

# Effective Medical Writing

Pointers to getting your article published

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## Abstract and keywords

### ABSTRACT

**The abstract of a scientific paper represents a concise, accurate and factual mini-version of the paper contents. Abstract format may vary according to the individual journal. For original articles, a structured abstract usually consists of the following headings: aims (or objectives), materials and methods, results and conclusion. A few keywords that capture the main topics of the paper help indexing in the medical literature.**

**Keywords: abstract, keywords, medical writing, scientific paper structure, structured abstract**

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### INTRODUCTION

Also known as a summary, an abstract can be regarded as an abbreviated and accurate representation of the paper contents, i.e. a mini-version of the entire paper. After the title, the abstract is probably the next most read part of a scientific paper. Normally placed at the beginning of an article, following the title page, the abstract assumes great practical importance because it is often the only part of the article that is read by editors and readers. It also leaves the reader with an impression of what is to come. It is therefore to the author's advantage to be able to construct as perfect an abstract as possible.

### ABSTRACT

According to the International Committee of Medical Journal Editors (ICMJE), the abstract should provide the context or background for the study and should state the study's purposes, basic procedures (including selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific effect sizes and their statistical significance, if possible), and principal conclusions. The new and important aspects of the study or observations should be emphasised.<sup>(1)</sup>

Besides being part of a scientific paper submitted for publication, the abstract is also an essential part of a thesis or dissertation. The abstract is also the sole representation of a research project submitted as a proffered oral presentation or poster for a scientific congress. Personal

databases and records can also be summarised into abstracts. As abstracts are the only substantive portion of the article indexed in many electronic databases, authors need to be careful that abstracts accurately reflect the contents of the paper. Unfortunately, many abstracts disagree with the text of the article.<sup>(2)</sup> Authors need to ensure that all the information and conclusion contained in the abstract appears in the body of the manuscript.

The format and length required for abstracts differ from journal to journal. Authors should aim to prepare their abstracts in the format specified by the journal they have chosen. Abstracts may be unstructured or structured, depending on the journal style. In general, unstructured abstracts are used for certain types of articles, e.g. case reports, review articles, invited commentaries and pictorial essays. Most original scientific articles require a structured abstract. Abstracts may also be classified into informative and indicative abstracts.<sup>(3)</sup> Some journals use more than one type of structure.

#### Abstract example 1:

- Objective
- Design
- Setting
- Participants
- Interventions
- Main outcome measures
- Results
- Conclusion

#### Abstract example 2:

- Objective
- Data sources
- Review methods
- Results
- Conclusion

Whatever the format, the purpose of the abstract is to give the reader the essence of the research done. If accepted, it will be indexed with the complete paper in major databases, such as MEDLINE/PubMed and Science Citation Index. Researchers often browse quickly through abstracts to keep abreast of the latest developments in their fields and decide whether the rest of the article is worth retrieving/reading/citing. Given its importance, many authors regard the abstract as the most difficult part of a scientific paper to write. Experienced authors

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therefore recommend writing the abstract last, i.e. after completing the body of the manuscript.

Most journals impose a word limit on the abstract. Typically, this is 150–200 words or less for unstructured abstracts, and 200–300 words or less for structured abstracts. A “generic” structured abstract should be divided into four paragraphs with the following headings.

- **Aim (or objectives):** State the hypothesis being tested or the procedure being evaluated in one to two sentences. (Why was the study done?)
- **Materials and methods (or Subjects and methods, or Methodology):** Briefly state what was done and what materials were used, including who the study sample or population was, if it was a prospective or retrospective study, and whether or not the study population was randomised. The sample size or patient number should be included. State how the study was performed, what measurements were made, the methods used to assess the data and to control bias, and how the data was analysed. (What was done and how was it done?)
- **Results:** Provide the findings of the study, including indicators of statistical significance. The data should include actual numbers as well as percentages. (What was found?)
- **Conclusion:** Summarise in one or two sentences the conclusion made on the basis of the findings. (What was concluded?)

The abstract should be completely self-contained, i.e. contains enough information to be stand-alone. Actual data should be included. References should be excluded. Avoid using abbreviations, unless a long term is used several times in an abstract. Avoid jargon and ambiguous terms. When starting to write an abstract, one can begin by making a list of the most important sentences that were written for each section of the paper, i.e. Aims, Materials and methods, Results and Conclusion. The author usually needs several drafts in order to prioritise and refine the inclusion of essential information in a succinct yet attractive manner. Less experienced authors should seek help from collaborators and guidance from an experienced mentor.

