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# Writing a research grant proposal

By Leon Jonker and Gill Marshall

## Introduction

Research is an essential element of all professions, because it facilitates the building of the profession's evidence base. For the emergent profession of radiography this is especially important because for it to become an autonomous profession, practitioners must 'carve out a knowledge base that is dynamic and forward thinking'<sup>1</sup>. Furthermore, high impact studies in the field of radiography serve to raise the profile of the profession<sup>1</sup>. The sections that follow detail the various tasks and activities that should be carried out in the several months it typically takes to get a sound proposal together.

## The evolution of a grant proposal

The cornerstone of scientific research is having a novel idea. Writing a grant proposal is essential if you want to turn such ideas into practice. Research funding consists of grants awarded in response to investigator-initiated projects, and contracts under which the research topic is proposed by the funding agency<sup>1</sup>. Bidding for research grants is very competitive, so it is essential to avoid mistakes in an application. Many worthwhile projects will be rejected – typically only 10–20% are accepted, with proposals for qualitative research having even lower success rates<sup>3,4,5</sup>. The guidance given here applies for quantitative, qualitative and mixed methods proposals<sup>6</sup>. It is important to write a grant proposal that shows the correct fit between you, as the researcher, or leader of a research team, often by demonstrating your track record, your organisation and the funding body<sup>7</sup>. Furthermore, if your application is for investigator initiated work, it is essential to document sufficient information in all sections to convince the funders that the proposal is worth funding<sup>8</sup>.

Bear in mind that there are several sources of support for grant writers, eg, books, videos, colleagues, consultants and the world wide web<sup>9</sup>. Although it can absorb much of the applicant's spare time, overall the development of a grant proposal should be enjoyable. It should be seen as an opportunity for researchers to crystallise an idea and to critically appraise their research plans. This is an essential exercise, because it is likely to enhance the quality of the study. The scope of the proposed work can be evaluated and possibly refined, and aspects including methodology and analysis must be thought through critically. At this stage, potential follow-up studies will become apparent, which will effectively create continuity.

First, the proffered hypothesis should be tested against current knowledge in the area using a comprehensive literature review. A good way to gain constructive feedback is by sharing your idea with colleagues. Typical questions to ask are: what am I trying to test/explain; what are the possible causes; what causes will I explore; and how do these causes come about<sup>10</sup>? At the literature review stage it will become clear whether an idea is simply a matter of building on current knowledge or if the idea goes against the grain of what others think. A bid for a research grant of an evolutionary nature, proposing incremental change, will stand a better

chance than a plan involving a revolutionary hypothesis. However, a research proposal that promises little in terms of added value will probably fail to impress.

Studying current 'hot topics' in the field of radiography or researching 'themed calls', for proposals, ie, those around specific topic areas, will give an indication of what the experts in the field feel are the research priorities. The Society and College of Radiographers (SCoR) recently published a list of research priority areas<sup>11</sup>. For diagnostic radiography this includes 'sociological analysis of the profession of diagnostic radiography' and for therapeutic radiography, a focus area is 'patient information'. If a project is tailored towards addressing these focus areas, it will improve the chances of success and means a grant proposal will better fit the eligibility criteria.

### Preliminary work and pilot data

Most organisations that fund research apply peer-review for selecting the best grant applications. It is easier to convince reviewers of the merits of a proposed project if there is already some promising data accompanying the application.

Preliminary or pilot data serves two purposes. Firstly, it will show that the hypothesis to be tested may be correct, or that the aims set can potentially be met. Secondly, by producing pilot data you can highlight that you are capable of producing data. This indicates that you can handle larger, full-scale projects. An important task is to explain the implications of the preliminary data for the aims of the proposed full project and for past work by peers in the field. An important thing to remember is that peer-reviewers may have produced the literature to which your proposal refers. Ignoring them, by not citing their articles and books, is unlikely to be well received.

A requirement of pilot data can lead to a catch-22 situation if obtaining this data requires funding. Sometimes, without financial backing, no data can be generated and without data, the chance of obtaining grant money is slim. It is therefore important to explore all sources of 'pump priming' funding within your institution. If applicable, approach patients or the public about their involvement (through Involve: see 'What goes wrong in grant applications?' below)

### Who should be on the research team?

To increase the chance of being successful with a grant proposal, it is important to have an experienced research team with a strong track record, particularly if you are a novice researcher. A senior colleague will be able to give invaluable advice on how to write and develop a proposal, so that the project is realistic in the anticipated time frame. A mistake frequently made by a novice researcher is to design a project that is too ambitious<sup>12</sup>.

