2016 Department of Medicine Summer Program

How to Choose a Research Project

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Nephrology

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Nephrology
Outline

• Describe ACGME research requirement
• Define research
• Examine reasons for doing research
• Discuss types of research projects
• Delineate key factors in choosing a project
• Consider common pitfalls and solutions
• UIC resources
• Q & A panel
ACGME Common Program Requirements
Internal Medicine

IV.B. Residents’ Scholarly Activities

IV.B.1. The curriculum must advance residents’ knowledge of the basic principles of research, including how research is conducted, evaluated, explained to patients, and applied to patient care. (Core)

IV.B.2. Residents should participate in scholarly activity. (Core)

[As further specified by the Review Committee]

IV.B.3. The sponsoring institution and program should allocate adequate educational resources to facilitate resident involvement in scholarly activities. (Detail)
What is scholarly activity?

- No uniform definition
- Proposed framework of 4 domains

<table>
<thead>
<tr>
<th>Component of scholarship</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovery = advancing knowledge</td>
<td>Abstract, published paper</td>
</tr>
<tr>
<td>Integration = synthesizing knowledge</td>
<td>Case studies, education reports</td>
</tr>
<tr>
<td>Application = applying existing knowledge</td>
<td>Participation in guideline panels, national professional society groups</td>
</tr>
<tr>
<td>Teaching = disseminating current medical knowledge</td>
<td>Delivering a lecture, curriculum development</td>
</tr>
</tbody>
</table>

Grady et al, J Grad Med Ed, 2012
What is research?

• “the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions.”

• Includes the discovery and integration domains of scholarly activity
  – Abstract, published paper, case report, education report
Why do research?

• **Improve your skills as a physician**
  – Conducting proper searches of scientific literature
  – Developing and answering clinical questions
  – Critical appraisal of scientific evidence
  – Application of contemporary knowledge to clinical practice
  – Critical thinking skills

• **Important for your career**
  – Inform your career choices
  – Research during training associated with scholarly work thereafter (e.g., career in academic medicine)
  – Desirable for fellowship opportunities

• **Practical**
  – It’s a requirement!

• **Exploring something new….you just never know where it will lead 😊**

Sansone et al, Prim Care Compan 2015
Levine et al, J Gen Int Med, 2005
Hayward et al, JGIM, 1993
Why do research?

• “In the scientifically guided delivery of health care, physicians make observations, test hypotheses, and experiment with different treatments. In this new millennium, the missions of internal medicine....will be carried out by both physicians and researchers whose effectiveness will be determined by shared educational experiences.”

Why do research?

• Learning values of various educational activities according to former IM residents

Hayward et al, JGIM, 1993
Why do research?

- Learning values of various activities in improving their ability to critically read the medical literature according to former IM residents (Hayward et al, JGIM, 1993)
Categories of Medical Research

• Basic
  – focuses on cellular, molecular and physiological mechanisms underpinning human disease

• Clinical
  – Involves patients and focuses on screening, diagnosis, prevention, treatment, and broad epidemiology of disease

• Translational
  – iterative feedback loop between basic and clinical research to accelerate knowledge translation from the bedside to the bench, and then back again
## Types of Research Projects

<table>
<thead>
<tr>
<th>Type</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature Review</td>
<td>minimal IRB</td>
<td>high level of skill required to write one, some topics endless to review</td>
</tr>
<tr>
<td>Case Report/Series</td>
<td>1st author, easy to draft, no/minimal IRB</td>
<td>hard to publish, less scholastically robust</td>
</tr>
<tr>
<td>Original Research</td>
<td>academic prestige, may use existing data</td>
<td>Most complex, most IRB</td>
</tr>
<tr>
<td>Obs. (Observational)</td>
<td></td>
<td>Weaker evidence</td>
</tr>
<tr>
<td>Exp. (Experimental)</td>
<td>strongest evidence</td>
<td>Complex, substantial time required</td>
</tr>
</tbody>
</table>

Each individual must weigh the advantages and disadvantages!
What seems to be popular?

