

Preparing manuscript: Scientific writing for publication

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ABSTRACT

Publication has become a burning issue among Indian medical fraternity owing to certain academic and professional necessities. The large number of submissions to the anaesthesia journals has resulted in accumulation of too much below average scientific material. A properly written manuscript is the dream of every editor and reviewer. The art of preparing a manuscript can be acquired only by following certain basic rules and technical aspects, besides knowledge and skills. Before preparing the manuscript, a target journal should be considered. All the instructions to the authors pertaining to that particular journal should be followed meticulously before preparing the manuscript for submission. The basic structure of the manuscript to be followed can be summarised by the acronym IMRaD (introduction, methods, results and discussion). The current review article aims to highlight all those mandatory and desirable features which should be kept in consideration while preparing a scientific manuscript for publication.

Key words: Introduction, manuscript, Medical Subject Heading, methods, results and discussion, scientific writing

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INTRODUCTION

Publication of a research work is the last step in the field of medical academics. A lot of efforts are made to accomplish medical research; however, when it comes to publishing this hard work, most of the researchers either lose the steam or get disinterested. Poorly prepared manuscripts and multiple rejections by various journals further dampen their spirits. Lack of novelty in research, poor research design, inappropriate methodology, errors in selecting proper statistical tools and techniques, inadequate training of scientific writing, grammatical and syntax errors and various other flaws are major contributory factors leading to the preparation of a poor manuscript. The enthusiasm and the joy of writing diminish with repeated rejection of manuscripts even in authors with good potential.^[1-3] This narrative review emphasises on the basic mandatory and desirable aspects which should be taken into consideration while preparing a manuscript for publication.

CURRENT SCENARIO IN INDIA

Scientific writing in India especially in medical field has for long remained in a plateau phase but has gained

importance in recent times. Performance pressure and obligation to publish for promotions has created a rat race for rapid publication and acceptance. 'Publish or perish' has become the necessary evil for medical scientific literature in our nation. Besides the flaws in the research methodology and poor study designs, the scientific writing and publication are also not up to the academic, scientific and ethical standards. With more emphasis on thesis completion, old topics are being presented in a new package. Although such thesis topics may help the post-graduate understand the steps of methodological research, for the scientific community, this is like garbage in and garbage out leading to accumulation of poor or below average literature. Ignoring the cultural and academic aspects of research is leading to plagiarism, misconduct and conflicts. An acute need is felt among academicians

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to resolve these issues by adopting appropriate measures to boost the ethical and scientific research in our nation. The current narrative review is part of such measures adopted by the Indian Society of Anaesthesiologists (ISA) including development of 'Research methodology and publication module' to guide the anaesthesiologists towards better scientific writing approach. The aim of this module is to inculcate the ethical and scientific approach towards the medical writing for publication among the anaesthesiologists.

PRE-REQUISITES TO MANUSCRIPT PREPARATION

Scientific writing for publication is a process that involves various steps such as planning, writing, revising and then, submission to the journal. There are a few prerequisites before one begins to write. A review of literature for originality of the idea and lacunae in the current knowledge is helpful. It is imperative to have a clear understanding of research hypothesis, data and anticipated key results. Identification of target readers helps in selecting the right journal for submission of manuscript. The manuscript should be prepared according to the specifications of the journal, and a statistician should be involved from the beginning. As the author guidelines for journals are subjected to change with time, it is advisable to review the latest author guidelines of the journal while preparing the manuscript.^[4] The International Committee of Medical Journals Editors (ICMJE) provides guidelines for authorship issues and these should be followed universally while preparing a manuscript.^[5] There are other research reporting guidelines to ensure accurate reporting such as Consolidated Standards of Reporting Trials (CONSORT) for clinical trials, Strengthening the Reporting of Observational studies in Epidemiology for observational studies (STROBE) and Preferred Reporting Items for Systematic Reviews and Meta-Analyses for systematic reviews and meta-analysis (PRISMA).^[6] Discussing the skeleton and empty tables and figures with co-authors helps in creating a clear and concise storyline. This should be done at the beginning of writing the manuscript after collection and analysis of data and making only relevant tables and figures.^[7] Methods and results sections are easier to write, and one can write them before writing introduction and discussion.^[8]

Title and abstract

Abstracts of various manuscripts are freely available online, and the readers rely on these to search relevant literature. The abstract is the single most important

part of the manuscript and yet often neglected and poorly written. A concise and standalone abstract serves as a resume for the manuscript and helps the readers decide whether it is relevant to their work.^[9] Abstract should be written according to the journal's guidelines, but it is preferable to restrict the word limit to <250. No reference should be cited in the abstract part of the manuscript. The abstract includes:

- Background and aims which should convey the need for the study
- Materials and methods should briefly describe the settings, design, parameters to be observed and statistical analysis
- Results should be brief with emphasis on significant findings
- Conclusions should be short and strong.

