

# Chapter 8

## Mentorship for Research Success



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### Introduction

There are increasing challenges to building a productive and successful career in academic medicine in the modern era, including increasing clinical and administrative demands and a progressively more competitive funding environment [1–6]. It has become nearly impossible to navigate the academic maze in a confident and efficient manner without support, guidance, encouragement, and mentorship. A dynamic mentee/mentor relationship is therefore critical to the growth and development of future clinician-scientists. With regard to research mentorship, the mentee/mentor team must actively pursue the immediate requirements for research progress, funding, and academic advancement while simultaneously anticipating the long-term requirements for academic independence, longevity, research program building, and national recognition. This chapter outlines the lessons and pearls learned from a productive and successful research mentee/mentor relationship, with a focus on clinical research. While there is no “standard of care” or algorithm that suits all mentee/mentor relationships, we will address certain behaviors, attitudes, and milestones that seem to promote research success (Fig. 8.1).

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**Fig. 8.1** Characteristics and drivers of a successful clinician researcher

## Research Mentorship

Many of the other chapters in this book are devoted to general mentorship and outline the key qualities and goals of both the mentee and mentor. All of these attributes hold true for research mentorship as well; however, research mentorship requires firsthand knowledge of the pitfalls and obstacles associated with developing a niche, acquiring necessary research skills, cultivating collaborations, achieving independent funding, and climbing the academic ladder. A research mentor should help their mentee make challenging decisions and avoid situations that may impede their success and advancement [7–13]. Research mentorship is an active process that should encompass all aspects of mentee development delineated below; while mentorship must be viewed as a selfless endeavor, the mentor often gains substantially from the mentor/mentee relationship.

## **Specific Considerations for Research Mentorship**

### ***Development of Interdisciplinary Research Skills***

It is important to determine early in an academic career which type of research the investigator is interested in pursuing. Once this is determined, a mentor should help their mentee determine the necessary skills and/or training to be productive and successful in today's competitive research environment. If the mentee is deficient in a given skill set, formal classes or even an additional degree is often required. This takes significant foresight and planning, as additional coursework often needs to be balanced with a busy clinical schedule and administrative responsibilities. An additional degree often requires 1–3 years of intense training and protected time, a commitment from the department, and often even requires funding. The mentor will not only need to guide the mentee in class or degree selection and funding targets but also how to negotiate dedicated time and clinical responsibilities with their department administrator. If all of these things are not considered in advance and simultaneously, the mentee is unlikely to obtain the resources and support necessary for success.

Once a course, training path, or degree is chosen, it is important that the mentee identifies someone who can guide them in course selection and time management during their coursework or other didactic training. If the mentor is not able to provide firsthand knowledge and advice for the mentee's formal coursework, it is important to seek an additional mentor who can provide this direct guidance. During every aspect of surgical and academic career development, it is paramount that all time management, study, and research is done in the most efficient and productive fashion possible. Formal coursework, specifically, can often harbor significant busy work, which can conflict with, and even be detrimental to, a busy clinician's career trajectory. Identifying an individual who can guide the mentee in the most efficient path will increase the likelihood of success. The mentee should further be advised to capitalize on any specialty-specific sources of secondary data (such as registries or claims data or existing parent studies) so that coursework or homework might become specialty-specific research investigations, allowing the mentee to simultaneously grow their skill set and their CV. Funding mechanisms for career development will be discussed later in this chapter.

### ***Manuscript Writing***

Publication in peer-reviewed journals is essential for the promotion and success of the clinician-scientist. Not only does it disseminate research findings to the surgical community, but it also demonstrates the investigator's ability to conduct and complete research investigations and propagate knowledge. It is a requirement for every aspect of career development, including promotion within the department, acquiring

external funding, and developing recognition within the field. Topic selection and publication, like every other aspect of a successful researcher's career, deserve careful consideration and planning. For the junior investigator, first-authored publications are paramount: these demonstrate to the scientific community that the investigator has the ability to conduct sound research and the perseverance to conquer the peer-review process.

The mentor should help their mentee develop a portfolio of research endeavors that will allow them to always have a handful of manuscripts to write. They should always balance longitudinal projects that require data collection against "low-hanging fruit" like registry analyses that allow for quicker turnover. The latter allows the investigator to hone their writing skills and develop an efficient manuscript writing framework while often simultaneously providing preliminary data for larger, fundable investigations. The mentee/mentor pair should also evaluate all clinical investigations for their appropriateness for abstract submission to specialty-specific conferences.

