



# How to write an original article in medicine and medical science

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Excellent research in the fields of medicine and medical science can advance the field and contribute to human health improvement. In this aspect, research is important. However, if researchers do not publish their research, their efforts cannot benefit anyone. To make a difference, researchers must disseminate their results and communicate their opinions. One way to do this is by publishing their research. Therefore, academic writing is an essential skill for researchers. However, preparing a manuscript is not an easy task, and it is difficult to write well. Following a structure may be helpful for researchers. For example, the standard structure of medical and medical science articles includes the following sections: introduction, methods, results, and discussion (IMRAD). The purpose of this review is to present an introduction for researchers, especially novices, on how to write an original article in the field of medicine and medical science. Therefore, we discuss how to prepare and write a research manuscript for publication, using the IMRAD structure. We also included specific tips for writing manuscripts in medicine and medical science.

**Keywords:** Education; Journal article; Medicine; Methods

## Introduction

Owing to the rapid development of medicine and the popularization of the internet, a vast amount of medical knowledge is available every day. To acquire new medical and scientific knowledge and data, researchers must read and assess published articles diligently and make continuous efforts to apply the findings to patient care or research. A researcher's ability to understand medical and scientific articles is very important.

Researchers can also obtain new knowledge by investigating unresolved queries, and informing other researchers of their studies. Researchers from all fields share their findings by reporting the results of studies in scientific journals. Re-

searchers with expertise in a particular field are valued and their authority is evident by the impact of their published studies. It is not easy to conduct excellent research, and it is often difficult to effectively communicate our research outcomes. Many researchers have trouble with writing journal articles and find the process burdensome. Journals with high impact factors often allow English submissions for publication consideration only. For researchers whose native language is not English, writing manuscripts in English is a major obstacle.

Fortunately, there is a standard, preferred way to write original research papers, and the format follows the introduction, methods, results, and discussion (IMRAD) structure (Table 1). Scientific articles in medicine and medical

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**Table 1.** Composition of an original article in medicine and medical science

Section	Purpose
Introduction (I)	Why did you conduct the research?
Methods (M)	How did you conduct your research?
Results (R)	What have you discovered through your research?
And (A)	
Discussion (D)	What are the implications of your research findings?

science first began in the form of letters and descriptions in the 17th century [1]. The IMRAD structure was introduced in the twentieth century. In less than 40 years, the structure became widely used [2]. Following the IMRAD structure when preparing a research manuscript has many advantages. In this review, we described how to write an original article using the IMRAD structure.

## The process of writing an original article

### 1. Preparation for writing

Before explaining the IMRAD structure, there are a few points that may assist with writing preparations. One aspect involves conducting literature searches and research. In general, an original article is written based on research results. A literature search is the first step in conducting research. It is essential to check whether there has been any prior research on the issue to be studied, and if so, understand the research findings, and identify the strengths and limitations of the research. In addition to landmark studies, recently published studies should be comprehensively investigated. This process allows researchers to view their research more objectively, and in turn, understand the strengths and weaknesses of their research. Furthermore, before starting the research, researchers should make the subject and target of the research as specific as possible, and consider whether the research to be conducted is feasible. Similarly, researchers need to ask themselves some questions before conducting their research and writing a manuscript: Did I perform something new and interesting? Is the task related to a current issue? Do I have solid evidence and clear answers to support my hypotheses and proposed goals? Are the conclusions of this study relevant? [3]. Only if the answer to each question is “yes,” should the researchers begin to prepare their manuscript.

Journal selection is also an important consideration. Be-

fore writing a manuscript, the authors should take the time to carefully consider the most appropriate target journals. The most common way to determine if a journal is suitable is to look at the articles referenced by researchers who are conducting studies in the same area. To determine if a journal is interested in an article on a particular topic, the authors should refer to the aims and scope of each journal. It is also helpful to read the latest publications of the target journal. For example, the *Kosin Medical Journal* (KMJ) aims to “communicate new medical information to medical personnel and facilitate the development of medicine, medical science, medical ethics, medical policy, and medical education, as well as the propagation of medical knowledge by publishing high-quality, evidence-based articles.”

