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Correspondence

Prof. Dr. Jay N Shah
Editor in Chief, Journal of Patan
Academy of Health Sciences
(JPAHS), Patan Academy of
Health Sciences (PAHS),
Lalitpur, Kathmandu, Nepal.

Email:

editor.jpahs@pahs.edu.np
drjaywufei@gmail.com
drjaywufei@hotmail.com

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Science of writing for publication in scientific journals: steps and resources

Jay Shah  

Chief editor, Journal of Patan Academy of Health Sciences (JPAHS), Patan
Academy of Health Sciences (PAHS), Lalitpur, Kathmandu, Nepal

The step-by-step process on how to write a publishable manuscript, starting from the title up to the reference requires reading articles and books which are available in plenty online and offline on scientific writing, and to prepare to start the journey of writing and publication in scientific journals. One of the best ways to embark on this journey is by trying to do it, by practice, practice, and more practice.

Historically, the initiation of modern scientific writing began some 350 years ago in 1665 with the publication of 'Philosophical Transactions', considered as one of the first scientific journal.^{1,2} Half a century later, the format of writing and peer-review were introduced in 1731, but it took almost two centuries, until after World War II, for the wider acceptance of the concept by the journals.³ The structured format of writing introduced in the 1940s has evolved to what we know today as IMRAD-introduction-methods-results-and-discussion. This IMRAD format helps guide authors to address the essential components of research work, and makes it easier for the reviewer, the editors, and most importantly the readers to understand what is being presented.⁴ The IMRAD, and aIMRAD (a=abstract, in which the discussion is replaced and presented as conclusion) is an easy concept for comprehension, Figure 1.⁵

The research shows that less than half of the presentations in scientific conferences get published as articles in a peer-reviewed journal.⁶ The lack of a formal teaching and training on 'how to write and publish in scientific journals' needs to be taken in to consideration in the curriculum starting from undergraduate which can be further strengthened during postgraduate program. The sporadic workshops and training are mostly limited to how to write a research proposal, collection of data, and statistics. Requirement for thesis for graduation fall short in actually teaching how to present nearly a hundred page of document (thesis) in to 4-5 pages of article in a journal. The manuscript writing for scientific journal is mostly a trial and error for most authors. So, what we can do to solve this?

A dedicated time and integrated curriculum for how to write and publish in the scientific journal is the best possible answer. This is slowly getting attention and being integrated into the curriculum in medical schools and academia. For example, besides the scattered credit hours on statistics and research knowledge, a full-day interactive workshop training 'on how to write and publish' is mandatory before completion of an internship for undergraduates at the medical school of Patan Academy of Health Sciences (PAHS). Also, PAHS has made it mandatory for masters-level postgraduate residents to include 'publishable article' together with a research thesis.^{7,8}

The online resources available on the internet to guide the aspiring authors are plenty⁹⁻¹² and found as - URL (uniform resource locator) portals, direct links (Weblinks), and specific tools. The URL is the reference (of the website address) to a resource on the internet. The website address locates a 'web page' containing displayable documents of institutions, professional organizations, publishers on a browser, e.g. [Google Chrome](#), [Microsoft Internet Explorer](#), [Firefox](#), [Baidu](#), [Safari](#), etc. The search engine provides web service to find the 'web pages', like Google, Bing, Baidu, etc. The web pages are collected, grouped, and connected on a 'web site' which is hosted on a computer (webserver) on the internet. For example, the Duke's university portal on scientific writing: [Scientific Writing Resources](#); the National Library of Medicine's NLM indexes biomedical literature on [PubMed](#); Google has [Google Scholar](#) for scholarly literature; Baidu provides [Baidu Scholar](#); China National Knowledge Infrastructure [CNKI](#) provides [China Academic Journals](#); Nepal Journals Online [NepJOL](#) indexes Nepalese journals; Nepal MEDLINE has Medical Literature Analysis and Retrieval System Online by Nepal Health Research Council [NHRC](#) as [NepMed](#); African Journals Online [AJOL](#) provides African-published scholarly journals; Korean medical, dental, nursing, nutrition, and veterinary journals are listed on [KoreaMed](#); National Databases of Indian Medical Journals on [IndMed](#), Index

[Medicus for South-East Asia Region](#) archives selected publications in health sciences in the WHO South-East Asia Region on [IMSEAR](#); etc.