The time from study initiation to publication in a peer-reviewed journal can be quite lengthy and discouraging. The mentor is also critical in helping the mentee navigate this process. From appropriate journal selection to timely and adequately responding to reviewer and editor comments, the process requires persistence and determination. Guidance and encouragement from the mentor can make this task less daunting and more routine. As the investigator progresses and develops their own area of expertise, it will be important for them to start publishing senior author manuscripts. The transition to independence is discussed later in this chapter.

Other important publication-related endeavors include peer-review and editorial positions for scientific journals. This is important for many reasons, including: (1) it is a method to contribute to the scientific community, (2) it keeps the investigator abreast of the latest scientific methods and discovery within the field, and (3) one of the best ways to learn how to write papers is to read and review many. However, these need to be considered and selected carefully, as there are significant time commitments that could theoretically derail other pertinent academic milestones. The young investigator should seek guidance from their mentor to determine which time commitments are most beneficial to the advancement of their career. The same holds true for book chapters (such as this one) and invited reviews. These endeavors require a significant time investment and should not be embarked on without great scrutiny and consideration. In general, they should be reserved for high impact or visible publications and should be done in conjunction with a trainee who would benefit from the experience and effort.

### ***Local, National, and International Societies: Exposure***

Local, national, and international involvement and recognition are vital to promotion, development of collaborations, and success in academic medicine. The mentor should help the mentee determine which local, national, and international societies to

join and which meetings to submit abstracts to and attend. Additionally, academic clinicians should seek thoughtful and strategic mechanisms to become involved in their specialty-specific communities, and this often translates to joining society committees. It is sometimes challenging as a junior investigator to get involved and get a spot on these committees, so mentor nomination and sponsorship are often required.

In addition to administrative activities within societies, poster and oral presentation at scientific meetings is an additional way to gain recognition. Abstract submission is the gateway to presentation at research conferences. Both mentor and mentee should determine which annual meetings are pertinent and place those meetings and their general abstract submission deadlines on their annual calendar. In addition, the time needed to conduct a study and prepare and submit an abstract should be carefully considered to ensure adequate time prior to deadlines. If selected, the mentee and mentor team should work closely to ensure that any poster or oral talk is polished and perfected. Delivering an engaging and professional oral presentation may lead to other invited talks and opportunities. They should also work to ensure that a study, if it was important enough for a conference, is efficiently published in a peer-reviewed journal; a reasonable mentor/mentee agreement might be that the mentee only attends the conference if the first draft of the manuscript has been completed (or if there are compelling reasons to delay manuscript submission).

## ***Funding***

Funding, via grants, scholarships, or fellowships, is a fundamental requirement for academic clinicians. Funding is the principal means by which clinician-scientists pay for career development activities, hire research staff, and fund all research-related endeavors. An academic clinician must be creative and proficient in securing funding from multiple resources, including and especially the NIH. This process should be started early in a clinician-scientist's career, as successful attainment of funding increases the likelihood of future funding [14–17].

The NIH has funding mechanisms for all stages of career development and independent research (Fig. 8.2) [18]. The earlier a clinician enters onto this path, the more likely they are to be able to successfully navigate it. The mentor should map out a 5- and 10-year plan with their mentee that includes funding mechanisms and application deadlines. As junior faculty, in addition to NIH K type grants for career development, there are numerous society-based and institutional grants that fund both preliminary research and additional coursework and training. This can be instrumental in helping an early investigator jump-start their research and develop preliminary data for subsequent NIH Career Development Awards. There is typically a 1–2 year turnaround time for NIH funding, so it is imperative that investigators continue to develop their projects and gather preliminary data and that mentors support these efforts with available mentor resources, in case resubmission is required (and also to keep the important research moving forward). Additionally,



once funding is secured, it is critical that the investigator starts to think about the next level of funding and how their current research provides preliminary data and supports subsequent grant application. For example, an investigator may obtain a K award for career development to obtain skills and conduct research on one specific area of medicine. They can then use the results of their K-related investigation to develop a larger-scale investigation that capitalizes and builds on that knowledge base. An investigator should start thinking about making the notoriously challenging K to R transition around 2–3 years into their K funding so that they are ready to submit their R application well before completion of their K award.