Whilst acknowledging the value of an experienced peer, other people can also help to improve the quality of a study and the grant

proposal. Access to a statistician is imperative to decide, for example, the appropriate sample size for a study. This requirement applies for both qualitative and quantitative research, regardless of whether or not it involves human participation.

Associated with this is the requirement to know the power of an experiment. For analysis of the generated data, it is also important to choose the correct type of statistical analysis<sup>13</sup>. Often it is mandatory to have authorisation from a statistician when applying for ethical approval, such is the importance of sound statistical appraisal of a project. If the proposed project observes a reduction in the length or number of treatments, or any other change that impacts on the costs involved in a service, there may be a requirement for the input of a health economist. Writing radiography grant proposals may be aided by consultation with a radiologist and/or medical physicist, depending on the precise nature of the bid. Co-investigators who complement your own background and training should be chosen<sup>14</sup>.

### How do I identify the source of funding?

Once an idea has been thought through, the aims formalised, and the research team assembled, the next stage will be to identify a source of funding. Consequently, we will cover the types of grant that are available and the different funding bodies that offer grants. The National Institute of Health Research has a useful figure on its website ([www.nihr.ac.uk](http://www.nihr.ac.uk)) that demonstrates what sort of funding is appropriate for what type of research.

◆ **Grant types:** grants come in different shapes and sizes, just like projects. Generally speaking, there are four different types of grants: research grants (money for one specific project); programme grants (large collaborative efforts that encompass a number of projects); studentships (to fund a research-based MSc or PhD degree); and fellowships (to fund career development). The latter two are awards made to a specific person.

Some grants promote collaboration between industry and the public sector and certain fellowships are intended specifically for, eg, clinicians. The type of grant that one should apply for depends entirely on the project and the applicant's circumstances. One area on which the choice depends is whether the applicant is employed as a radiographer by a hospital or private organisation, or by a university or other higher education institution. Employment status also impacts on what can be claimed in terms of salary.

To establish yourself in research, career development grants are a good option. These are allocated to applicants who can demonstrate that they have the potential to become successful independent researchers; a track record is not an essential prerequisite. Apart from the need for a sound project proposal, other requirements have to be met to satisfy the reviewers...

It must be evident that the candidate has a strong desire and commitment to work in

research long-term. The organisation for which the candidate works also has to be committed to supporting and developing this person. It is therefore essential that the infrastructure exists to provide that support, both through the presence of a mentor and adequate research facilities<sup>15</sup>. Even if the candidate shows promise and the research plan is of a high quality, his or her employer has to match this level of potential with sound back-up support.

◆ **Funding bodies:** there are several funding bodies that currently fund research for radiography and radiology. In the UK, the Society and College of Radiographers offers research awards for smaller projects and it has an industry partnership scheme ([www.sor.org](http://www.sor.org)). This may be a good initial funding body for those researchers who are applying for the first time, because it is available specifically for professionals in the fields of radiography and radiotherapy.

Larger grants are available from the National Institute for Health Research (NIHR) and from the more generic research councils, such as the Medical Research Council (MRC) and the Wellcome Trust. Depending on the topic of a project, more specific organisations may be approached. For example, for a project investigating aspects of mammography, then a charity such as Cancer Research UK may be an appropriate funding body.

For all funding bodies, the types of grants offered and themed calls for proposals are subject to change. Therefore, it warrants checking the websites for grant news on a regular basis. One website ([www.RDinfo.org.uk](http://www.RDinfo.org.uk)) incorporates calls for proposals and deadlines for applications, and is a one-stop shop for virtually all there is to know about funding opportunities.

Once the decision has been made as to where to apply for funding, it is useful to get in touch with the chosen organisation. People are employed by the funding bodies to provide guidance and information to (prospective) applicants, so double-check your eligibility or the appropriateness of your project with them – there is nothing worse than going through the application process and finding out that the application cannot be considered because you are not eligible or because the topic is outside their remit.

Different funding bodies use different software and formats for applications, which means that an application can often not simply be cut-and-pasted to fit another call for proposals.