FIGURE 1. Median response and interquartile range, percent of internal medicine residents involved in various scholarly activities during the years 1998 through 2001. *P<.05, Wilcoxon ranksum test for comparison of university versus nonuniversity programs.

Levine et al, J Gen Int Med, 2005
Considerations in choosing a research project

- Recognize the steps, elements, and timeline required to complete a project

<table>
<thead>
<tr>
<th>Table 1</th>
<th>The Three Phases of Resident Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>−12 months</td>
<td>1-2 month(s) (The research elective)</td>
</tr>
<tr>
<td><strong>Preparatory phase</strong></td>
<td><strong>Investigatory Phase</strong></td>
</tr>
<tr>
<td>Selecting a topic and formulating a question</td>
<td>Creating a database</td>
</tr>
<tr>
<td>Finding a mentor</td>
<td>Data collection</td>
</tr>
<tr>
<td>Utilizing existing institutional resources</td>
<td>Storage and management of data</td>
</tr>
<tr>
<td>Study design and statistical consultation</td>
<td>Institutional review board submission</td>
</tr>
<tr>
<td>Institutional review board submission</td>
<td></td>
</tr>
</tbody>
</table>

Choose a topic
- Draw from your own questions encountered during patient care.
- Discuss your ideas with as many people as possible.

Formulate a specific question
- Define the population, intervention, and outcome.

Find a mentor (or two)
- Discuss research, personal, and professional interests with your mentor(s).
- If you don’t “click” with someone, look for another mentor.

Identify existing institutional resources
- Consult with experts in your area of interest.
- Look for existing databases to help answer the question.

Detail the study design
- Think through each and every step of data collection.
- Anticipate what problems may arise.
- Create a database.

Complete the institutional review board (IRB) paperwork
- Call the IRB directly for questions related to category of review.
- Make sure your study is HIPAA compliant.
- Determine whether informed consent is necessary (ask the IRB).

Consult with a statistician
- Clarify what a clinically significant finding would be.
- Perform a power calculation.
- Determine the statistical tools you will need after data collection.
Preparatory phase – formulating the question

**Table 3** Elements of an Appropriate Clinical Research Question

- Relevant to clinical practice.
- Focused.
- Utilizes available institutional resources.
- Involves a well defined study population.
- Includes a well defined outcome.
- Takes career strategy and interests into account.
- Invokes curiosity in others.
Preparatory phase – parts of the proposal

Table 5  Elements of a Research Proposal

<table>
<thead>
<tr>
<th>Background (1-2 paragraphs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis (1 sentence)</td>
</tr>
<tr>
<td>Specific aim (1-3 sentences)</td>
</tr>
<tr>
<td>Methods (2-4 paragraphs)</td>
</tr>
<tr>
<td>Anticipated results (1 paragraph)</td>
</tr>
<tr>
<td>Timeline (1-2 sentences)</td>
</tr>
<tr>
<td>Mentor signature of approval</td>
</tr>
</tbody>
</table>

Preparatory phase – what’s needed?

- Skills that you will need.....

Table 1. Frequency with Which Residents Rated the Following Skills as Important or Very Important for Completion of Their Research Project and How Well They Believe These Skills Are Taught at Their Residency Programs*

<table>
<thead>
<tr>
<th></th>
<th>Importance, † %</th>
<th>Thoroughly Taught, ‡ %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature searching</td>
<td>96</td>
<td>38</td>
</tr>
<tr>
<td>Abstract preparation</td>
<td>93</td>
<td>13</td>
</tr>
<tr>
<td>Critical appraisal</td>
<td>80</td>
<td>35</td>
</tr>
<tr>
<td>Medical writing</td>
<td>79</td>
<td>3</td>
</tr>
<tr>
<td>Data analysis</td>
<td>73</td>
<td>13</td>
</tr>
<tr>
<td>Research design</td>
<td>69</td>
<td>19</td>
</tr>
</tbody>
</table>

*There were no statistically significant differences in responses between residents who presented research abstracts and those who presented clinical vignettes.

