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Research primer

Funding sources for research: A research primer for low- and middle-income countries

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ABSTRACT

Research is a fundamental component of the development of quality emergency care systems. Developing qualified professionals and programs to conduct emergency care research is essential to understanding epidemiology in low resource settings. This leads to evaluating research outcomes, developing clinical practice guidelines and program implementation. This paper aims to introduce the reader to opportunities for research funding at various stages of one's career. We will discuss concepts necessary to obtain funding for research, a crucial step towards initiating a research program. The chapter further describes competitive funding mechanisms including governmental agencies, foundations and private industry along with organisations that offer funding for global health and emergency care research. We describe categories of grants specific to a stage of an investigator's career, developing a team for a proposal and the grant application process.

African relevance

- Research is a fundamental component of the development of quality emergency care systems.
- Funding is a crucial step towards initiating many research projects.
- Almost all research funding is competitive, and preparation is essential for funded proposals.

The International Federation for Emergency Medicine global health research primer

This paper forms part 8 of a series of how to papers, commissioned by the International Federation for Emergency Medicine. This chapter aims to introduce the reader to opportunities for research funding at various stages of one's career. We have also included additional tips and pitfalls that are relevant to emergency medicine researchers.

Background

Emergency medical services provide rapid assessment and care to patients with critical illness while also functioning as a safety net for those with limited access to primary healthcare. The 15 leading causes of death and disability worldwide have emergent presentations requiring appropriate emergency care [1]. Emergency medical conditions account for over half of all global mortality [2]. Based on this, to combat global emergency conditions; advancement of emergency medicine practice is integral to improving patient outcomes. In 2019 the 72nd World Health Assembly adopted the Global Emergency and Trauma Care Initiative that aims to enhance quality emergency care capacity in countries around the world [3]. To improve emergency care delivery, we must invest in and develop emergency care research programs. Emergency care research has improved clinical practice advancement across many emergency conditions including injury, heart attacks, stroke, shock, infectious diseases and non-communicable diseases [4–9]. Furthermore, implementation research has demonstrated that emergency medical training and clinical care delivery is associated with improved adult and paediatric patient outcomes, including reduced mortality [10–13]. Investment in emergency care research infrastructure and human personnel is required to achieve appropriate knowledge generation and knowledge translation to health providers. This benefits high-risk global patient populations in need of emergency care.

Almost all research funding is competitive, and preparation is essential for funded proposals. Learning research fundamentals, connecting with others conducting research in your area of interest and knowing how to conduct research in your setting are important first

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steps. Some researchers complete fellowship training in emergency medicine research to obtain formal training under the guidance of a mentor at an institution that can provide the necessary resources. However, finding a good mentor is likely more important than obtaining specific research postgraduate training for most EM researchers. Writing a grant is difficult and the mentorship of a senior colleague provides important guidance. A mentor can be at your institution; however, many are found through national and international societies' programs as well.

This chapter will introduce the reader to important considerations when pursuing funding including various types of grants and which ones may be appropriate at different points in a researcher's career. The chapter will identify key steps in preparing a grant and provide advice for resubmission of grants not funded on the first application.

Pursuing funding

When considering applying for a research grant, it is important to understand the different types and potential sources of funding. Some examples of funding sources include student/trainee research calls, seed funding calls, and post-doctoral funding calls. Educational institutions, specialty societies, private foundations, governments and corporations may sponsor grants. Your department, hospital, medical school or university may offer funding for pilot projects and new research studies, often referred to as seed funding. They may also maintain databases of available funding opportunities including funds specifically for young researchers completing medical school, postgraduate training or early in their specialty careers. Universities may have a specific office of research administration where assistance with accessing this information can be found.

Philanthropic organisations often fund foundation grants that may offer support for specific projects related to the organisation's interests or geographic location. Such organisations may have flexibility around the types of research they will fund and may accept unsolicited proposals. Some will consider supporting educational projects or supplies that provide the background for a research program. It is important to understand the type of work the private donor may fund before starting a proposal. It is common for early researchers to seek smaller grants to determine the feasibility of an idea. If the project is successful, then additional larger funding sources can be sought.

In all types research funding, it is important to be aware of the regulations that govern the funding source and ensure that the applicant or that the collaborators meet the requirements to be eligible to receive support. If there is uncertainty around this or clarification is needed, then the funding body should be contacted before the application is submitted.