Online 'web links' provide various documents directly by one-click, and avoids the tedious mining of one-by-one among the listed resources on URLs. For example, a simple click to the weblink [Scientific Writing Resources](#) will access the book on 'How to Write and Publish a Scientific Paper by Barbara Gastel and Robert A. Day' listed on the URL portal the Dukes university on Science Writing. The online 'tools' are useful for a specific need, for example, the spell checkers [Grammarly](#), and [plagiarism check](#) are useful resources during scientific writing.

The beginning of writing an article can be overwhelming, for example, how to start with and present a good title. The topic or title of an article is a label with a concise statement in simple and catchy words that stand out among the millions of documents available on searchable databases. The content of the title should match the main text and convince the reader to go to read the full article. With the flooding of information in the digital world today, readers simply scan rather than read the title. And so, we need to spend time to construct a good title that should contain keywords and phrases to catch the attention of the readers and even more importantly the 'eyes' of indexing software which will increase the visibility of the article.¹³ Writing a good introduction section within the limit for word count (150-200) is like a resume which is the entrance to the main text. It provides briefly starting from a broader overview of the topic narrowing it down to the study itself. It provides relevance for the research topic with a clear statement to convince the readers why they should care to read the full article.¹⁴

The policy statements and guidelines advocated by the International Committee of Medical Journal Editors ([ICMJE](#))¹⁵ in its updated 'Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals' provides detailed information on how to improve the

quality of medical science and its reporting. The ICMJE guidelines are increasingly adopted by the journals for 'Uniform Requirements for Manuscripts Submitted to Biomedical Journals'. For example, the author and authorship issue for listing in the names in author byline in compliance with ethical norms and to avoid a misconduct.¹⁶

Some of the basics of scientific writing include a clear presentation of 'why' the study was done, 'what was done, and issues like how, where, and so what, the ethical issue', etc. All these should be presented in a logical flow in a well-written method section.¹⁷ Conflict of interest, funding, acknowledgments are necessary parts of the final manuscript that add value. Citation of literature with a searchable link in references¹⁸ according to the journal style is an integral part that allows the reader to go back to the source of evidence. Citations are acknowledging others' work. It also, avoid being a victim of plagiarism. The ethical issues in publication can be found in detail on the Committee on Publication Ethics (COPE).^{9,10,15} The arguments for the findings, in context to what is already known, any deviation from the norms and future directions for further work should be provided with necessary details in the discussion¹⁹ which must be based on the results²⁰ to address the objectives of the research work outlined in details in the methods.

One of the ways to overcome the fear of writing is not to look for perfection in one go and postpone the actual writing endlessly. Starting with a rough draft is helpful to overcome the fear and then make revisions to progress, and finally achieve the goal of completing a publishable manuscript. Once the draft is ready, it is better to let it rest for a few days before starting the revisions right away. This resting time is not a postponement, and should not wait until the

deadline to be in pressure for final submission to the journal. This will increase the chance of errors. A poorly prepared, and incomplete manuscript is the main cause for desk-rejection.^{21,22}

The findings of the research are the most exciting part. However, in the journal article, it occupies the least of the space. The result should begin by presenting the main findings, as outlined in the aim and objective of the study and not always, this many were male and female of this age, etc. unless the research focusses on the demographics.²⁰

The discussion section is where the findings of the research work are scrutinized to fit into the bigger pool of literature by providing meaning to the results based on the methods. The discussion should begin with the most important finding stated in the objectives of the method section and explore in broader logical elaboration, in the form of a triangle opposite to the introduction which starts from a broader aspect to the study itself. This section discusses how the results can be generalized, how the findings are similar to not to the published literature and to expand the knowledge in the related field.¹⁹

The abstract appears at the beginning of an article, but it should be written only after the completion of the draft manuscript. The abstract is a freely available 'mini-article'. It is written in a structured format of aIMRAD within the word limit (mostly 250) as required by the journal.²³ The information in the abstract must be in line with the main text, and should not contain abbreviations and citations.