†Five-point Likert scale: 1 = very important, 2 = important, 3 = neutral, 4 = not important, 5 = not very important.

‡Three-point Likert scale: 1 = not taught, 2 = taught somewhat, 3 = thoroughly taught.
Preparatory phase – what’s needed?

Resources that you will need….and why

- Protected time
- Available faculty mentors
- Adjunctive personnel (e.g., statistician/methodologist, research assistants)
- Institutional resources
- No time, no way
- Refining ideas, translation of idea into actionable format, writing proposal
- IRB, study design, data collection, data analysis
- Available patient population, lab space

Sansone et al, Prim Care Compan 2015
Challenges from the perspective of program directors

**Table 1. Barriers to Resident Research According to Program Directors of 271 Internal Medicine Training Programs, in Decreasing Order of Citation:**

- Lack of resident time
- Lack of resident interest
- Lack of money
- Lack of teaching program or materials
- Lack of faculty time
- Lack of computers or software
- Lack of faculty role models and mentors
- Lack of faculty interest
- Lack of a research director
- Lack of research consultants
Challenges from the perspective of residents

• 123 IM residents surveyed in 1998
  – 28% published
    • Level of residency and prior research experience were important predictors of success
  – 57% of projects remained incomplete or were abandoned
  – Why?
    • lack of time (68%)
    • lack of interest (31%)
    • faculty’s lack of interest (20%)

Gill et al, Acad Med 2001
Challenges from the perspectives of residents

- 138 IM residents surveyed in 2002

Responses to 5-point Likert scales were dichotomized and analyzed as proportions. Data were categorized by abstract type, research abstract versus clinical vignette, for bivariate analysis. \( t \) tests, \( \chi^2 \), and Wilcoxon rank sum tests were used to compare the categories. Data were analyzed using Stata 8.0 (Stata Corporation, College Station, TX).

**RESULTS**

Surveys were returned by 73 of the 138 participants (53%). Fifty-three percent of respondents exhibited a clinical vignette and 47% presented original research abstracts. Two thirds of respondents (66%) were postgraduate year (PGY) 2 or 3 residents when the project was initiated and 69% had participated in research prior to residency. One fifth of respondents (21%) expected to have careers as clinician-investigators. There were no significant differences in response rates, past research experience, or fellowship and career plans between residents who presented research abstracts and those who presented clinical vignettes (all \( P > 0.05 \)). Residents who presented research abstracts were more likely to respond that their research experience had positively influenced their desire to pursue a research career (56% vs 33%; \( P = 0.05 \)).

**Resident Involvement in Their Scholarly Project**

The top reasons that residents worked on their scholarly projects were intellectual curiosity (73%), career development (60%), and to fulfill a mandatory research or scholarly activity requirement (32%). More than half of residents (59%) were responsible for initiating their project. Residents who completed clinical vignettes were more likely to initiate the project on their own than those who had presented a research abstract (78% vs 28%; \( P < 0.001 \)). While 77% of residents worked with a mentor, those who presented clinical vignettes were less likely to have a mentor than those conducting research (64% vs 91%; \( P = 0.006 \)). Residents who performed research were more satisfied overall with their mentor compared to those presenting clinical vignettes (94% vs 72%; \( P = 0.03 \)). Most residents planned to write up their project as a manuscript for publication (68%), and expected to be first author (69%).

Residents performing original research spent more total time (median, 200 vs 50 hours), elective time (median, 24 vs 0 hours), and personal time (median, 65 vs 35 hours) than those presenting clinical vignettes (all \( P < 0.001 \) by Wilcoxon rank sum test). Most residents (54%) did not have funding for their project.

Residents commented on barriers to completing their scholarly project. The most common barriers cited by residents were the lack of time (79%), lack of research skills (45%), and the lack of a research curriculum (44%) (Fig. 1). There were no significant differences in responses between the residents presenting the two types of scholarly projects.

