

Preparing a paper for publication in a medical journal

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Every day do some reading or work apart from your profession. I fully realise, no one more so, how absorbing is the profession of medicine, but you will be a better man and not a worse practitioner for an avocation. I care not what it may be: gardening or farming, literature or history or bibliography, any of which will bring you in contact with books.

Osler. *Aequanimitas*

Preparing a paper for publication is an arduous task which is not always rewarded with the success of acceptance. More often than not, the rejection of a paper is due to bad methodology in performing a study or to testing a flawed hypothesis; in other words the science of the work is inferior. However, not infrequently, a paper is rejected simply because the presentation of the work in its final printed form is inadequate, either because it does not follow the journal stipulations for publication or is so disordered in structure as to obscure a message which may, indeed, be of merit.

There are different categories of publication in medical journals, each of which calls for a particular approach. Editorials, review articles, occasional papers and book reviews are usually invited and journals publish guidelines for the publication of scientific papers and case reports which must be followed. This brief review is concerned with publication of original scientific papers.

Varieties of paper

Editorials
Occasional papers
Scientific reviews
Topical reviews
Book reviews
Obituaries
Patient reports
Brief reports
Letters
Abstracts

Original scientific papers

Young doctors hungry for curriculum publications often rush into performing a study or survey without taking the time to plan and structure the project properly. This is particularly likely to happen in clinical medicine when the instigator of the study is junior and working in a busy department which does not conduct much research. Any editor will testify to the fact that there is an abundance of bad research being performed. The consequences of this are not solely confined to the investigator whose paper is rejected for publication. Often a rejected study has involved patients in unnecessary disturbance and, on occasion, discomfort which is not always without danger. Hopefully, hospital ethics committees will reduce research that exposes patients to danger, but ethics committees are

Journal of the Irish Colleges of Physicians and Surgeons
E. O'BRIEN, MD, FRCPI, FRCP, FACC, editor

Stages in publication of a scientific paper (3-6 years)

I.	Protocol (4-6 drafts) Ethics Committee approval	}	6-12 months
II.	The study proper Data processing	}	12-24 months
III.	Preliminary draft Further drafts (7-10)	}	2-3 months 6-12 months
IV.	Submission for publication Refereeing process Modification with editorial suggestions	}	4-12 months
V.	Proof stage Publication	}	4-9 months

not always in a position to judge the scientific merit of a proposed study though it would seem to me that if a study is so designed that a conclusive outcome is unlikely, it is then unethical. In short, ethics committees must be capable of making a reasoned scientific assessment of research proposals.

Stages in publication

The stages through which a paper must pass from the conception of the idea that fires the process to actual publication take longer than is generally realised. The times allocated to each stage are necessarily estimates, as the process is dependent on many factors, not least of which are the time taken to perform the project and the delay of the selected journal in processing a submitted manuscript, but in general two to three years may be added to the time taken to carry out a study. This, in effect, means that few ideas find expression in print in under five years. Of these stages the one most crucial to success is writing the protocol.

Writing a protocol

Since the establishment of ethics committees in all hospitals performing research the study protocol has become mandatory but even for research projects, such as retrospective surveys of hospital records, which may not at present come within the remit of ethics committees, a protocol should be an indispensable part of the process of scientific enquiry. In planning a research study, Bradford Hill's fundamental questions should be given careful consideration.¹

A protocol should be written as if it was, in fact, the finished paper; it is the paper *sans* results. The process of modifying and updating the protocol which will blend almost imperceptibly into the first draft of a manuscript for publication is greatly facilitated by using a word processor, which should now be

regarded as an essential skill for any aspiring researcher. The protocol, like the paper into which it will mature, should follow the standard format of scientific papers. It should begin, therefore, with a title page listing the authors. The number of authors should be restricted to those who contribute significantly to the work and some journals request a declaration defining the role of participant authors. The journal to which it is proposed to send the paper when the work has been completed should be selected so that its publication requirements, such as reference style, can be followed from the outset. The literature should be thoroughly searched at this stage and all references read and listed.

The title page should be followed by a summary, which at this stage can do no more than set out the aims of the proposed research but even the discipline of summarising what one hopes to do can be a salutary experience. An introduction referring to the listed references is followed by a detailed description of the methods to be used including methods of analysis and the statistics to be employed. At this stage, the results section must remain blank though an outline for presentation of results can be presented, such as the design of tables and illustrations. A preliminary discussion based on the literature search familiarises the researcher with the field and, in particular, ensures that the work has not been done previously. This is followed by the references accurately typed in the Vancouver style² or according to the style of the journal selected. As the study proceeds, the literature should be continuously reviewed so that the discussion and reference list is brought up to date from time to time. Finally, acknowledgement should be made to participants who have assisted in the work but do not merit authorship status. Grant awarding bodies should also be acknowledged. The protocol should also include a detailed costing of the study. When it has been

completed, it should be discussed with the head of the department and the other authors and modified as necessary in the light of these discussions. It may take as many as four to six drafts before the protocol is satisfactory.

Submission to ethics committee

When the protocol has been completed, it is submitted together with other necessary documentation (e.g. patient consent form, national drug regulation documentation and pharmaceutical company indemnity where indicated) to the ethics committee. This is mandatory and most journals will not publish without an assurance that such approval had been granted. Allowing for queries and modifications suggested by the ethics committee this process usually takes at least six months.

