

Grant Writing 101

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Abstract

Writing a grant is a hefty undertaking. Start by surrounding yourself with a successful mentor and accompanying team with a good track record. Get organized, select clear goals and objectives to your project. Once the foundation for the grant is set, begin by generating a robust hypothesis. Once your hypothesis is clearly defined, you should contact the project officer of the specific grant for which you are applying; they can help identify if the proposal meets an area of need. The basic components of a grant include the following: the face page, which highlights the key contributors; followed by table of contents; abstract; biographical sketches, which are minicurriculum vitae; budget; research plan, which is composed mostly of background, significance, and specific aims; and lastly, references cited. Be sure to follow specific formatting. Use resources including the internet to find an appropriate grant. Finally, given the confines of a busy surgical practice and the significant amount of work necessary to complete a grant, it is essential that the work begins early and well in advance of the proposed deadline.

Keywords

- ▶ grant hypothesis
- ▶ mentorship
- ▶ face page
- ▶ biographical sketches
- ▶ budget
- ▶ research plan
- ▶ specific aims
- ▶ letters of support

Objectives: Upon completion of this article, the reader will have an understanding of basic grant writing.

Overview

Writing a grant is a hefty undertaking; one must methodically sort through generating a hypothesis, planning a study, and logistically making it happen; this *Grant Writing 101* will summarize these formalities. In no way will this review be comprehensive as each grant and funding agency have specific guidelines that need to be followed and cannot be summarized in this small review. It will provide some of the basics necessary for a successful grant application. Before starting, it is important to appreciate that writing a successful grant mandates a clear understanding of the expectations of the reviewer. The goal is to not only convey how you are going to perform your study but also convince the reviewer why. It is human nature to respond to incentives; the reviewer will want to know what your project contributes to the current

field, and perhaps more selfishly, what does your project contribute to him or her. There are two key questions that a reviewer will ask about your grant: is the work important and does it describe a method for delivering the stated outcomes. It is essential to keep these questions in mind when writing. Successful grant writing requires clear implicit or explicit incentives to the reader.

Where to Start?

If you already have an idea for a project, congratulations, you have already accomplished a huge step. The next step, and perhaps the most vital to the entire process, is surrounding yourself with experienced faculty and support, or a mentoring team. Next to the science, the mentoring team is perhaps the most important part of the grant application. Start by finding a mentor. Whether this is your first grant proposal, or your 50th, it is important to gain the support of those who know the subject matter (thus helping with specific content),

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who have a track record of successful grantsmanship (styling matters), and motivationalists (grant writing can be tough, laborious, and often disappointing). This step typically applies to any academic endeavor, but with grant writing it is an absolute necessity. In addition, find similar funded projects and seek out the respective principle investigator. They may even be willing to share a copy of a funded project allowing for a better sense of what it takes for success. Furthermore, their ideas and the structure in which these ideas are represented may help shape your current proposal. Of course, yours should be original and not a duplicate. Beyond this, once your grant is complete, have several seasoned grant writers review the study; this will help fine-tune your work.

Concurrently, you should begin sketching a project timeline with deadlines. Most grants have very specific and strict deadlines which must be adhered to for a successful application. Some grants even require a “letter of intent” to be submitted at a date before the actual due date of the grant. Failure to recognize this requirement may result in automatic disqualification. The key point here, however, is not to have the grant proposal due date as the only deadline, but develop dates in the interim that will keep your grant on track. Set your own incentives for accomplishing each interim step; maybe something as simple as taking the next night off. Worked into this timeline should be regularly scheduled meetings with the chosen mentor to ensure that the project remains on track. Make it a marathon and not a sprint; you will have better results.

Next, develop clear goals and objectives for your project. Brainstorm why your proposal is unique, what questions will be answered, and how is it going to change the field. Keep your thinking simple and comprehensible. Make it understandable to a layman, but also sophisticated enough that it is interesting to the research panel. Be directed in your thinking; tell the reader exactly what you are proposing and do not leave statements up for question or debate. Support your objectives with evidence, and if lacking, with strong emotional rationale.

As your idea is beginning to take shape, you should scrutinize the grant application guidelines and instructions. Each grant has specific and unique instructions and guidelines which if not followed will disqualify your application or set yourself up for an unsuccessful application. In addition, within each grant application, certain sections are weighted differently. If there is a significant amount of weight given to a certain section, you will want to ration your effort so more time is spent on that “high yield” section.