**Residency Program Support of Scholarly Activity**

Most residents agreed or strongly agreed that their residency program is very supportive of resident research (68%), with no difference between abstract type (\( P > 0.05 \)). Sixty-eight percent reported that their residency program had a mandatory research requirement. Thirty-four percent reported that their program has a curriculum for teaching research skills. Although most residents rated highly the importance of various research skills for the successful completion of their project, only 19% to 38% felt these skills are thoroughly taught at their residency program (Table 1). Fifty-one percent reported that their institution has a...
Pitfalls and Ways to deal with them

Pitfall

• I’m overwhelmed and don’t know where to start

• I have no clue about study designs

Solution

Think of questions based on your clinical experience and review of specific topics

Speak to colleagues (other residents) about what worked for them

No worries…there are folks to help you with design. Focus on formulating a good question….this will inform the study design

Make use of things learned in journal club!

Macfarlane et al, Austr Psych, 2015
# Pitfalls and Ways to deal with them

<table>
<thead>
<tr>
<th>Pitfall</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too many interruptions by other duties</td>
<td>Request uninterrupted research block</td>
</tr>
<tr>
<td>Project too complicated</td>
<td>Target something challenging but not beyond your ability</td>
</tr>
<tr>
<td>Project requires too many resources</td>
<td>Choose projects that do not need new funding</td>
</tr>
<tr>
<td>Too many investigators</td>
<td>Keep the investigators few and roles clear</td>
</tr>
<tr>
<td>IRB delays</td>
<td>Try to use a project already approved or one that can be exempt or expedited</td>
</tr>
</tbody>
</table>

Sansone et al, Prim Care Compan 2015
Advice from other residents

When residents were asked to give advice to interns about selecting and completing a scholarly project during residency, the following themes emerged:

1) start early
2) set aside adequate time
3) adhere to a timeline
4) work with a strong mentor
5) choose a research topic that genuinely interests you
6) keep the project simple yet innovative

Rivera et al, J Gen Int Med, 2005
Closing points

• Establish clear goals and expectations for yourself
• Determine what interests YOU
• Establish a doable project and also one that is worth doing
• Carefully choose a mentor
• Balance your ideas and your independence with those of others
• Recognize that it really does take a village
• Be open to learning, correction, and even failures
Potential Ways to Think of Research During your Training

R1 year: Begin gathering ideas for research project and methodology; consider potential mentors; consider scheduling research rotation during the R2 year or early R3 year.

R2 year: Narrow down the idea list; contact potential faculty mentor to discuss project and arrange supervision; develop the proposal with mentor and submit to the Research Committee; compile data.

R3 year: Complete data gathering and analysis; write up findings in consultation with mentor; submit research abstract to scientific meeting; submit report to Research Committee which reviews the report and notifies resident of successful satisfaction of research requirement; submit full manuscript for peer-journal review.
Institutional Resources to Help Get Started

• Department of Medicine Drupal “Craig’s List” Tool
• UICollaboratory
• CCTS Consults
• College of Medicine Scholarly Activity Incentive
### Scholarly Activities and Opportunities

<table>
<thead>
<tr>
<th>Minimum Training</th>
<th>Type</th>
<th>Title</th>
<th>Division</th>
<th>Site</th>
<th>Stipend</th>
<th>Post date</th>
<th>End date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>Research - Clinical</td>
<td>NICU Project Studying Patient/Provider Communication</td>
<td>Academic Internal Medicine &amp; Geriatrics</td>
<td>UI Health</td>
<td>No</td>
<td>07.13.2016</td>
<td>07.23.2017</td>
</tr>
<tr>
<td>Student</td>
<td>Research - Clinical</td>
<td>Point of Care (Ultrasound)</td>
<td>Academic Internal Medicine &amp; Geriatrics</td>
<td>UI Health</td>
<td>No</td>
<td>07.08.2016</td>
<td>07.18.2017</td>
</tr>
<tr>
<td>Student</td>
<td>Research - Clinical</td>
<td>Clinical Research in Endocrinology</td>
<td>Endocrinology, Diabetes &amp; Metabolism</td>
<td>UIC</td>
<td>No</td>
<td>06.13.2016</td>
<td>06.30.2017</td>
</tr>
<tr>
<td>Student</td>
<td>Research - Basic Science</td>
<td>Racial Disparities Research in Colorectal Cancer</td>
<td>Gastroenterology and Hepatology</td>
<td>UIC</td>
<td>No</td>
<td>06.14.2016</td>
<td>06.30.2017</td>
</tr>
<tr>
<td>Student</td>
<td>Research - Clinical</td>
<td>An educational intervention to improve patients' communication with their physicians.</td>
<td>Academic Internal Medicine &amp; Geriatrics</td>
<td>Jesse Brown, VA</td>
<td>Yes</td>
<td>06.03.2016</td>
<td>06.30.2017</td>
</tr>
<tr>
<td>Student</td>
<td>Research - Translational</td>
<td>Host-microbiome interactions with immune-mediated diseases</td>
<td>Pulmonary, Critical Care, Sleep &amp; Allergy</td>
<td>CDM, UIC</td>
<td>No</td>
<td>06.03.2016</td>
<td>06.30.2017</td>
</tr>
</tbody>
</table>

