Abstract

Introduction: Whilst many medical students become involved in research during their medical school careers, there is often little formal guidance on how to write this research up into a paper that is suitable for publication. Abstracts are often used for screening and selection of research by journals, conferences/meetings as well as the readers. Therefore, a good, clear abstract that accurately conveys research in an engaging manner is necessary to provide a competitive advantage for publication/poster presentation.

Methods: A non-systematic search of PubMed and Google was conducted to identify articles published prior to November 2018 that were relevant to writing an abstract.

Results: There are three main types of abstracts: informative, critical, and descriptive. Each is used under different circumstances to summarise different types of work. In this paper, provide worked examples of each of the different types of abstract and discuss the style and formatting of an abstract. Focus is also given to how to write concisely and develop an academic writing style, together with additional tips on submitting an abstract to journals or conferences.

Discussion: This paper provides a comprehensive overview of the types of abstracts that medical students may need to write and how to write them. Whilst structure and content are of course important, the key to writing a good abstract is the ability to develop a concise, formal academic writing style, which takes practice. Specific journals and conferences may have their own rules on the style of abstract needed, and these should always be followed.

1 Introduction

An abstract is ‘a self-contained, short and powerful statement that describes a larger work’ (The Writing Centre & University of North Carolina at Chapel Hill, n.d.). They are found at the beginning of research articles published in journals, poster presentations, and during oral presentations of work in formal academic settings, such as conferences.

The purpose of an abstract is to provide a summary of the body of work described in an article, poster, or oral presentation. This summary may be used as a standalone overview of the work, to screen work for publication or poster presentation, or to help the reader quickly decide whether or not to read the full article or poster (The Writing Centre,
Abstracts are also often the only part of an article that can be seen in online databases prior to accessing the whole article. As abstracts are generally the first part of your research that will be read, it is crucial that they are well structured and written to convey the key aspects of your work (International Committee of Medical Journal Editors, 2018).

The approach to writing an abstract can differ depending on the type of abstract required by your piece of work. This guide summarises the three main types of abstracts and how each should be structured, as well as providing an overview of the style and tone of an abstract, and some useful external resources.

2 Methods

A non-systematic search of PubMed and Google was conducted to identify articles published prior to November 2018 that were relevant to writing an abstract.

3 Types of abstract

There are several different types of abstract, which can be broadly divided into: informative, critical, and descriptive (Labaree, 2018).

Informative abstracts are the most common type and are used by most research articles. They provide a formalised overview of the study, with distinct sections for each part of the study. As such, informative abstracts should be able to act as a surrogate for the study itself. They should not provide any new information that is not already in the main body of text and hence no references should be used in this type of abstract. Informative abstracts are used by most scientific journals and conferences, including those run by the National Student Association of Medical Research (NSAMR).

In addition to the study description that is provided in informative abstracts, critical abstracts provide an evaluation of the research and its relevance, validity, and reliability. Consequently, they are usually longer than informative abstracts (Labaree, 2018). They are designed to aid readers in deciding on whether or not to read the particular piece of work the abstract is critiquing, although they are not commonly used (Juhasz & Amminger, 1965).

Descriptive or indicative abstracts provide an overview of the scope and method of the research, but do not include results, evaluation, or discussion of the research. They are usually very short, and are rarely used in scientific papers. Descriptive abstracts can be considered an overview of the work, and may act as a substitute for a contents list (The Writing Centre & University of North Carolina at Chapel Hill, n.d.). Alternatively, descriptive abstracts can be used for reviewing books or films in an academic setting (Schall & John A Dutton e-Education Institute, 2014).

3.1 Informative abstract

The informative abstract has distinct sections for each part of the study, and should give the reader a summary of the pertinent points of the paper. The main sections are: introduction or background; materials and methods; results; discussion or conclusions. This is commonly abbreviated to the 'IMRaD' structure (The Writing Centre, 2018).

3.1.1 Introduction or background

The first section in the abstract is the introduction or background. It should be a brief overview explaining the background to your study, such as what research has already been done in this field and why your research is important. You should include the aims and hypotheses of your study in this section.

