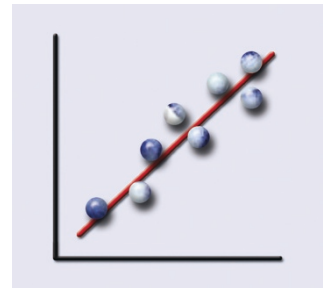


IN BRIEF

- Writing up the findings of your research is the last phase of the project, and the starting point for your future research. You may wish to write up your project for different audiences: Colleagues and patients in your practice; Funding bodies that supported your research; Readers of academic journals.
- Depending on the audience you are writing for, you should emphasise different aspects of your research, though all audiences will be interested in the answer you found to your research question.
- Publication of your research in academic journals is important to establish your contribution to our understanding of dentistry, and to allow the broadest possible community to benefit from your findings.

Research in primary dental care Part 7: Writing up your research

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Writing up your research for publication is an important part of the research process, since it is through publication in all its forms that the wider community becomes aware of your contribution to knowledge. How the research is written up will depend to a large degree on your target audience; in this final paper we discuss writing up your research for members of your practice, funders of your research, and for publication in academic journals.

RESEARCH IN PRIMARY DENTAL CARE

1. Setting the scene
2. Developing a research question
3. Designing your study
4. Measures
5. Devising a proposal, obtaining funding and ethical considerations
6. Data analysis
7. Writing up your research

The final stage of any research project is the reporting of the findings. The purpose of the report is twofold: to describe the process which was undertaken, and to describe the findings. In the description of the process the aim is to provide information to your audience about the reasons for undertaking the project, about previous research in this area, and why this research was a logical extension of that previous research. It is also important to describe the methods which were used so that other researchers can analyse the strengths and weaknesses of your approach.

The format of your report and the style that you adopt in writing up will depend upon the audience that you are addressing. We will discuss writing for three different audiences:

- Writing up for your practice staff and patients
- Writing up for funding bodies
- Writing for publication in professional journals

WRITING UP FOR YOUR PRACTICE

The staff and patients of your practice will be interested to know what became of the research which they were involved in. You may wish to produce a short written summary for patients, or a poster summary for the waiting area. The key points for this group are listed below:

- Identifying the characteristics of your audience
- Readability and understandability

- Using pictures and diagrams to replace words
- Identifying the key points of importance to your audience.

Identifying the characteristics of your audience

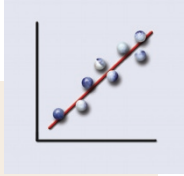
What are your patients like? What will they be interested in? It seems unlikely that your patient mix will include a great many dental researchers. Your patients are less likely to be interested in the detailed methodology, and the intricacies of statistical analysis than other groups. Identifying those points which are most important to your audience is important, and could be achieved by discussing your findings with a small number of patients and seeking their view on the most salient points.

Readability and understandability

You may wish to consider your use of jargon (for example calculus, periodontal disease, plaque); do your patients understand these terms? Similarly bear in mind the readability of your text. Short sentences with short words are easier to understand than longer sentences with multi-syllabic words. The average reading age of UK adults is 14 years, you should aim for your text to be readable by people of the average reading age or younger. Many word-processing packages will provide information on the readability of your text. For more information on design of written materials for patients see Newton.¹ Consider also the

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The format of your report and the style that you adopt in writing up will depend upon the audience that you are addressing



size of font that you use. The Royal National Institute for the Blind recommends a font size of 12 point as a minimum.

Using pictures and diagrams to replace words

Diagrams and figures explaining the findings are generally favoured over tables of numbers. Most people report finding graphs and figures easier to understand than tables. Consider using bright, clearly labelled figures to summarise the major findings.

Identifying the key points of importance to your audience

Providing a systematic structure will help your reader to make more sense of the report. Sections help to break up the text and make it easier to read. You might want to consider structuring your presentation as a series of questions, for example

- Why were we interested in carrying out this study?
- What did we do?
- What did we find?
- What will happen now?
- How will this affect you, as a patient?

WRITING UP FOR FUNDING BODIES

If you received funding support for your research, it is probable that you will be asked to write a report summarising your findings. The key points to consider in writing for funding bodies are:

- What are the requirements of the report?
- Financial summaries
- Executive summaries

Most funding bodies are quite specific about the requirements of their reports, and you should follow these. Most will require a statement of the process which was undertaken and the key findings. In addition, funding bodies are usually explicit about requiring statements of expenditure to ensure probity.