While the United States' National Institute of Health (NIH) is the largest sponsor of biomedical research worldwide, the funding is highly competitive and unlikely to be the source of most junior researchers' projects. The NIH offers mentored career development grants that provide finite salary for research. While these are accessible to researchers in Africa, the expectation is that these would be applied for in conjunction with a US based mentor.

It is important to pursue funding that is matched to the investigator's experience and resources. One main differentiation in research grant funding is unsolicited versus solicited applications. In unsolicited applications, investigator-initiated proposals are submitted to funding bodies without pre-defined topics for the work. Alternatively, in solicited applications, the funders' goals identify high-priority research topics, which guide the proposals that they will fund. Throughout their careers, researchers will be most successful when applying for funding geared towards their experience and effort allotted to complete the research. Some grants are appropriate for short-term projects while others prioritise career researchers (see Tables 1 and 2).

The grant application process

Preparing a research grant application is an extensive process, which can be organised into three steps of: preparation, development and submission.

Preparation

Before writing a proposal, a researcher must schedule adequate time dedicated to the process. Plan ahead to meet all deadlines. An important step is building a suitable team. As the primary investigator with a worthy research question, finding a senior researcher to mentor your project is critical. You may also need appropriate content experts such as statisticians, health economists, and public health experts. Collaborators and mentors can come from any institution in any country or though focus on South-South collaborations, transdisciplinary collaborations and establishing research networks all of which may offer opportunities with specific funders. There may be benefits to partnering and working with personnel who are local to ones setting to facilitate ease of contact and meeting, however this is not required. Research teams can be made up of partners from within and external to Africa with mentors from any geographic location as long as the research team contains all the appropriate people with the correct expertise to be able to create the research proposal and carry out the planned studies once funding is obtained.

When beginning a proposal, one must understand the application guidelines and scoring criteria. The funding organisation usually provides these on the grant website. One should find information about successful submissions, review projects the organisation has funded in the past for scope and budget (Grant websites may list previously funded projects.), discuss budgeting with a grant officer, or even present the proposal at a conference to seek feedback. Consider the ethics of your proposal and any conflicts of interest.

Contacting the sponsoring organisation with well-developed, specific questions may aid in submission of the best possible application. Briefly introduce the project idea and the career background of the investigator. Funders are motivated to identify promising proposals and will usually discuss whether a project idea is within their scope. These discussions may also reveal members of the review committee and other advice for the proposal process. This contact can prevent wasted time on submissions not aligned with the organisation's goals and can provide updates on timelines and extensions, changes in funders' priorities or other tips to give the application the best chance for success.

Developing the proposal

Outstanding research proposals identify the significance of the problem and describe the project's unique contribution to science. They demonstrate that the work is achievable accounting for the investigator's experience, timeline and resources. Describing the “specific aims” in one page is the author's first opportunity to present this expertise. This page conveys the problem that must be addressed and why this research team should do the work. It briefly but comprehensively explains the research plan. The specific aims page must be understandable to someone who is not an expert on the subject, must justify your team and its approach to the problem, and must engage the reviewer to read on. Unlike most scientific writing that is unemotional and cautiously avoids inflating the importance of one's findings, the research proposal should use a persuasive, passionate tone to convince the reviewers to fund one's approach.

The rest of the proposal lists details of the project and highlights reasons that the approach provides a sensible, novel solution appealing to the funder's goals. One must maintain a reasonable scope and set realistic expectations of what a project will accomplish. These can be organised into easily visualised timelines and charts to help with project management tasks and keep track of when they will be completed.

Table 1
Types of grant mechanisms.

Category	Type of call	Characteristics
Solicited application	Request for applications (RFAs)	Focus on single issue identified by sponsor Content level experts with significant research experience and resources typically apply Researchers build a team to fit a proposal to the specifics of the call for applications
Solicited application	Program announcements	General solicited application related to sponsor's area of interest Scope of work is usually prescribed but allows researchers to propose objectives with more flexibility
Unsolicited applications	Funder makes no formal request for the proposal	Researcher contacts funder with a proposal Many funders do not accept these

Many funders will have specific guidelines about what they can or cannot fund. This may include travel, investigator's salary, and other specific items. Review these carefully, justify the need for the costs in your budget and use accurate calculations. Most grants will not allow additional requests for funds, so it is important to ensure that the work you propose can be completed with the funds you request. If your institution is providing contributions, these can be shown in the budget as “in kind” contributions. Although the “in kind” contributions are not required they can be viewed favourably by external funders as they demonstrate institutional level commitment to the proposed work.