3.1.2 Materials and methods

The materials and methods section describes how the author has conducted their study; for example, the number of patients involved in a study and the type of study performed or the types of experiments that were performed.

In the case of experimental research, this would include description of the equipment and methods used, or for a data or patient project, this would include a brief description of inclusion or exclusion criteria, and the statistical tests you analysed your data with. For reviews (systematic or literature), the methods should detail databases you searched (e.g. Medline, EMBASE, CINAHL), the search terms you used, selection and/or screening criteria used to identify relevant papers. When writing a systematic review, good practice is to refer to and follow the PRISMA checklist (Moher, Liberati, Tetzlaff, Altman, & Group, 2009a) and flow diagram (Moher, Liberati, Tetzlaff, Altman, & Group, 2009b). Some examples are given below:

**Clinical**

“Data were collected from 106 adults consecutively admitted to the ICU of a U.K. tertiary hospital and requiring exclusive EN ≥ 3 days. Protein targets based on local guidelines (1.25, 1.5, or 2.0 g/kg/d), nutrition prescription, and delivery were recorded for 24 hours between days 1-3, 5-7, 8-10, and 18-20 post-ICU admission.” (Mitchell et al., 2018).

**Experimental**

“Methods. Left ventricular (LV) tissue of 24 patients with end-stage heart failure was obtained during cardiac transplantation. Gene expression of NOS II and endothelial NO-synthase (NOS III) was quantified by competitive reverse transcription-polymerase chain reaction and compared to tissues of five nonfailing donor hearts. Nitric oxide synthase II activity was determined by citrulline assay and related to changes in force of contraction induced by the β-adrenergic agonist isoproterenol, NO-donors and/or N-mono-methyl-L-arginine (L-NMMA), an inhibitor of NOS” (Drexler et al., 1998).

“Site-directed mutagenesis was used to mutate specific amino-acids in the GluN1 subunit of rat NMDA receptors. Mutant GluN1/GluN2A receptors were expressed in HEK 293 cells and were assessed functionally using patch-clamp electrophysiology. The responses of the mutant receptors to glycine and...”
anesthetics were determined." (Armstrong et al., n.d.).

**Systemic Review**

“We searched CENTRAL, MEDLINE, Embase, LILACS, SCI-Expanded, BIOSIS for eligible trials comparing digoxin versus placebo, no intervention, or other medical interventions in patients with atrial fibrillation or atrial flutter in October 2016. Our primary outcomes were all-cause mortality, serious adverse events, and quality of life. Our secondary outcomes were heart failure, stroke, heart rate control, and conversion to sinus rhythm. We performed both random-effects and fixed-effect meta-analyses and chose the more conservative result as our primary result. We used Trial Sequential Analysis (TSA) to control for random errors. We used GRADE to assess the quality of the body of evidence.” (Sethi et al., 2018).

It is important the methods describe what you set out to do, not what you found. Ergo, there should not be any results in the methods section. A common mistake is to state the number of individuals involved the study in the methods when it was not predefined. For example, ‘a retrospective study of 127 individuals was completed between the dates 16/1/18 and 15/1/19’ when the author actually meant to say ‘a retrospective audit was completed between the dates 16/1/18 and 15/1/19 and 127 individuals were found as a result of that audit.’ In the methods, it is possible however to include the calculated number of test subjects required to provide statistical significance in results. However, while the methods section in the main text of publications strictly follow these rules, solely including information on methodology, equipment, and conditions used, given the concise nature of abstracts, this rule is sometimes broken in abstracts and, as some published examples (see above) do include the actual number of subjects studies, which ideally should be included in the results section.

It is important to note that some journals require the methods to be written at the end (after the discussion) in the main body of text and sometimes in the abstract, so as mentioned before it is important to consult the journal or conference guidelines prior to submission.