The abstract outline may be developed early and can be revised later to include the highlights of manuscript. Usually, 3–10 keywords are required along with the abstract that reveal the main topic of the study. These should be the words registered under Medical Subject Heading of National Library of Medicine databases.^[10]

After writing the abstract, the author should be able to answer fundamental questions on writing: Why did we start? What did we do? What did we find? What does it mean? These form the basis of introduction, methods, results and discussion format used for scientific writing.^[11]

Introduction section

It is the section where the author states the purpose or rationale for carrying out the research. Information about the background of the problem (what is known) and its current state (what is unknown) is included in the introduction. Authors have to highlight the gaps in the literature that the study is going to fill and state the relevance of research question. Research hypothesis and study outcomes (primary and secondary) are integral parts of introduction. This creates a strong background on which the aims and objectives of the study are built. Important statements need to be backed by pertinent references, but too many references should be avoided as they dilute the novelty of the study. There are no maximum word limits for introduction, but it is preferable to restrict it to <10%–15% of total word count of the paper.^[12]

Material and Methods

This section provides adequate information about the design, methodology and feasibility to replicate

the study. Editors judge the study on whether the methods used are adequate to answer the specific aims and research question. This section should begin with a mention of ethical clearance from the institute review board or pharmacovigilance committee clearance as well as patient's consent. Authors and institutional identity should never be disclosed in the main manuscript as majority of the journals follow a double-blinded, peer-reviewed process. Inclusion and exclusion criteria should be clearly defined on scientific and clinical basis. If scoring sheets or scales are used, one should ensure that they are properly validated and should have scientific support. Authors should describe the procedures and statistical tests used in detail and the rationale for choosing these. It is better to avoid the method which the authors do not have expertise with. Rather the presentation of methodology should be in clear, plain English for a general reader to understand. Other essentials of materials and methods section include but are not limited to following aspects [Table 1].

Results

Result section forms the heart of the manuscript. It should always be written in the past tense. Results confirm or reject the hypothesis which was built initially during planning of the study, but they do not prove anything. It is a good practice to present a flowchart of the recruitment procedure and response of the subjects to interventions.^[13] While mentioning these procedures, the CONSORT statement should be strictly followed for all the research studies. It is better to write the result section after figures and tables are constructed and including them in the outline. Analyse the data critically and use logical headers

Table 1: Essentials of materials and methods

Describe study design or analysis of study with respect to various variables and parameters
Details of the clinical trial registry of India to be mentioned
Drug or technique studied to be described in detail
Study period or duration of study (starting and completion dates) and the place where it was conducted (primary, secondary or tertiary care centre and in which part of the country)
Process of randomisation and technique of blinding
Sample details (recruitment of subjects on the basis of inclusion and exclusion criteria and rationale for sample size calculation based on primary objective or end-point should be described)
Describe the exposure or intervention investigated, what outcomes were measured, when and how they were measured
Describe outcome or dependent variables starting with the primary outcome measures
Provide sufficient details about the software and statistical analysis used. This part can be written with the help of a statistician.
Details should clearly mention about the basis of various parametric and non-parametric tests

and subheadings while writing the results. The observations should be presented in the order listed in the methods, preferably from general to specific. All the findings whether significant or not should be stated without bias or interpretation. The results determine whether the original research question has been answered and it forms the base for direction for future studies.

Discussion

In this section, the results are discussed but not repeated or summarised. One should begin with a summary of the main findings or by answering the research question in the first paragraph itself. This is followed by a literary comparison with other studies and implications in clinical practice or research.^[14] When comparing with other studies, the most recent articles from the highest impact journals must be selected. In case of contrasting results, scientific and clinical explanation must be provided if possible with a valid reference. The strengths and limitations of the study should be acknowledged, and means for improvement should be suggested along with future direction for such studies.^[15] 'Do not try to fill River Ganga in a small bowl' by getting too verbose or with overstatements as only a few studies can make discoveries and innovations that can change the course of anaesthesia practice. In doing so, authors most often:

- Attempt to overstate the importance of their findings
- Come to erroneous or statistically unsupported conclusions
- Uncritically accept statistical results, which results in excessive length, a common problem.

Authors should let the data speak for themselves. The discussion section should end after appropriately mentioning the conclusions in brief.

Conclusion section

Conclusion part should contain the key message that has been discussed in the manuscript. It should be brief, succinct and should not mention anything which has not been discussed earlier in the text. Similar to abstract, no reference should be cited in this part of the manuscript.