Grant proposals do not require preliminary data, but if such data is available, it can be helpful as it shows the funders that the researchers have experience in the field of interest. In addition to preliminary data, information justifying the team's expertise or resources successfully to achieve proposed grant outputs are helpful. For example, data demonstrating access to the population of interest and experience working with that population can provide key support for a proposal. This data can be in the form of published or unpublished work in the field by the investigator, the broader research team or the mentor.

Submission

Supporting documents are essential to an application and should not be overlooked. Often approvals from many individuals at one's institution (departmental, college, university or even Ministry of Health) are required for project budgets. You must leave time to assemble relevant documents, do not defer this portion until the last minute. Include updated biographical summaries reflecting specific expertise and experience relevant to this application from each collaborator. Where allowed, letters of support may be used for a mentor or other notable collaborator to summarise the important parts of the proposal and acknowledge their plan to participate. Principal investigators assist in drafting letters of support—assure that it is specific in the collaborator's contribution and is supportive. Ask colleagues for examples to guide your work.

The biographical sketch in a grant application is a different document than the resume one would prepare to apply for a job. The grant maker usually limits its length to as little as 1–2 pages, in some cases with very detailed instructions for the format and content. Even when the format is not specified, focus on biographical information relevant to your research career. The major purpose is to establish your research credentials. Do not include personal data irrelevant to your research. Use the grant maker's form and do not alter the order of the information requested. If no guidance is provided, use instructions from other agencies or seek advice from researchers in your field.

A successful proposal should be easy for reviewers to assess. It is clear and follows the expected structure. Seek feedback on the draft from several colleagues who are unfamiliar with the particular project to ensure that it is easy to understand and highlights your ability to complete an innovative and interesting project successfully. Avoid long, overwhelming blocks of text and instead use figures and tables where appropriate. Follow instructions on font, text size and margins. Use spaces, bold fonts, and section headings to separate elements. Avoid underlining and fancy fonts. Ensure that grammar, spelling, and calculations are correct. Lack of adherence to submission guidelines, timeline and poor planning will hurt one's chances of obtaining the award. Have someone else review the proposal for flow and style prior to submission (Table 3).

Resubmission

Rejection of grant proposals is common. If your grant is rejected, utilise the reviewers' comments to strengthen your next grant submission. Many sponsors will accept rejected proposals in a future funding cycle. When this occurs, the investigators should carefully consider the feedback to address any concerns about the proposal with particular attention to research methods. If reviewers question your innovation, modify your project explanation to make it clearly and concisely portray your project's value. In the revised proposal, emphasise the points reviewers marked positively and then address each criticism to improve

Table 2
Types of grants over a researcher's career.

Stage of career	Grant characteristics	Common funding sources
Trainees	Projects with scope limited enough to complete in finite training period Seed funding for pilot projects and proof of concept particularly appropriate	Departmental, college, university, specialty society and community organisations are often award sources
Early research career: career development grant	Specifically for those seeking a career in research Aid in building skills using defined mentorship Require educational plan Scoring often weighs research and education training plans equally	Universities, specialty societies and especially governmental research agencies
Experienced investigator	Investigator initiated awards Investigator presents importance of problem studied and justifies the cost Most common type of grant	Governmental research agencies, non-profit organisations and foundations

Table 3
Common components of a grant application.

Component	Description
Aims page	Brief statement of the problem solved and convincing justification on why the research team can complete the work to address it
Timeline	Organised documentation of what steps in the project will be required and how long they will take to complete
Budget	Clearly justified list of inputs and expenses. Must be accurately tabulated.
Biographical sketch	Specialised brief curriculum vitae to convey your research credentials. Usually requires a specific format for the grant.
Mentor letter of support	Collaborator's assertion that researcher has the necessary skills and support to complete the project. Researcher may help to draft a supportive and specific letter for mentor to edit.

your proposal. Counter arguments to reviewer suggestions should be rare. Have a colleague outside of your research team review the re-submission letter to ensure that you use a tone that is not argumentative. Do not be discouraged by rejection. View each proposal as an opportunity to develop skills in the process and to utilise feedback for future successful applications.

Securing funding is an important part of emergency medicine research in low resource settings. While the process can seem daunting, with ample preparation and organisation, the researcher should not fear the grant seeking process. Develop a team and a proposal that explains to the funder why a project is important and why you are equipped and ready to perform the work. With diligent attention to preparing a proposal and application of any feedback, a researcher can find many opportunities to fund research in any setting at all career stages.