### How to write a good grant application

A good grant application requires an understanding of what research is, how to formulate a research question, extensive literature evaluation, and an appreciation of the ethical implications of the proposed research. In addition, a research project should apply an appropriate methodology. Quantitative data should be recorded and analysed by applying an appropriate statistical test, while qualitative data is usually analysed via themed analysis



or quasi-statistics. Below are summarised the main steps involved, from start to submission:

- ◆ Decide on the type of grant and funding body, contact the programme officer and review application forms and instructions
- ◆ Outline and draft the proposal
- ◆ Conceptualise the project and review the literature
- ◆ If applicable, approach patients or the public about their involvement (through Involve: see 'What goes wrong in grant applications?' below)
- ◆ Start work on, or collect any pilot data (ensure compliance with governance and ethics, [www.myresearchproject.org.uk](http://www.myresearchproject.org.uk)) – if necessary, obtain internal funds to support the pilot project
- ◆ Identify potential collaborators or mentors
- ◆ Further define the research question and methodology/analysis tools
- ◆ If required, consult experts in statistics or other disciplines
- ◆ Develop and finalise the budget
- ◆ Review and draft second version of proposal
- ◆ Critical appraisal by research team members, collaborators and lay persons
- ◆ Finalise revisions and submit grant application.

### Administrative elements of a grant application

A research proposal is typically several pages long. Try to make life easy for the reviewer by strategically restating the key questions that the project will attempt to address. For a reviewer, it is helpful to be reminded by the applicant how the proposal fulfils the key points in the proposed research. Likewise, each section of an application may benefit from a summary containing the key points.

Also, you must be aware that when constructing a grant application you must sell yourself to the reviewers. There is no harm in highlighting the fact that you have worked on a similar project in the past or attended a specialist course relevant to the proposed research project. The reviewer may not know anything about the applicants' backgrounds; therefore, the reviewer has to be informed about any skills that may make the applicant qualified to deliver on the promised work.

It is essential to adhere to the guidelines for submission, from budget to bibliography. If the abstract can only be 200 words long, do not overstretch to 250 words because the application will be rejected. It is not compulsory to write to the nearest maximum word count, but it does need to be concise, clear and complete<sup>16</sup>.

Undertaking independent research with funding means getting to grips with calculating the costs of a project. Depending on its size and length, this part of a grant proposal can vary from being manageable to requiring a specialist. When writing a first grant it is vital to ask someone with previous experience to look at the finances. There are different costs incurred when carrying out a project and these need to be categorised.

Directly incurred costs are the salaries for the people stated on the grant application, ie, the

people working specifically on the project and who are therefore paid directly from the grant. Consumables purchased specifically for the project also fall under this category. Directly allocated costs are those inherent to conducting research in a department or an institute. These are, for example, charges for radiographic staff and overheads for research infrastructure such as the use of x-ray room time. Finally, there are indirect costs, which include costs for general back-up support staff such as those in the library, human resources and finance.

There are other things to bear in mind when preparing a budget for a grant proposal. For example, wages are calculated with the inclusion of the on-costs incurred by the employer – this means that pension and national insurance costs should be added to the gross wages. Also, if a project runs for more than one year, you have to incorporate salary increases based on inflation or previous annual increments. For equipment and consumables costs, it is important to find out if these figures should include Value Added Tax or not. When an expensive item is listed in the grant application, ask for quotes from different companies to get an idea of the costs involved. It has to be noted that some funding bodies do not allow for capital expenditure like equipment or machines.

Finally, other costs associated with a research project must be considered, such as travel and registration costs associated with presenting research outcomes at a conference, or publishing a manuscript in a peer-reviewed journal. Disseminating the outcomes of the research at conferences and in articles helps to gain a reputation based on the work carried out. It needs to be realised at the stage of writing the proposal that you may be required to say how and where the work will be disseminated to ensure that the more appropriate events/journals have been identified.

Although beyond the scope of this article to discuss in detail, we would like to highlight that for each project one needs to consider if it requires ethical approval. In addition, if the research is conducted in an NHS organisation, it will need to be approved by the R&D department of each NHS Trust where the study will be conducted. For both ethics and NHS approval, see [www.myresearchproject.org.uk](http://www.myresearchproject.org.uk) where information on the new Integrated Research Application System (IRAS) can be found. Of particular interest to radiography is that approval from the Administration of Radioactive Substances Advisory Committee (ARSA) can also be obtained using IRAS.

### What goes wrong in grant applications

Grant applications can be rejected for various reasons. It can be turned down because the writer does not have a strong enough track record or the university, hospital or organisation for which the applicant works is not renowned for hosting research. If so, it will be difficult to turn this around in the space of a few months and to re-submit an application.

More common are content-related errors that make a reviewer decide to turn down a

request for funding. In the past, funding bodies have been approached about why some grant applications are funded and others are not<sup>17,18</sup>. In their response it transpired that certain omissions, mistakes and deficits are more common than others. The major review issues related to a National Kidney Foundation call for proposals included those listed in table 1<sup>17</sup>.