Funding bodies may require you to produce an ‘Executive Summary’ of your report, typically a single side of A4 paper. The aim of the executive summary is to provide an overview of the most important points of your report. This can be difficult, especially when you have spent a great deal of time and effort on a complex piece of work. It might be useful to think of summarising your work in terms of broad headings, for example

- Objectives
- Methods
- Findings
- Conclusions

Writing a few sentences about each section will allow you to focus on the most salient points. The original research question can help. The objective of your research was to answer the research question, and the conclusion should be the answer to the question.

WRITING FOR PUBLICATION

If you are writing for publication in an academic or professional journal, it would be a good idea to seek advice from someone who has published in these journals before. Most people would be willing to read drafts and to discuss style and presentation. Again, there are some key points to consider:

- Identify your journal
- Read some recent articles
- Study the guidelines for authors
- Draft and re-draft
- Submit
- The review process
- Be prepared to make modifications
- If at first you do not succeed ... look at other journals

Identify your journal

In thinking about the most appropriate journal for your research, you need to consider the audience who are most likely to be interested in your research. Since you are working in primary dental care, you should consider journals which are aimed to this group. Consider which journals you read yourself, and which journals were of most relevance when you were reading about your topic.

Read some recent articles

Once you have decided on a suitable journal, or journals, take a look at some of the most recent issues. This will do two things. First it will show you the type of issues which are being published or talked about in that journal. Second it will allow you to see the style of the articles. Does the journal use a lot of diagrams in colour? Are there different ‘types’ of articles? For example, the *British Dental Journal* (BDJ) has articles on Research, Education, and Practice. Check whether your article would fit into a particular section and whether there are any particular requirements for that section.

Study the guidelines for authors

Every journal has guidelines for authors. These detail how the journal formats the articles within it. There are standard requirements for the way in which references are formatted for example. You should read these guidelines carefully and ensure that your article follows them. This shows the editor that you have thought about his or her journal specifically. Also it cuts down on work, since if your article is accepted you are going to have to put it in the format sometime. The guidelines for authors can be found in the journal, or may be available on-line if the journal has a web page.

Most articles have a fairly standard structure. The sections in a ‘typical’ article are shown in Figure 1.

Draft and redraft

Write a first draft of your article and show it to friends and colleagues for comment. They

should be able to tell you where there are logical inconsistencies, or a lack of clarity in the text. Re-draft your article in the light of these comments. Be prepared to re-draft - it is unlikely that anything you write will be perfect first time. All authors should see the final version of the paper before you submit it.

Submission

When your article is ready for submission, send the required number of copies to the editor of the journal. The name and address of the editor together with details on how to submit articles will be found in the guidelines for authors that you studied previously. Many journals require the covering letter to the editor to be signed by all authors, so take note to ensure this is done if it is necessary. The covering letter should include a statement that the paper has not been submitted for publication elsewhere (if a paper has been submitted to another journal previously but rejected, then you do not need to mention this since that submission has in effect been withdrawn).

The review process

Once an editor receives your article he or she will read through the article and then send it to independent reviewers for comment. This process inevitably takes some time. Most editors will be happy to give you an idea of how long the review process takes and many, including the *BDJ*, will undertake to turn papers around within a certain time period. After the initial review the editor will write back to you with a decision regarding your manuscript. If you have chosen the right journal, and your research is interesting and well carried out then most probably your article will be accepted. Inevitably referees and editors will recommend changes to your manuscript.

Be prepared to make modifications

It is exceptional to have the first draft of a manuscript accepted as it stands. Again you should be prepared to re-draft. The letter from the editor will be accompanied by copies of the referees' comments. Read these carefully and note each point where changes are recommended. It is then easy to address each point in turn. As you make these changes we would recommend that you make notes about how you have addressed each point. When you resubmit the manuscript, you can send these notes to the editor to demonstrate how you have addressed each point. In many ways this draft is perhaps the easiest to write. You have clear guidelines (in the form of the referees' comments) about what to change, and the majority of the manuscript will not require changing.

