start of recruiting to article completion)</td>
</tr>
</tbody>
</table>
Table 1. Suggested Sequence of Tasks in the Residency Research Process.

<table>
<thead>
<tr>
<th>FINISH LINE</th>
<th>Submit Progress Report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Continue to keep up to date with relevant literature on selected topic</td>
</tr>
<tr>
<td></td>
<td>Continue study protocol/data collection</td>
</tr>
<tr>
<td></td>
<td>Data analyses</td>
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**Submit Finished Research Project**

- Poster presentations. All MWU OPTI residents are required to present their research findings at MWU’s Kenneth A. Suarez Research Day typically held in May
- Prepare manuscript for submission to journals and/or abstract for conference presentations
- Apply for publication/conference presentations.

**Topic Selection and Faculty Research Mentors**

You are probably very busy with learning how to effectively and efficiently care for patients. This includes becoming familiar with your responsibilities such as rounds, calls, medications, and interventions. You do not need to rush to start a literature search…. But you do need to start thinking of possible research projects.
How to Generate Ideas:

This really is one of the first steps in the development of your research project. Most clinicians can easily come up with good ideas about clinical research based on gaps in existing knowledge.

Where can you look for ideas? Below are some ways to develop your own ideas:

- Keep your eyes open for interesting clinical cases which may provide topics for research.
- Read journal articles on subjects of interest in various specialties; pay particular attention to author’s conclusions for areas needing further research.
- Keep a list/journal of all potential research ideas; keep refining the topics and ideas as your knowledge increases, talk to other clinicians about your ideas.
- Become familiar with the ongoing research at your institution; join a project and propose your own research as an offshoot of that project.
- Brainstorm with peers in your specific discipline to determine gaps in overall knowledge and understanding of that specialty.
- Look for the variation between the articulated standard of care or established practice guidelines and the day-to-day reality of clinical practice; why do variations exist? Is there an evidence-base for the preferred method?
- Did you read an article that interested you? Did you attend a presentation or workshop on a topic you would like to learn more about? Use this as a starting point to ask additional questions.
- Talk to your faculty mentor about it – ask questions about why things are done the way they are taught.

**Tip**

ALWAYS BE THINKING ABOUT POSSIBLE RESEARCH QUESTIONS!!!!
Once you have an idea, or hopefully several ideas, your next step is to perform a preliminary literature search/review on those topics. The section on Literature Review and Library Access in this manual provides you with more information as to the why’s and how’s of conducting a literature review as well as a guide for setting up a library account and gaining access to MWU’s library resources. Information on how to conduct literature searches will also be provided to you during your residency at a variety of workshops on using library resources.

Through the library at MWU you have access to many electronic databases, academic journals, books, etc. which are great resources. At this point in time you do not need to read every article you find nor do you need to print all the abstracts. This step is to familiarize yourself with what types of studies have been done, become aware of what is out there, and what has been done around your particular area of interest. Pay special attention to what the author’s point to as “gaps in existing knowledge” as this may provide you with a great starting point for your own study.

As you move through the process of refining, narrowing down, and redefining your research topic you should keep in mind the characteristics of a good research idea which are represented by the mnemonic FINER. Ask yourself if your topic fulfills these criteria. A checklist to help you determine if a research project is appropriate for you and if the project is feasible can be found in Appendix 2.

FINER

Feasible: Refers to logistics of the study.
- Adequate number of subjects
- Adequate technical expertise
- Affordable in time and money
- Manageable in scope

Interesting: Is this topic interesting to you? Does it intrigue you and will it keep your attention over the period of a couple of years?

Novel: would this confirm, or refute previous findings or extend previous findings and lead to new developments?

Ethical: Amenable to a study that the institutional review board will approve

Relevant: Is the topic relevant to scientific knowledge, to clinical and health policy, or to future research directions?

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Faculty Research Mentor Selection

Picking a faculty mentor, the right mentor for you, is a very important step in the completion of a successful research project and is one of the first steps in the research process. You will be working with numerous people. With some you will have a more direct relationship with. Is there anyone you get along with well? Is anyone currently involved in research, or was involved in research? Picking the right faculty mentor is an integral piece of a successful project, so it is a great idea to keep your eyes open.

Ideally, do a little research on your potential “mentors”. Look to see if they have any publications (how recent? what topics?). Speak with their co-workers or research partners in an attempt to assess them as a researcher – reliability and predictability come into play here as well. Fellows who worked under the clinician, former residents or medical students are all good resources for you to utilize when investigating your mentor.

This project will require a big commitment from both of you – time, energy, thought. Be sure your faculty mentor is someone with a dependable track record as well as someone with whom you could spend time. When you do decide on a mentor, approach them with your request in such a way that they do not feel obligated or trapped. If they have research experience, they will be familiar with the arduous task ahead. Be clear about your expectations and allow them to inform you of their expectations for you. Give them time to consider the idea, then follow-up with a phone call, email or personal visit.