More and more funding bodies demand input from patients or lay people in the design and dissemination of a research project. The organisation Involve can be of use here ([www.involve.org.uk](http://www.involve.org.uk)). Lack of such involvement may lead to rejection of the proposal because user involvement during the development of a research bid can often have a positive effect on the design of a study<sup>18</sup>.

Particularly in qualitative research involving patient questionnaires, lay people can highlight the use of too much jargon, or too many acronyms and/or abbreviations. Similarly, discussions with patients may shed light on important ethical issues, such as how and when to approach patients for participation in a study. If we consider the research focus areas identified by the SCoR, it can be concluded that most topics could benefit from user involvement. As with the generation of pilot data for a research grant application, much user involvement work is unpaid. Table 2 provides a checklist to consider before submission.

### Conclusion

Obtaining funds for research through a grant application is an essential activity to develop the evidence base of radiography practice. This will help promote radiography as an autonomous profession. A successful application is not written in a week or so; it takes up to a year to fully develop an idea and project plan.

Apart from getting the science right, writing a grant proposal is a meticulous process which has common pitfalls associated with it. If these are avoided and the preparations for a grant proposal are done properly, the chance of being successful in the selection process will increase. However, with the current success rate of grant applications being 10–20%, it is more likely that a grant application is rejected rather than accepted. If this happens, it is important to learn from the feedback.

Most of the reasons for rejection can be addressed and worked on. If the reviewers believe that the applicant does not have a strong enough track record, more senior peers can be contacted to propose collaborating. Ideally, this should have been done early on in the writing process. What is important is to address any issues, not to try your luck with another funding body. This is especially so when dealing with niche subjects, including radiography and radiology, where there is a significant chance that the same reviewer may be approached again.

If the perseverance does pay off then this should certainly be celebrated. Obtaining a research grant is a prestigious feat and, together with a positive outcome of the actual project work, should lead to more successful grant applications, worthwhile collaborations, and an increased research reputation for the team.

Table 1: Common mistakes in grant applications (modified from<sup>11</sup>).

Percentage of grant applications in which the named issue was present:	
Study design issues, such as unclear design or too many measurements	76%
Statistical issues including inadequate power calculations	34%
General issues, eg, issues with originality where it appears to be mentor's idea and not applicant's idea	29%
Hypothesis problems, such as undefined aims or lack of novelty	24%
Significance of the study and how it impacts on current knowledge	18%

Table 2: Checklist for grant applications (amended from<sup>14</sup>).

Section of application	Item to check
Eligibility	Check if you fit the requirements for eligibility Ensure the proposed study fits in with the funding body's priorities – especially when applying for a themed call for proposals Explain why the planned work is novel and necessary
Hypothesis and objective	Check if the research has not already been done before; the need for the research should be justified Clearly define the hypothesis Place the proposed study in the context of the current knowledge on this topic
Methodology	Explain the procedures involved for testing reliability and validity
Finances	Justify the amount you are requesting Carefully calculate the total amount requested; double check all aspects of this, from number of hours for wages to prices for equipment
Communication	Public and patient involvement in preparation for the study and dissemination of the results is encouraged
Finishing touches	Check grammar and spelling Adhere to the guidelines: do not exceed the maximum number of words allowed Ask someone to proof-read your application, particularly if some sections have to be read by lay people

## About the Authors

Dr Leon Jonker is senior research fellow at the University of Cumbria.

Professor Gill Marshall is senior fellow and national teaching fellow of the HE Academy, and research development lead at the University of Cumbria.

References for this article can be found under 'Synergy resources' at <http://www.sor.org/members/pubarchive/synergy.htm>

To comment on this article, or discuss how you fared if you have ever applied for funding, please write to [racheld@synergymagazine.co.uk](mailto:racheld@synergymagazine.co.uk)

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## Test Yourself

Below are some questions to answer which you can count towards your CPD. Note down your answers and any other observations and put them in your CPD folder. If you record this activity in CPD Now, remember that you can scan your paperwork and attach it electronically to your CPD record. The answers are available online from 1 September, under 'Synergy resources', at: [www.sor.org/members/pubarchive/synergy.htm](http://www.sor.org/members/pubarchive/synergy.htm)

1. What is the typical success rate of grant applications?
2. Writing a grant application, from idea to submission, can take up to a year – true or false?
3. Where can you find calls for proposals?
4. Is it important to adhere to the instructions set out by a grant provider?
5. What is the role of preliminary data?
6. Should a research team include specialists in areas in which you are planning to research?
7. How do you find out whether the grant is appropriate?

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