Once the target journal has been decided, it is important to meticulously read the instructions to authors, which are usually available on the journal’s website. Instructions to authors contain detailed information regarding the design and structure of the abstract and main context, preferred referencing style, the maximum number of words, format of figures and tables, etc. Authors must ensure that all the journal requirements are met. If authors soundly format the article according to the requirement of the target journal, journal editor will be happy to facilitate the review process.

### 2. Title page

The title page should consist of the full title, authors, institutional affiliations, the corresponding author’s name and contact details, funding sources, and conflicts of interest. Please be mindful that while most journals require these in the title page. There are also journals that are very particular about what to include and not include. Some require two title pages for example a separate title page file with all the information and a simplified title page with the main text with only the full title. This is especially so, if the paper uses blinded peer review. Depending on the journal, a running head, word count, and the number of figures and tables may also be required.

#### 1) Article title

A good title is cardinal because it arouses curiosity and can lead the reader to read the article. Simultaneously, the title should explain the content of the manuscript. A succinct title is easier to understand than a long and complex title. In addition, a succinct title that describe the study design. The

title should contain all sensitive and specific information so that the research can be detected through electronic retrieval [4].

### 2) Authors and institutional affiliations

Names are a sensitive issue. We recommend that you do not change your name throughout your career. Decide carefully what name you will publish under from the beginning. For authors, whose first language is not English, pay particular attention to the spacing between the letters of the English version of your name. Some journals also present the highest academic degree(s) for each author, while others do not. Always check the name of the department(s) and institution(s) to which the research is attributed.

Authorship and order of authors are also controversial. The International Committee of Medical Journal Editors (ICMJE) recommends the following criteria for authorship. Authorship credit should be based on (1) substantial contributions to the study concept and design, data collection, or data analysis and interpretation, (2) drafting or critically revising articles from important perspectives, and (3) final approval of the version to be published. The authors should satisfy all three conditions [4].

### 3) Corresponding author

The corresponding author receives all correspondences from the journal editors and is responsible for archiving the entire study. Therefore, the corresponding author must provide details of his/her full name, workplace, postal and e-mail addresses, telephone numbers, and fax numbers.

### 4) Funding and conflicts of interest

If the study was supported by funding or if there are any conflicts of interest, these must be declared.

### 5) Running head in the footer

Some journals demand a short or running title in the header or footer. A running title usually consists of no more than 50 characters (including letters and spacing). Running heads appear in most journals and are used in the editorial office to organize and locate manuscripts.

### 6) Word counts and the number of figures and tables

In general, word count refers to the number of words in the main text, excluding the abstract, acknowledgments, figure legends, and references. The number of figures and tables should be limited to the range permitted by each journal. For example, Table 2 shows the KMJ specifications for each publication type.

## 3. Abstract

The abstract should summarize the key concepts and results of the study to inform the subject and content of the research. It may be the only part that the readers read. Certainly, it is often the only part used in a bibliographic search system [3]. Therefore, it is important to communicate the most meaningful parts of the research in a concise and specific way. To identify which aspects of the article should be emphasized, writing the abstract after writing the manuscript is recommended. Authors should check the guidelines in each journal to determine if a structured abstract (e.g., using background, methods, results, and conclusion as headings) is required. In the medical and medical science fields, many journals recommend a word limit of 250 words for the abstract.

## 4. Keywords

These words are at the heart of the article. Articles can be searched through keywords to obtain more citations. Therefore, it is important to include the most relevant keywords

**Table 2.** Kosin Medical Journal specifications for different publication types

Type of article	Original article	Review article	Case report	Editorial
Abstract (word count)	250	250	250	NR
Text (word count) <sup>a)</sup>	NL	6,000	1,500	1,000
References	40 <sup>b)</sup>	100	20	20
Tables and figures	NL	NL	6	3

Any article longer than these limits should be discussed with the editor.