Even after an investigator has obtained R-level funding, they must continually reevaluate their area of investigation and focus and constantly look for ways to obtain additional funding and enhance their research. As each specific field evolves, changes in the work-up, management, or treatment of a given disease process can provide areas of academic exploration for new grants or grant renewals. Investigators at this stage should also consider a K24 award; this unique award provides protected time and support for an established investigator to mentor more junior clinical investigators. Throughout the entire funding life cycle, guidance and mentorship are necessary to progress to the next step. Numerous studies have pointed out the extreme difficulty in securing NIH-level funding as a junior investigator, despite appropriate training, and mentorship is paramount to overcoming these challenges [14–17, 19].

## ***Collaboration***

As the young investigator matures, it is important that they forge collaborative and multidisciplinary relationships, both within and outside their departments and institutions. These relationships will certainly enrich areas of investigation that are outside of the scope of the investigator's background and training. They will also enhance the possible extent of research that an individual can perform. At major academic institutions, there are often many local experts looking for opportunities to collaborate and create a scientific network. Finally, these sort of relationships and collaborations are vital for growing a network of colleagues to conduct sound scientific research. When applying for funding, most governmental and other funding agencies will favor multidisciplinary collaborators that are experts in any area of investigation proposed in the research project.

## ***Transition to Independence***

Transitioning from a mentored investigator to an independent investigator is often one of the most difficult phases in a young investigators career, not just in funding but also in scientific growth. An investigator needs to gain the appropriate skills

necessary to conduct independent research, perform and publish quality-mentored research, identify collaborators, generate preliminary data, and secure funding. However, accomplishment of the above milestones alone is not sufficient to transition to independence. During the above processes, the mentee needs to carve out an area of investigation that is uniquely different than their mentors and collaborators. In a saturated scientific field, this can often be challenging. Very early in a young investigator's career, it is important that the mentor help the mentee develop focus and begin to build a devoted area of investigation distinct from that of the mentor. This process can take years; however it is imperative that the mentee/mentor pair discuss this early and keep their intended niche actively in their mind throughout the development. As appropriate, it is important for the mentor to gradually increase the responsibility of the mentee and allow them to become the principal investigator for a specific area of research. The success or failure of this process will set the tone for the mentee's future ability to mentor future investigators through the same process.

## **Top 10 Pearls for the Mentee/Mentor Team**

Research success can be defined in many ways, but regardless of the final definition, it is something that can be very challenging to obtain. It takes perseverance, diligence, institutional support, foresight, and careful planning. There are many obstacles and distractions that can hinder success. Here are 10 pieces of advice that we have learned along the way while traversing many of these obstacles:

1. Identify a mentor early on. Seek someone with a good track record for successfully mentoring clinician-scientists.
2. Map out your 5- and 10-year plan in a detailed fashion. Make sure it accounts for research and clinical responsibilities, plans for funding, career development, and promotion. Review and revise it every 3–6 months. Be flexible, as unanticipated things often happen.
3. If you are truly dedicated to research success, make sure you negotiate for substantial protected research time. While time alone won't be sufficient enough to guarantee success, it will be nearly impossible to achieve success without it.
4. Avoid activities that are time sinks with little academic reward. Think very carefully about sitting on committees, taking administrative roles, doing book chapters, etc. These often require significant time commitments which detract from pursuing the academic endeavors that are necessary for promotion and academic advancement.
5. Continually evaluate your research portfolio to ensure that you are always being as productive and prolific as possible. This includes both low-hanging fruit or short-term investigations and longer-term, longitudinal projects that involve data collection. The latter can progress in the background while the investigator is honing their investigation and manuscript writing skills with higher turnover projects.



6. Be creative about funding mechanisms. There are a multitude of funding sources in addition to the NIH, including institutional grants, societal grants, and company-sponsored trials. In addition, apply early and repeatedly. For every grant you get, you need to submit multiple (our personal track records indicate three to eight unsuccessful grants per successful one). Be persistent and resilient. Reach out to program officers and review committees after grant review to find out how your grants and studies can be revised and improved to increase the likelihood of success.
7. Be efficient in every aspect of life. Often evaluate which of your responsibilities can be safely delegated to another individual: think about the likelihood that individual will not accomplish the task and the repercussions of the task being done poorly (or not at all).
8. Develop a multidisciplinary network of collaborators that you trust and work well with. Be patient as these relationships take years to build.
9. Be strategic about gaining visibility within the scientific community, including becoming an active and contributory mentor in specialty-specific communities.
10. If you are missing a necessary skill set and do not have collaborators who can provide this skill set at an expert level, seek out additional training and career development.

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