The clarity in writing with sufficient details is crucial²⁴⁻²⁷, so that others can reproduce and validate the findings.²⁴⁻²⁸ Happy writing and publication.

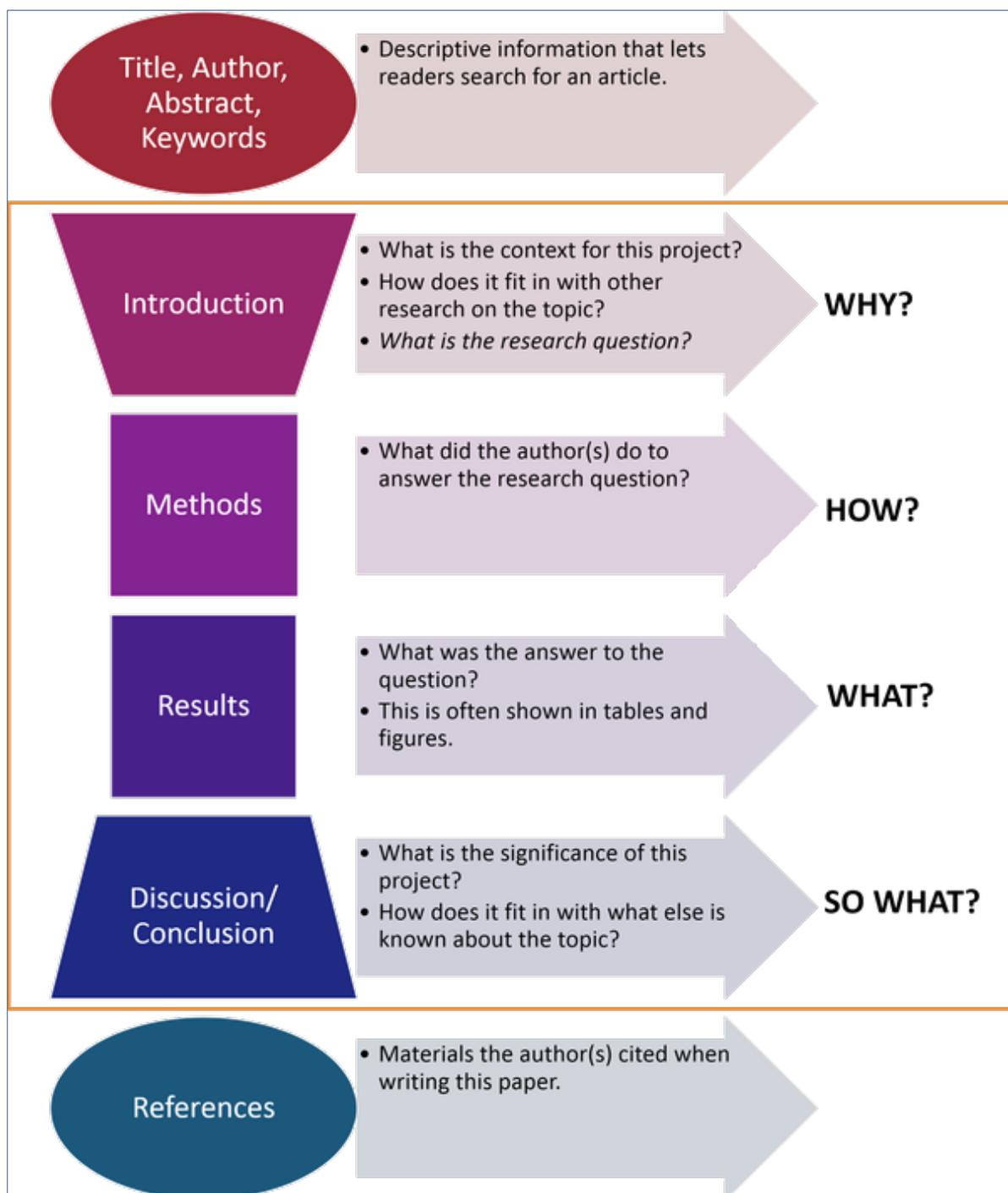


Figure 1. The IMRAD (introduction, method, result, and discussion) structure of an article in a scientific journal.⁵

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