Fundamental Principles of Writing a Successful Grant Proposal

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It is important for the field of hand surgery to develop a new generation of surgeon-scientists who can produce high-impact studies to raise the profile of this specialty. To this end, organizations such as the American Society for Surgery of the Hand have initiated programs to promote multicenter clinical research that can be competitive for fiscal support from the National Institutes of Health and other funding agencies. Crafting a well-structured grant proposal is critical to securing adequate funding to investigate the many clinical and basic science questions in hand surgery. In this article, we present the key elements of a successful grant proposal to help potential applicants to navigate the complex pathways in the grant application process. *(J Hand Surg 2008;33A:566–572. Copyright © 2008 by the American Society for Surgery of the Hand.)*

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To the majority of hand surgeons and to many in the research field, grant writing is a stressful and arduous process. It has been stated that writing a grant is much harder than actually doing the proposed research.[1] But today, with funding becoming increasingly difficult to obtain, grant-writing skills are more important than ever. The National Institutes of Health (NIH) projected that it will fund only 21% of the more than 35,000 proposals submitted in 2007, down from 32% in 2001.[2] Although fewer proposals are being funded, more proposals are being submitted. In the past 10 years, applications to the NIH have increased by more than 40%.[2] With increasing numbers of proposals to review, minute differences among proposals matter more than ever before.[3] This means that the grant application process has become extremely detail oriented. Gone are the days when good science could make up for less than stellar grant-writing abilities. Today's applicants have to excel in every one of the 5 NIH Review Criteria: significance, approach, innovation, investigators, and environment[4] (Table 1).

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GETTING STARTED

If one is considering writing a grant proposal, including grant submissions to specialty foundations, he or she will most likely already have an idea of the study question. But this idea may not be fully articulated into a formal research question. The research question is central to the entire grant by providing a strong platform on which to build the rest of the proposal. The research question should lend itself to a testable hypothesis and have the potential to provide results that have an impact. This is also the point when an extensive literature review should be conducted. A comprehensive understanding of the background of a field will avoid conducting a study that has already been published. Furthermore, knowledge of the literature will allow one to frame the *significance* and *innovation* of the research question. These two factors play an important role in achieving funding.

After a solid research question has been formulated, it is important to select the appropriate funding agency for the proposal. It is critical that the subject of the investigation is consistent with the mission of the agency and the guidelines presented in the Request for Proposals. This may seem self-evident, but a study of proposals submitted to the National Kidney Foundation found that 7% of proposals were ineligible to be reviewed because the nature of the research did not match the priority goals specified by the Request for Proposals.[5] If one is unclear about whether the research question falls within the scope of the particular funding agency, investigators should not hesitate to contact the grant administrator at that agency. It is preferred to determine the suitability of the proposal prior to writing the grant rather than wasting time and effort only to have the grant returned as inappropriate.

TABLE 1: NIH Review Criteria[4]

Significance
Does this project address an important problem?
What impact is the project likely to have on the field?
What impact is the project likely to have on society?
Approach
Are study design and methods feasible and appropriate for the results desired?
Are the statistical methods sufficient to detect any possible results?
Innovation
Is the project original?
Does the project develop or use novel techniques or ideas?
Investigators
Are the investigators experienced in the performance of this type of project?
Is there appropriate senior investigator and/or consultant support, where necessary?
Environment
Is there appropriate institutional support and facilities to complete the project?

After the research question has been formulated and a funding agency has been selected, writing can begin. This need not be an intimidating process, however. For every successful grant proposal, whether requesting thousands or millions of dollars, the formula for writing is essentially the same. Below we detail some of the keys to successful grant writing. Although we focus on NIH grant submission, the format used is similar for most grant submissions, including those to the American Foundation for Surgery of the Hand.

FOLLOW THE DIRECTIONS

The first step in writing an outstanding grant, before a single word of the proposal is written, is to read the instructions—all of them. With instruction booklets for NIH grants numbering 200-plus pages, it is tempting to skim through the instructions, particularly when the information contained is often quite bland. But the information, which includes page limits, font sizes, and the like, is very important, no matter how unimportant the details may seem. For example, a NIH grant will be returned if the margin justification is incorrect. In one study of grants submitted to the NIH, 20% of proposals had formatting errors for which the instructions were clearly spelled out.[6]

Although completing everything the instructions ask for is critical, it is just as important not to include things that are not requested. Padding the proposal with irrelevant information will not impress the reviewers; quite to the contrary, it will annoy them. Each reviewer has many grants to read; they are not sympathetic to applications that are unfocused and loquacious. Information that is not requested in the application instructions but that the author feels is absolutely necessary to the proposal should be included in the appendix.

Finally, the instructions will provide information on how to submit the proposal. It may need to be submitted electronically or via mail; it may need to include copies of the entire application or just portions of it. It is important to know all of these details well in advance of the deadline. Of course, the most critical piece of information included in the instructions is the application due date. Circle it on your calendar and memorize it. This date is rarely negotiable. Finally, be sure to know where the application components should be sent.

START EARLY

Crafting a winning grant proposal takes time, often lots of time. Plenty of time should be left for the actual proposal writing, but there are other portions of the process that can take just as much time. While reading the instructions, make a list of everything that will need to be submitted and who will be involved in or responsible for gathering this information. These materials include forms to be filled out by the sponsored research office in one's institution or letters of support to be written by consultants and collaborators. The best way to organize these items is to make a checklist (Fig. 1). This will allow one to easily see, at a glance, what is completed and what is missing.

When organizing the checklist, authors should take a moment to decide what the course of action will be if any of the items are unobtainable. Finding alternative solutions will be easier in the planning stage than near the deadline. Having alternative plans is especially important when proposing a multicenter trial. For example, our team planned an 8-center clinical trial when, approximately 3 weeks before the proposal was due, 1 of the centers dropped out because of administrative issues. Fortunately, we had planned ahead and made a list of all items that would need to be changed if this were to happen. Within hours, we were able to alter the proposal and all supporting documents and submit our now 7-center trial proposal to the NIH on time.

The time for writing a proposal ranges from 3 months to 1 year,[4,6,7] although the time period for the grant planning

Item	Responsible Party
☐ Proposal Approval Form (ePAF)	Sponsored Research Office
☐ Abstract page	Investigator
☐ Project Narrative	Investigator
☐ Budget	Sponsored Research Office
☐ Budget Justification	Investigator
☐ Biosketches	Investigator/Consultants
☐ Resources Page	Investigator

FIGURE 1: Sample grant submission checklist.