Your manuscript may be rejected by the journal to which you have sent it. It is important that you read carefully the reasons given for the rejection. The worst case is that your paper is rejected because it is thought not to be of sufficient scientific merit. The referees may feel that

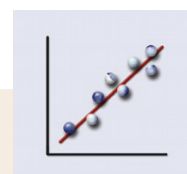
Fig. 1 Sections of a paper with brief descriptions of each section

Section	Description
<i>Abstract</i>	A brief summary of the research. Most journals place a word limit on the length of the abstract. The abstract does not usually contain a great deal of information on the background to the study. Abstracts may be either structured or unstructured. A structured abstract consists of specific sections such as <i>Aim; Method; Findings; Conclusions</i> . Unstructured abstracts contain similar information without the explicit sections.
<i>Introduction</i>	This section provides a summary and review of previous studies and literature which have led up to the present study. The Introduction sets the context for the study.
<i>Materials and method</i>	This describes how the study was carried out including information on the participants, the measures that were made, and the procedure that was followed. Often the Method can be sub-divided into sections on <i>Participants; Methods; Procedure; Analysis</i> .
<i>Findings</i>	The findings describe the results of the study including the analysis of the research question.
<i>Discussion</i>	The discussion should summarise the findings of the research and how these fit with previous research. The discussion will highlight how this new knowledge builds upon and extends previous knowledge in the area. The discussion should also examine any possible methodological weaknesses of the study – for example the representativeness of the sample, the weaknesses of the measures used.
<i>Conclusions</i>	The conclusions should be a brief statement of the findings of the study. A simple way to think about this is that the conclusions should state the answer to the research question.
<i>References</i>	A listing of the literature which has been referenced in the paper. There are several formats that can be used, it is important to ensure that you put your references in the correct format for your journal.

there are major flaws in the science of the study which mean that your findings cannot be supported. Often this is the result of poor response rates, or difficulties with sampling. Such concerns will mean that it is unlikely that your paper will be accepted in any journal. This eventuality is unlikely if your study has been well planned and conducted.

Other reasons for rejection are likely to be about the kind of material which the journal likes to cover. For example, the issue you tackle in your research may be a major concern for dentists in the UK but relatively insignificant outside the UK (an example might be whether patients know the charges for NHS dental treatment in general practice, and feel the charges are acceptable). In this instance a journal with an international focus may feel that the article is not of interest to its readership. Alternatively you may have sent an article on patient satisfaction with periodontal treatment to a journal that largely deals with research into caries. Often in this case, referees will suggest alternative journals to try. In this case you should look out the alternative journals and read carefully about the scope of the journals. Submit the manuscript to the most suitable journal.

After the modified manuscript has been submitted, it will be reviewed either by the editor alone if modifications are minor, or by the editor



Once an editor receives your article he or she will send it to independent reviewers for comment

Table 1 Writing guides and further information

General guides on writing up research

Murray R. *How to write a thesis*. Buckingham: Oxford University Press, 2002.
 Albert T. *The A-Z of Medical Writing*. London: BMJ Books, 2000.
 Day A. *How to get research published in journals*. Aldershot: Glower, 1996.

Writing up randomised controlled trials

See The Consort Statement available at: www.consort-statement.org/

It is also published in *The Lancet*:

Moher D, Schulz K F, Altman D G. The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomised trials. *The Lancet* 2001; **357**: 1191-1194.

Further information

The editorial board of the journal of the Faculty of General Dental Practitioners (UK), *Primary Dental Care*, will offer support and advice to GDPs who are hoping to publish their research in *Primary Dental Care*. Please contact the Publications and Communications Officer at:

Faculty of General Dental Practitioners (UK), The Royal College of Surgeons of England, 35-43, Lincoln's Inn Fields, London WC2A 3PE. Tel: 0207 869 6759

and referees if the modifications are more comprehensive. There might then follow another round of changes (it pays to be patient in the research world) but eventually the paper will be accepted. At this point you will be asked to assign the copyright of your manuscript to the journal. This simply transfers the copyright of the actual text of the manuscript to the publishers although the intellectual property remains with the author. The publisher then owns that paper, and any rights over reproduction etc. Most journals also ask you at this point to provide a copy of the final version of your manuscript on computer disk. This helps the typesetting process.

There is a delay between the acceptance of your article and its publication. This can be anything from a few months to over a year. Before the paper appears in print you will be sent a set of proofs to examine. These are rough

prints of the article as it will appear. Your job is to check for typographical errors. By the time you see the proofs publishers are working to deadlines, so they will ask you to send them back quickly. Shortly after you have sent back the proofs (usually within a month) your article should appear in print. You will either receive some copies of the article ('offprints') free of charge or they can be purchased from the journal. These are useful to give copies of your article to other researchers, some of whom will write to request a copy. You might also want to send copies of your article to academics and researchers whom you have quoted or whose work you have admired. It can be a good way of building contacts.

1. Newton J.T. The readability and utility of general dental practice patient information leaflets: an evaluation. *Br Dent J* 1995; **178**: 329-332.