**Box 1. Components of a structured abstract:**

1. Aims (or objectives)
2. Materials and methods
3. Results
4. Conclusion

**KEYWORDS**

Immediately following the abstract, most journals require the authors to provide, and identify as such, three to ten keywords or short phrases that capture the main topics of

the article. These will assist indexers in cross-indexing the article and are often published with the abstract.<sup>(1)</sup> A proper choice of the keywords will help the paper to be located easily during a literature search, particularly an online search. To choose the most appropriate keywords, authors should understand the subject and purpose of paper. The most important concepts should be selected, and then these concepts should be expressed in words which match the retrieval words of readers. Typically, keywords reflect the anatomical region of interest, the modality and procedure used, and the pathological process investigated.

The selected keywords should be checked against established indexing systems or databases e.g. MEDLINE/PubMed. Ideally, terms from the Medical Subject Headings (MeSH) list should be used. If suitable MeSH terms are not yet available for recently-introduced terms, present terms may be used.<sup>(1)</sup> MeSH is the US National Library of Medicine (NLM)’s controlled vocabulary thesaurus, and is used by NLM for indexing articles from 4,800 of the world’s leading biomedical journals for the MEDLINE/PubMed database. MeSH descriptors are arranged in both an alphabetical and a hierarchical structure, with more specific headings found at more narrow levels of the multilevel hierarchy.<sup>(4)</sup>

**SUMMARY**

The ideal abstract is a factual, objective and accurate outline of the entire manuscript. It creates a positive impression on editors and reviewers to increase the chance of manuscript’s acceptance, and induces readers to read the entire paper. Selecting keywords is important as they are used to index your paper in the medical literature.

**Box 2. Take home points:**

1. The abstract should be concise, factual and stand-alone.
2. A structured abstract is preferred for an original scientific paper.
3. Keywords are carefully selected for indexing in the medical literature.

**REFERENCES**

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**SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME**  
**Multiple Choice Questions (Code SMJ 200809A)**

- |   | True                     | False                    |
|---|--------------------------|--------------------------|
| <b>Question 1.</b> The abstract is:   |                          |                          |
| (a) Probably the least read part of a scientific paper.                               | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) A mini-version of the entire paper.   | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Usually follows the title page.   | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Never indexed in electronic databases.  | <input type="checkbox"/> | <input type="checkbox"/> |
| <br><b>Question 2.</b> Regarding the format of abstracts:                             |                          |                          |
| (a) The format and length are exactly the same for all journals.                      | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Case reports usually have structured abstracts.                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Invited commentaries usually have unstructured abstracts.                         | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Abstracts are typically 300 words or less in length.                              | <input type="checkbox"/> | <input type="checkbox"/> |
| <br><b>Question 3.</b> The following statements about a structured abstract are true: |                          |                          |
| (a) They usually consist of four or more sections.                                    | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) How the study was done is stated in the Materials and methods section.            | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Actual numbers should not be quoted in the Results section.                       | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) The Conclusion should be made on basis of the findings.                           | <input type="checkbox"/> | <input type="checkbox"/> |
| <br><b>Question 4.</b> The following items should be included in the abstract:        |                          |                          |
| (a) Actual data.  | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) References.   | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) As many abbreviations as possible.  | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Aims of the study.  | <input type="checkbox"/> | <input type="checkbox"/> |
| <br><b>Questions 5.</b> The following statements about the keywords are true:         |                          |                          |
| (a) Keywords aim to capture the main topics of the article.                           | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Keywords help indexing in the medical literature.                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Authors should avoid any keyword listed in MeSH.                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) A scientific paper typically contains 3–10 keywords.                              | <input type="checkbox"/> | <input type="checkbox"/> |

**Doctor's particulars:**

Name in full: \_\_\_\_\_

MCR number: \_\_\_\_\_ Specialty: \_\_\_\_\_

Email address: \_\_\_\_\_

**SUBMISSION INSTRUCTIONS:**

(1) Log on at the SMJ website: <http://www.sma.org.sg/cme/smj> and select the appropriate set of questions. (2) Select your answers and provide your name, email address and MCR number. Click on "Submit answers" to submit.

**RESULTS:**

(1) Answers will be published in the SMJ November 2008 issue. (2) The MCR numbers of successful candidates will be posted online at [www.sma.org.sg/cme/smj](http://www.sma.org.sg/cme/smj) by 15 November 2008. (3) All online submissions will receive an automatic email acknowledgment. (4) Passing mark is 60%. No mark will be deducted for incorrect answers. (5) The SMJ editorial office will submit the list of successful candidates to the Singapore Medical Council.

**Deadline for submission: (September 2008 SMJ 3B CME programme): 12 noon, 25 October 2008.**