[http://dom-drupal.med.uic.edu/drupal](http://dom-drupal.med.uic.edu/drupal)
Cardiac Imaging and Heart Failure

Description: Database analysis, Cardiac Imaging and Heart Failure

Note: medical students, residents and fellows are welcome to inquire about the position posting.

Host-microbiome interactions with immune-mediated diseases

Description: Host-microbiome interactions with immune-mediated diseases

Minimum training: Student
Type of Activity: Research - Translational
Posting start date: 2016-06-03
Posting expiration date: Fri, 06/30/2017 - 07:00
Site: COM, UIC
Stipend: No
Contact name: Patricia W Finn
Contact email: pwfinn@uic.edu
Contact phone number: 312-996-7700
Medicine Division: Pulmonary, Critical Care, Sleep & Allergy
• Online research information management tool managed by CCTS and Elsevier

• Faculty profile built from:
  • Basic demographic information collected from university HR resource database
    – College/department affiliations
    – Scopus publications and NIH funded grant information

https://uic.pure.elsevier.com/
How can UICollaboratory Help?

• Consolidate research information on one platform

• Identify collaborators for funding opportunities and research projects

• Find a potential mentor and supervisors

• Study faculty/researcher’s expertise

• Track list of publications, grants and other researchers’ scholarly work and “mentions”
Welcome to UICollaboratory Research Profiles

Explore profiles, expertise and research at UICollaboratory Research.

Profiles  Colleges and Programs  Grants  Research Output  Activities  Clippings

3383  107  1039  2997  80  3

https://uic.pure.elsevier.com/
UICollaboratory: Search
UIC Center for Clinical and Translational Science (CCTS) Service Cores

http://www.ccts.uic.edu/content/ccts-research-service-cores
UIC Center for Clinical and Translational Science (CCTS)
Service Cores

THE DESIGN & ANALYSIS CORE

The CCTS’s Design and Analysis Core provides consultative services to clinical-translational investigators in the conceptualization, design, conduct, and analysis of their research studies.

The Design and Analysis Core provides campus researchers with expanded access to faculty and service personnel with a range of expertise in design and analysis methods and tools. We support the professional development of analytics specialists across campus to increase the availability of quality design and analytic services and to engage quantitative faculty in developing new methodologies for clinical and translational research.

In addition to consultative services, the Design and Analysis Core also encourages the development of collaborative research arrangements between investigators and our team of biostatisticians. Through such collaborations, we hope to contribute substantially to translational research inquiries and the development of novel methodologies.

The Design and Analysis Core is operated in partnership with the University of Illinois Cancer Center.

Learn more about The Design & Analysis Core's featured resource REDcap
College of Medicine Resident Scholarly Activity Incentive Program

• Incentive program for work published in peer-reviewed journals with impact factors during their residency training.

• Rewards determined by the Impact Factor of the journal and # of authors:

• Monetary Reward =

  \[(\text{Impact Factor} \times (\$500)) / \text{Number of Authors}\]