Ideally, you should be an expert in the field you are proposing to study. Know what work has been done in the past and also what work is currently in progress. What direction is the field going in? Is there a hot topic that may be worthwhile to “catch and ride the wave” on? This will also help shape your specific application. Keep in mind that the reviewers of your grant will likely be knowledgeable in a similar, if not the same, research area. As mentioned previously, staying clear and simple is important in your elaboration, but enough detail must be included to spark the reviewer’s interests. Do not be modest, let them know you

are capable of carrying out what you proclaim and provide objective evidence. The best way to approach this is by introducing the project first by what is already known, then by what is not known, and finally, by how your idea is going to fill this gap in knowledge. If the reviewer does not believe you are filling a needed gap in knowledge, then it is unlikely that you will have a successfully funded project.

It is now time to build the backbone of your grant: the hypothesis. The hypothesis is the basis of your grant application. If your hypothesis is solid, then it will guide the rest of the grant. A strong hypothesis is one that is clear, easy to understand, unique, and readily testable. If proven, it should contribute to the field in a significant way. In addition, it should explicitly or implicitly address or acknowledge other alternative hypothesis; this helps validate your hypothesis. Finally, it should be interesting; the reviewer should be excited to read on after reading the hypothesis.

With a hypothesis firmly established, it is almost time to delve into the details of the grant application. This is a good time for the grantee to contact the project officer of the specific grant for which he/she is applying. Project officers can be an important resource, guiding the applicant through the application process and helping identify if the proposal meets an area of need. The following section will go through the grant application and describe its content, the format, and provide tips.

Face Page

This section identifies the title of the project, the principal investigator, the coinvestigators, collaborators; project title; project details including length of study, the monetary request with associated project budget, study population, classification of research; and an attestation statement. Typically, the grant application will have sections of what you need to provide in the appropriate format; therefore, it will ultimately be a self-explanatory section. A helpful resource for this section is referencing past grants.

Table of Contents

This is the easiest section of the grant complete and is self-explanatory. Commonly this is the last section to be completed.

Abstract

Although this section typically precedes the remainder of the application including the narrative research summary, you will want to complete it toward the end as it will be a summary of your proposal. The abstract is a critical portion of the application as it provides a clear and concise summary of your project. It should include your hypothesis, goals and objectives, importance of objectives, methods, and overall implications of your findings. Is there community involvement? How will your findings impact the community, society, policy, future research? Pay attention to limits on length; typically stay short and clear, and make every word count.

Biographical Sketches

You can think of this section as a catalog of modified curriculum vitae of the principal investigators and collaborators. All staff, whether professional or nonprofessional, should be listed. As with most of the other sections of a grant, the format is strict and will likely be provided with the application guidelines. If you or one of your coinvestigators has been involved with grant applications or proposals in the past, there is a strong likelihood most of this section is already done. Each sketch should contain the name and position title, the education/training, a brief personal statement, positions and honors, and peer-reviewed publications (select publications if the investigator has too many to list), and research support (ongoing and completed). A personal statement should reflect the investigator's role and associated relevant history and ability to be an effective investigator for the specific project. This section overall will be anywhere from 1 to 4 pages.

Budget

Similar to the abstract section, this section should be completed once your research plan is done. This will provide you with a more accurate idea of a realistic budget necessary to perform the project. It is appropriate to outline the funding needed for the principal investigator, the coinvestigators, collaborator costs, consultant or contractual costs, supplies, and other expenses. Keep in mind there are salary caps which can be found on the National Institutes of Health Web site. When completing this section, realize how the reviewer or reviewers will interpret this section; as in purchasing a house, he or she will be looking for accountability and value behind each monetary assignment. Most academic institutions have a granting budget office that can help with the grant application budget. It is important to meet with them early and often as the deadline for the grant approaches.

Research Plan

The research plan is really the backbone of the entire grant application. It is a full detailed description of your project. Just like the rest of the grant application, there are often specific page limits to this section. The difficult task is twofold: (1) convey your message to the reviewer within these strict page limits and (2) convince the reviewer that you are fully capable of accomplishing the specified goals and objectives of the grant within the proposed time frame. This portion of the grant calls for "grantsmanship" and belies the importance of a good mentor. As mentioned previously, it is important to have a strong and solid hypothesis as this is going to be the backbone of your research plan; your specific aims and project goals will be direct extensions of the hypothesis.