Data processing

In many studies, it is possible to process data as the study progresses, whereas with others, such as blinded trials, the results are not available until the study has been completed. Data processing and statistical analysis are facilitated by using relevant computer software packages.

Writing the paper

If the above scheme is followed, two-thirds or more of the paper should be written by the time the study is completed and the time taken to prepare a manuscript may be shortened

Bradford Hill's criteria for publishing a paper

Why did you start?
What did you do?
What answer did you get?
What does it mean?

greatly in that two or more preliminary drafts will have been prepared in writing the protocol and during the study. None the less, a number of further drafts will be necessary and in my experience it is rarely possible to prepare a manuscript for submission for publication in a prestigious journal in much under ten drafts, and if the topic is complex or the study intricate, as many as twenty drafts may be needed before a satisfactory manuscript is produced.

In submitting a manuscript, it is essential to comply with the journal requirements. Some journals require a number of copies, all demand professional artwork and glossy prints of illustrations, some ask for a signed declaration by all authors that the work has not been submitted or published elsewhere and others request a manuscript processing fee. Finally, the manuscript should be neatly presented and clearly laid out with headings and sub-headings as appropriate; the use of a word processor should make it possible for research workers to produce their own manuscripts without secretarial assistance. Only good quality paper should be used and it is surprising how often authors who have spent years working on a piece of research, trust the final product to the vagaries of the postal service in a flimsy envelope. It is worth the extra expense to

ensure delivery by special post and to put the manuscript in a cardboard envelope.

Writing style

There are many books expressing views and opinions on writing style and the importance of clarity of expression, but the best way of mastering a reasonable style suitable, at least, for medical papers is to heed Osler's admonition and to read outside of medicine. Of the many books on the subject of medical writing, Richard Asher's *Talking Sense* is the most enjoyable as well as being effective.⁴

Peer review and editorial decision

Once a paper leaves the gestational sanctuary of the research laboratory or clinical department it undergoes considerable scrutiny from a number of sources. First, the editor will read it and decide if it is suitable for his journal and if the scientific content seems reasonable. In this, he is concerned more with the general principles of scientific presentation rather than with the specific content of the paper. A badly written paper with inadequate statistics, poor data presentation and incomplete or out-dated references may influence an editor to turn down a paper but usually all papers are sent to at least one and often to a number of referees. Many journals have a policy of sending all papers to two referees initially and, if both are in favour, the paper is likely to be accepted subject to the referees' conditions being met by the author(s). If the referees are in disagreement, the editor may send the paper and the conflicting referees opinions to a third referee and then use his discretion in making the final decision. A paper on a clinical subject but relying heavily on statistics might be sent both to clinical and statistical referees and a negative response from one discipline in the face of a recommendation from the other might suffice to see the paper declined publication.

On the basis of the referees' opinions, together with his own feeling for the submitted paper, the editor decides to reject the paper, to accept it as it stands or with modifications suggested by him and his referees. It is, in fact, very unusual for a paper to be accepted without modification which often has to be quite extensive. The editor will generally impose a time limit for the author to return the paper after the expiry of which the paper will be treated as a new submission subject to the peer review process again. The intricate editorial and peer review processes have been critically evaluated by Lock.⁴

Two rather sobering facts emerge from consideration of the editorial process: first, a prestigious journal may reject more than 80% of the papers submitted to it, and second the work involved in modifying a paper to satisfy editorial requirements may be considerable. It is the exceptional paper only that is published within nine months to a year of the date of original submission with many taking appreciably longer.

If an editor turns down a paper the author is

usually given the reason for the decision which, more often than not, is based on peer opinion. The editor may enclose the opinion of the referee(s) or summarise their conclusions. If an author genuinely feels that a paper has been judged unfairly it is reasonable to write to the editor arguing the case. If the argument is persuasive the editor may send the paper out again to an independent referee. If the decision remains negative and the author(s) are convinced about the scientific integrity of their work the only option is to try another journal. If, however, the editorial process has identified, as it so often does, a major weakness in the study, it is best to perform the study again or to abandon hope of publishing rather than attempting to place a paper of inferior quality which will endure in print as an embarrassing indictment.

Proof stage

Proofs of a paper are the penultimate stage in the long publishing procedure and their prompt return is usually requested. This often bemuses authors who have been through the arduous and protracted task of modifying the paper to the satisfaction of an editor who is now demanding urgent attention. This happens because once a paper has passed from manuscript form to page or galley proof it is destined for a particular issue which will be at an advanced stage of planning and any delay with proof reading

Structure of a scientific paper

Summary
Introduction
Patients (materials) and methods
Results
Discussion
References
Acknowledgements

can have serious consequences. It is advisable for researchers to learn the more common proof correcting signs.⁵

Conclusion

Publishing a scientific paper in a medical journal demands discipline and an understanding of the rather protracted procedure that attempts to ensure that inferior work does not confound an already overloaded literature. The most important stage in the process is protocol planning — if this is founded on sound scientific principles, the project is likely to succeed; the converse is also true. The daunting aspects of writing a paper are more than compensated for by the personal achievement in successfully bringing a concept to fruition in print.

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