**3.1.3 Results**

The results section of the abstract should highlight the main findings in your research. It should include the number of individuals the study involved and demographic details (if these were not predefined as part of the methods, as well as the most pertinent findings. These findings can be presented in a number of ways, for quantitative research this can be as raw numbers or percentages, with p values or power calculations included if relevant. If the research is qualitative, descriptive analysis can be included instead.

**3.1.4 Discussion or conclusion**

The conclusion is often regarded as the main part of the abstract and should summarise what the main findings of the research were and provide recommendations either of how to apply this knowledge or what further research might be required. This should be no more than a few sentences.

**3.2 Example of a structured informative abstract**


**Introduction:** Whilst many medical students become involved in some form of research during their medical school careers, there is often little formal guidance on how to write this research up into a paper that is suitable for publication.

**Methods:** In this study, we recruited a cohort of medical students who had written at least one scientific paper. Students were anonymously surveyed on their confidence writing abstracts using an online survey.

**Results:** 73 students responded and the study showed that 37% of students surveyed rated their confidence writing abstracts as ‘very poor’, with a further 42% rating their confidence as ‘poor.’

**Discussion:** Based on these results, it is clear that students need more guidance on how to write abstracts. The authors recommend that all students wishing to learn how to write an abstract read the National Student Association for Medical Research ‘Anatomy of an Abstract’ article.

Word Count: 145.

**3.3 Critical abstract**

A critical abstract is generally written about a different author’s work and contains all of the information mentioned above, but also an element of evaluation or critical appraisal of the study, which may include discussion of the reliability and validity of the results (Labaree, 2018). For this purpose, references can be included to provide supporting evidence for your arguments from relevant literature.

The critical abstract includes information regarding the article e.g. author, title etc. and then briefly provides their key findings/conclusion. The main content of the abstract then highlights the positives and negatives of the article.

Examples of things to consider here could include:

- How relevant is this research question?
- Is the hypothesis clearly stated?
- Type of study/trial/research?
- What is the sample size? Is it large enough to provide statistically significant findings?
- Were the methods used appropriate and justified? Could they be improved?
- Is the conclusion valid based on the evidence?
- Are there any conflicts of interests?
Provide your interpretations and opinions on what you thought of the author’s work, what was good and what could have been done differently/what could be improved (Young & Solomon, 2009). Critical appraisal frameworks, such as the Critical Appraisal Skills Programme (CASP) checklists can be used to guide your critical examination of a piece of work (CASP, 2018).

Usually in abstracts, references are not included, however in critical abstracts, as critical analysis of articles usually requires referral to other literature, this is sometimes accepted. Again check the guidelines as provided by the relevant journal/publisher.

3.3.1 Example of a structured critical abstract


**Introduction:** Whilst every study published in a scientific journal contains an abstract, little research has been done on the exact format, content and style with which an abstract should be written. This makes it difficult for authors to adequately summarise their work in an abstract.

**Methods:** In this study, the authors recruited a cohort of medical students who had written at least one scientific paper. Students were anonymously surveyed, on their confidence writing abstracts using an online survey, maintaining confidentiality. However, this method may have been subjected to selection bias, where those who have completed abstracts but not written a full scientific paper may be excluded. Use of online surveys may also contribute to selection bias, based on the fact that subject participation is voluntary and particular characteristics e.g. access to internet, whether the students view the site/email providing access to the questionnaire, time available for completion, etc., may differ per individual and hence reduce the representativeness of the sample regarding the medical student population (The Writing Centre & University of North Carolina at Chapel Hill, n.d.).

**Results:** 73 students responded and the study showed that 37% of students surveyed rated their confidence writing abstracts as ‘very poor,’ with a further 42% rating their confidence as ‘poor.’

**Discussion:** Based on the author’s results, it is clear that students need more guidance on how to write abstracts. The authors recommend that all students wishing to learn how to summarise their work in an abstract.


4 An approach to writing an abstract

Abstracts are usually written once the main bulk of the study is finished and when all results and conclusions have been written. This is because one will have a better understanding and feel of the paper after a draft is written, making the organisation of an abstract an easier task. However, some authors may prefer writing their abstract prior to writing the actual paper.