Methodology of Referencing

References should strictly be written and quoted according to journal's instructions which are easily available on the website of the journal. The references

should be entered in Vancouver style in the text part of the manuscript; that is they should appear in the same consecutive numerical order as they appear in the final references section. Journal articles, book references, monographs, articles from electronic databases and books should be written strictly according to the prescribed format by Indian Journal Of Anaesthesia (IJA). Use of *et al.* should appear after six authors if there are more than six authors in the reference as per the recommendations of ICMJE. More information regarding precise method of reference writing can be searched from <http://www.icmje.org> or http://www.nlm.nih.gov/bsd/uniform_requirements.html.

Tables and figures

Tables and figure are critical to a paper as the editors and readers look at these before reading the manuscript. Editors can judge the entire manuscript on how well these are constructed. They help in eliminating numerical data and unnecessary long explanations in the text. Any ambiguity in the data becomes immediately clear. Figures display important trends and procedures, simplify detailed data and show basic methodologies. Journals, (such as the Indian Journal of Anaesthesia), do not routinely publish coloured figures and graphs for economical reasons, unless they are extremely necessary for understanding the content. The journal permits colour printing at fixed costs, as per journal's policy. Moreover, maximum permissible number of tables and figures should not exceed six and it should be ensured that the content of the tables and figures is not repeated unnecessarily in the text. The editorial board can allow more numbers to be published as per their assessment of the article content and importance and impact on anaesthesia practice.

Contents of the title page

Besides the title and type of manuscript, the title page should also contain the information regarding authors including their institutional affiliation, current designation, contribution of each author and contact details. It should also contain the registered trial number of the research. Running title should also be mentioned in the title page file. Copyright form signed by all authors should be uploaded during submission of the manuscript

An editor's perspective

Incorrect style irritates editors and reviewers, and invariably, the chances of acceptance get diminished. A careful evaluation again including elimination of

spelling errors, punctuation mistakes, grammatical and syntax errors should be done before finally submitting it to the journal [Table 2]. This practice can be improved by writing, rewriting and rewriting. Incorrect citations and inaccuracy of references put everyone in the editorial board in an inconvenient state before acceptance and are a disservice to the reader after publication. Numerical data, figures and tables legends must be checked multiple times for their consistency and accuracy [Table 2]. Repetition should be avoided such as repeating some sentences of introduction in the discussion section or repeating figure legends, table titles or contents of the tables in the text. Abbreviations, definitions, symbols in figures and tables must be explained in legends and footnotes and never refer a reader back to text for such information [Table 2].

Selection of a wrong journal or format, poorly presented abstract and title, flawed study design, inappropriate research question and hypothesis, poor selection of statistical tests, being too verbose about study results, disorganised writing style with grammatical and syntax errors and poor presentation of tables and figures are some of the main flaws which are responsible for rejection of the manuscript.

Submission and showing patience

Pressure to publish quickly may lead to rejection as all the editors and reviewers devote their precious time to evaluate the manuscripts. They do the honorary work without any emoluments and do expect good conduct from authors. It is therefore suggested to the authors that after they finish writing, they should put the manuscript away for a few days. Then, read it again for finding potential mistakes by reading it aloud in front of any co-author. While revising and editing, one

Table 2: Editor and reviewer's expectation of a good manuscript

Title: Descriptive and specific
Abstract: Specific with recommended word limit
Introduction: Short, strong and should focus on background
Research question: Clearly stated
Literature: Comprehensive, relevant and not too old
Methods: Descriptive and replicable
Figures and tables: Should speak for themselves
Citations: Strictly relevant to topic and properly described in text
Discussion
Focus on resolution of stated research question
Appropriate comparison with earlier studies
Addressing of the limitations
Need for future research
Writing should have clarity of thoughts, logical and terse

should not be hesitant in getting useful inputs even from the junior colleagues. One should develop their own style of writing as it will help immensely in the long run of academic life.

The manuscript to be submitted should strictly adhere to the journal's guidelines. After submission of the manuscript, authors should show some patience for the review process and decision. After the peer-review stage, the manuscript sent for revision should be duly attended on point to point basis as per the reviewer's and editor's comments. Casually attended comments and incomplete revisions are mainly responsible for rejection even though the manuscript may be scientifically good. It takes a minimum of 3–6 months for the completion of review process and final decision, but articles which are not suitable for publication are rejected in quicker time.

SUMMARY

This narrative review has covered almost everything which is essential and desirable towards writing and preparing a good scientific manuscript for publication. Whatever has been discussed in this review is a very basic process of scientific writing which is mandatory for submission to any journal. However, certain areas may have been described in a very brief manner, but the scope of this article covers only the basics of research writing and advanced aspects can be downloaded from the ICMJE website (www.icmje.org). We do hope that this article proves very helpful for our anaesthesiologist fraternity in future for writing for any scientific medical journal.

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Conflicts of interest

There are no conflicts of interest.

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