The first section of the research plan should be the *background and significance*. The background should provide a story of how past studies have shaped your ideas for this project. The story should make sense of why you have developed the idea for the proposal; essentially these past

studies are the backbone to your project. By providing a thorough synopsis of the literature, it demonstrates the "expert" factor—you have a solid understanding of the field and the direction in which it is headed. You can further establish your credibility in this section. The significance of your project should be short, yet have the content to carry a punch. You need to create an image that this project needs to be done, not that it will be simply "nice to know." You can justify this with knowledge of the field and identifying the next logical steps of research after your project is completed. In addition, provide how your project will directly increase knowledge and production within the field, amongst other researchers, and more importantly to the population of people as a whole not only now in the short term but also in the future.

The next section of the research plan is the *specific aims*. This is perhaps the most difficult section of the grant and one which will have numerous iterations. There may be multiple specific aims, each one is a direct extension of the hypothesis, each one demonstrating the objectives of your project and what you are looking to accomplish. Each specific aim should be limited to one or two sentences. They should be directly relevant to your project's goals, and not long-term goals beyond the scope of your current project. Each aim should build on the previous specific aim.

Within each specific aim, there should be a relevant section further detailing the background and significance. This paints a clear picture to the reviewer why the specific aim is important. Preliminary studies that have been performed in the past supporting the specific aim will add to the credibility of the project; building confidence in the reviewer for your understanding of the direction of the project. It also demonstrates your capability and resources to perform the proposed project. You support your argument with tangible, objective data, not simply thoughts. Make it clear how the transition from past projects leads right into your project. It should be told like a story. You should be critical of past data, label shortcomings accurately, and identify how your project will fill in the gaps. It is preferable to have your own preliminary data as research support, but you may also cite published and even unpublished data.

Each specific aim should be linked to a research design and methods section. This should be thoughtful and organized. You should identify the cohort of subjects who will be studied, what variables, measures, and endpoints you will be using to study them, and what statistical tools you will be using for the analysis. This will also give the reviewer a feel for how much power your study has and the possibility of finding significant results. In addition, you should explicitly state what you will regard as a successful result versus an unremarkable result. Do not leave any stone unturned and be clear in your thought process.

Use current technology to your advantage; charts, flow diagrams, and pictures help solidify your point. Color is attractive and should be used if possible. When using these modalities, pick and choose which ones are effective as there is often a page limit for most grants and use of large images will limit the utilization of the space. It is essential to leave

enough “white space” in the body of the grant to allow for easy reading. The amount of “white space” must be balanced against the inclusion of enough information to confer upon the reviewer a sense of confidence that you will be able to complete the project.

If you plan to use human subjects or samples from human subjects, there are certain criteria you must demonstrate before submitting your grant. Ensuring protection of this population is the overarching goal. Most grants have a specific section pertaining to protection of human subjects which must be followed closely (http://grants.nih.gov/grants/about_grants.htm). If you are using vertebrate animals, a thorough description of the proposed use and care for the animals must be documented.

Finally, contractual or consortium arrangements oblige the grantee to carefully document these relationships and their role in the overall project. Including a letter of support from each respective arrangement is preferred. If you have a consultant, a letter of support and contributions to the project should be included.

References Cited

This section is straight forward. You should include all the authors' names, name of the journal or book with respective details. The academic community is remarkably small. There is a possibility that the primary reviewers of your grant will be familiar with the references cited. It is critical to be thorough, thoughtful, and relevant when citing references.

Letters of Support

Make sure it is clear the reviewer knows there is an army of support behind your project. Support from reputable and well-funded investigators will make it more likely that the reviewer will have confidence in the ability of the applicant to complete the project in the proposed time period. It is critical to have a close working relationship with the proposed mentors as often they will be expected to provide an in-depth letter of support (1–2 pages). The stronger the letter, the more likely your chances for procuring funding.

Finding a Grant

An excellent resource to learn more about the process is from the funding source, that is, the National Institutes of Health Web site at <http://grants.nih.gov/grants/funding/submission-schedule.htm>. There you can access additional general information, application due dates, review and award cycles, and submission policies. You can also download the application forms.

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