Tips on this topic

- **Carefully review submission instructions and deadlines:** Excellent submissions may be disqualified for failure to comply with published instructions and deadlines. Follow the requested organisation and structure. Complete all documents in time to send hard copies by mail when requested and to ensure that electronic copies are delivered by the stated hour in the time zone where the funding agency is located.
- **Review examples to guide you to successful submissions:** Understanding the scope of previously funded proposals and the size of typical awards help set realistic expectations for your submission. Use information posted on the website, discussions with grant offices, and the experience of other investigators to find information about previously funded submissions.
- **Use your successes to seek additional funding:** When you receive funding, you establish a record of accomplishment. Consider asking your department or university as well other partners to consider funding travel to present your findings or to match funds in future work.

Pitfalls to avoid

- **Do not ignore the eligibility criteria:** Application requirements may be limited by stage of career, site of work, country of origin, research topic or many other factors. It is important to review these before beginning the proposal to ensure a good match and to avoid wasted time.
- **Do not miss the opportunity to speak to a grants officer/administrator at the institute or foundation where you are applying:** Utilising the chance to discuss with the organisation offering a grant will often yield additional feedback on whether an idea fits well with the funding programs goals. It may provide more guidance to improving a submission or information about new requests for proposals or deadline changes.
- **Do not give up when you receive a rejection:** Most grant proposals are not funded on the first submission. Utilise any feedback to further develop the project and to develop a stronger submission in the future.

Annotated bibliography

1. AuthorAID provides several free online courses, webinars, and resources for authors in low and middle-income countries. The program also offers networking to connect mentors and mentees for entire projects as well as for specific questions and advice. AuthorAID also maintains a list of funding opportunities. https://www.authoraid.info/en/e-learning/
2. The West African Research Association offers fellowships and travel grants for work in West Africa as well as in the United States meeting their criteria. https://www.westafricanresearchassociation.org/fellowships/
3. The Young African Leaders Initiative hosts a free “Fundamentals of Grantwriting” course on its website. These videos focus on seeking foundation grants and provide a certificate of completion after successfully answering all final quiz questions. https://yali.state.gov/course-2052/#/
4. African Forum for Research and Education in Health (AFREhealth) is an interdisciplinary health professional grouping that seeks to work with Ministries of Health, training institutions and other stakeholders to improve the quality of health care in Africa through research, education and capacity building. https://afrehealth.org/
5. The Consortium of Universities for Global Health supports academic institutions and partners to improve the wellbeing of people and the planet through education, research, service, and advocacy. Available training in research “Establishing a Research Career in Global Health” https://www.cugh.org/resources/472
6. Rachel Strohm maintains a blog with a list of research funding opportunities for African academics. https://rachelstrohm.com/2015/07/30/professional-development-opportunities-for-african-academics/
7. The Foundation Center offers free training in the form of online videos and self-guided training: https://grantspace.org/training/courses/introduction-to-finding-grants/?_ga=2.192192238.519969744.1564060752-1491740927.1564060752
8. The aliEM article “10 tips on writing your first grant” offers practical advice for junior researchers and provides several links to additional resources. https://www.aliem.com/2014/08/10-tips-writing-your-first-grant/
9. The Fogarty International Center, the international component of the US National Institutes for Health, funds mentored research for foreign investigators and keeps a directory of Non-NIH Funding Opportunities that includes program summaries and links to websites for a variety of grants and fellowships for global health researchers. https://www.fic.nih.gov/Funding/NonNIH/Pages/default.aspx
10. Those considering applying for NIH grants should review the NIH “Information for Foreign Grants” website at https://grants.nih.gov/grants/foreign/index.htm and the NIH Application Submission Tips for International Applicants page https://grants.nih.gov/grants/ElectronicReceipt/files/Tips_for_International_Applicants.pdf for information about how to obtain necessary accounts and assistance in navigating to important resources.
11. The John's Hopkins University Office of Research Administration Sponsored Research Handbook further defines many types of

research agreements and awards and provides links to several sites compiling sources of funding. https://www.hopkinsmedicine.org/research/resources/offices-policies/ora/handbook/handbook_II.html

Authors' contribution

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: LD contributed 70%; ES and AA contributed 15% each. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

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Declaration of competing interest

The authors declared no conflicts of interest.

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