NL, not limited; NR, not required.

<sup>a)</sup>Maximum number of words excluding the abstract, references, and figure legends.

<sup>b)</sup>Except for meta-analyses or systematic reviews.

so that others can find the article. Many journals require three to five keywords. Keywords should use terms retrieved from the Medical Subject Headings (MeSH) of the National Library of Medicine.

## 5. Introduction

The introduction presents the reasons why the researchers conducted this study. In general, it should be written in a format that introduces the research subject, the research purpose, the context, and the direction of the current research. The introduction should address three questions: (1) what is the problem? (2) what is the significance of the problem and what are the unsolved queries? and (3) what question does your research answer? [5]. In this last part, the hypotheses and goals of the research study should be articulated. An introduction with three paragraphs is usually sufficient. The content should be clear and concise. Only essential and relevant references should be cited. If the introduction is too long, the reader will not want to read the remainder of the article. We have not included the results or conclusions in the introduction. Any details, conjectures, or comparisons with other studies should also be left for discussion.

## 6. Methods

The methods section specifically presents how the research was conducted. In other words, the details included should be sufficient to allow other researchers to reproduce the research study in whole or in part. Findings from the research is included in the results section, and not in the methods section [3]. The following information should be included in the methods section.

### 1) Study design

A detailed description of the study design should be provided in a separate paragraph and the type of study should be specified (e.g., cohort, clinical trial, randomized, cross-section).

### 2) Participants

When describing the methodology, where the research was conducted, how the participants were selected, the inclusion and exclusion criteria, how the randomization process was created, the number of participants who were withdrawn from the research, the number of participants who

finally participated, and so on, should be provided.

### 3) Variables

The variables must be clearly defined for readers to understand. In general, variables may be classified into numerical and categorical variables. If a variable is divided or categorized into two or more groups, the procedure for setting the cutoff point should also be distinctly described [3].

### 4) Measurement and monitoring criteria

Describe in detail what the variables were measured, how they were measured, how many times they were measured, and so on [3]. If a commercial kit was used for the research, the accurate name of the kit and the location of headquarters have to be provided.

### 5) Estimation of the sample size

In order to obtain accurate results, optimal sample size calculation and power analysis are one of the most important issues of research. Generally, the sample size calculation and power analysis are arranged by effect size, power ( $1-\beta$ ), significance level ( $\alpha$ ), and type of statistical analysis [6,7].

### 6) Statistical methods

The statistical tools used in the research should be detailed, including the  $p$ -value cutoff for statistical significance, and the measures of effect sizes used. In general, numerical data is compared using the Student  $t$ -test (a parametric test) and Mann-Whitney  $U$  test (a nonparametric test) [8]. And, categorical data is compared by using the chi-square test (a parametric test) and Fisher exact test (a nonparametric test) [9]. In terms of the risk factors, logistic regression analysis is used to assess the risk factors of the diseases, and Cox proportional hazards regression analysis is used to investigate risk factors affecting survival rate. If an uncommon statistical analysis is used, it is recommended that references be provided.

### 7) Research ethics

The approval from a relevant Ethics Committee or Animal Experimentation Committee to conduct the research must be articulated. For prospective human research studies, informed consent must be explained.

## 7. Results

This section should include only research findings. Your interpretation of the results should be provided in the discussion section [5]. Results may be presented visually as tables and figures so that readers can understand easily and clearly. The information presented in tables and figures should not be repeated in the text. Results are usually written in the past tense. The number of tables, figures, and graphs allowed by the journal may be limited. Each table, figure, or graph requires a descriptive title. The names of the variables, units, legends, etc. should be included so that the results can be interpreted without reference to the text.

## 8. Discussion

This section describes the research subject that the researcher presented in the introduction, with particular emphasis on the meaning and relationship of the research findings to the subject [3]. Information already detailed in the introduction or results sections do not need to be repeated in this section. It is often useful to briefly begin with a lead paragraph accentuating the most important findings in the area to date. Then, provide possible explanations for the research findings. Plausible or possible underlying mechanisms can also be suggested. Discuss the similarities or differences of the study's findings with evidence from other associated studies in the literature [4]. If the results differ from previous studies, highlight the reasons for these differences.

Any limitations of the research must be mentioned. Also, explain how the limitations may influence the interpretation and substantiation the research results. The relevance of the results should not be overestimated. In addition, the strengths of the research should be described based on the findings. The author's responsibility is to mention all aspects and suggest future research directions and clinical practice applications [5].

The discussion section closes with a conclusion. Conclusions should be drawn based on the research findings. A key message to the reader should be articulated. Importantly, researchers must not arbitrarily interpret research findings and draw conclusions that have not been clearly demonstrated in the study.

## 9. References

The Harvard and Vancouver systems are the most common

referencing styles in medicine and medical science. Of these, the Vancouver system is commonly used in medical journals [10]. To ensure the correct referencing style is used, refer to the "instructions to authors" of the target journal. For Vancouver style, the references are numbered sequentially in the order in which they appear in the manuscript. If possible, it is better to use recent references. A citation management software (e.g., Endnote or Mendeley) can be useful for managing the bibliography [11].

## 10. Acknowledgments

In acknowledgments, include the names of individuals or organizations who have contributed to the research but who are not listed as the authors. Any assistance provided during research exploration to manuscript submission should be acknowledged [10].

## Additional information related to KMJ

KMJ is international, open access, peer-reviewed quarterly journal of medicine published online only in English (31st March, 30th June, 30th September, 31st December). The aims of KMJ are to publish high-quality evidence-based, scientific research articles from various disciplines of the medical sciences including basic and clinical studies. The categories of KMJ are consisted of editorials, review articles, original articles, and case reports. As mentioned above, the instructions to authors and more specific details are listed on the website of KMJ (<https://www.kosinmedj.org>). If researchers need further information from KMJ, feel free to contact KMJ office ([office@kosinmedj.org](mailto:office@kosinmedj.org)).

## Writing tips

- Before writing the manuscript, we suggest creating the tables and figures. Then, write the results, methods, introduction, and discussion sections in this order. Finally, write the abstract and insert the title [3].
- Make the manuscript publication valuable by finding simple, concise ways to tell your story. Check the logical arrangement of the argument and the flow of the experiment, and remember to use the summary statements [12].
- Write a good cover letter and pay attention to references. Make sure you fully understand the material you refer to, and that it defends the work in the way you think it does [12].

- Ask your colleagues to review your manuscript. Reading your manuscript aloud to your colleagues may also help with checking the logical and structural flow with checking the logical and structural flow. When writing the manuscript, write carefully and with enough detail so that even non-professionals in your field can understand your manuscript.
- Make no mistakes, especially grammatical errors. If you plan to submit your manuscript to an English journal, you may need assistance with proofreading and editing to review your manuscript, especially for syntax and grammatical errors. For researchers whose first language is not English, professional English proofreading services are available.
- Read the comments of the reviewer carefully and apply the suggestions to actively improve the quality of your manuscript.

## Conclusions

Writing an original article in medicine and medical science is challenging, especially initially. Similar to establishing a research method, manuscript writing can be improved with constant practice. Reading research articles written by others is paramount to writing a good original article. Taking notes of relevant sentences, including structures and expressions, can also help with your writing. The IMRAD method is a traditional method. It is likely to continue to be used in the future. Thus, researchers need to be familiar with this structure.

## Article information

### Conflicts of interest

Sung Eun Kim is an editorial board member of the journal but was not involved in the peer reviewer selection, evaluation, or decision process of this article. No other potential conflicts of interest relevant to this article were reported.

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### Author contributions

Conceptualization: SEK. Investigation: GK, SEK. Supervi-

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