4.1 Formatting

The format of the abstract can differ per journal, so please check the requirements on the relevant journal’s guide, this can usually be accessed online.

Some abstracts can be written with the subheadings for each section and this is known as a ‘structured abstract’. Other journals do not require the subheadings and instead require a paragraph with all the content.

4.2 Style

The style of the abstract is the language, tone and tense used. It is essential that the style of your abstract is appropriate for publication, so formality is preferred. Developing a formal, academic writing style is important so that publishers and reviewers are able to make a judgement about the quality of your academic writing from your abstract. Having a good writing style also ensures readability and can help with concision.
Table 1: The key dos and don’ts of writing an abstract

<table>
<thead>
<tr>
<th>Do</th>
<th>Don’t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure to look at the guidelines for the specific journal or conference.</td>
<td>Include lengthy background or introduction — save words for the main sections!</td>
</tr>
<tr>
<td>Include brief introduction, methods, results and conclusion where possible.</td>
<td>Include references in the abstract — the abstract should only summarise your work.</td>
</tr>
<tr>
<td>Emphasise the importance of your research and why it is relevant.</td>
<td>Use abbreviations or jargon that may be confusing to the reader.</td>
</tr>
<tr>
<td>Ask someone else to read it — to ensure it is coherent and reads well.</td>
<td>Include any images, figures or tables in the abstract.</td>
</tr>
<tr>
<td>Write concisely.</td>
<td></td>
</tr>
</tbody>
</table>

The passive voice used to be the classic ‘formal’ method of writing, however academic writing appears to be moving more towards the active voice (Bostian, 1983). The more direct approach of the active voice, which clearly describes what the author(s) or the work achieved makes the text easier to read and can also help to maintain brevity.

- Passive voice: The abstract was written by the stressed medical student.
- Active voice: The stressed medical student wrote the abstract.

Additionally, an abstract should not include any references, images or figures, unless specifically stated by the journal. One should also try to avoid using too many acronyms where possible, and these should always be explained in full the first time they are used.

4.2.1 Word count

For publications, abstracts are usually allocated a specific word limit. For most journals and conferences, including NSAMR, this is 250 words. Other journals and conferences have word limits ranging from 100 words to 400 words. For shorter word limits, it is necessary to be concise.

4.2.2 Writing concisely

Abstracts are short and sweet; writing concisely is key. This is a skill developed through practice, and you may need many revisions before your abstract is ready for submission to a publication or conference. Some strategies to consider when revising an abstract with the aim of reducing the word count could include:

- Cutting any descriptive words, e.g. ‘very’ or ‘extremely’.
- Cutting linking words, such as ‘that’ or ‘and.’ These can often be replaced with punctuation, either a comma, semi-colon or full stop.
- Re-wording to reduce the number of words used to convey the same information.
- Minimise background information to allow for more words to be used discussing results and conclusions.

For example:

This field of study is extremely important for considering the general welfare of medical students all across the country, and, indeed, the entire world; and currently there is little or no published literature or case discussion on the effect that being involved in lots of research at medical school has on the overall satisfaction students have with their studies, and eventually their careers.

Word Count: 63

Which can be revised to:

This field is important for considering the welfare of medical students worldwide; currently there is little literature on the effect of involvement in research at medical school on student satisfaction regarding their studies and careers.

Word count: 36

5 Submitting your abstract

If you are writing an abstract with the aim of submitting your piece of work to a publication or conference, make sure to submit well within the deadline given; late submissions are very unlikely to be accepted (Lee & Kumar, 2006).

As previously mentioned, it is important to make note of any formatting or style rules outlined by the particular publication or conference to which you are submitting your abstract. Again, abstracts which don’t adhere to any specific guides given are unlikely to be accepted.

6 Other useful resources

There are many online resources that can help you in writing up an abstract for your piece of work. A few of them are outlined below and you can also see Table 1 for a quick reference list of abstract writing tips.

- Most universities will have their own online guidance to writing abstracts in different departments - try looking at your university’s online Library Services or similar for guidance.
- For another comprehensive guide to writing an abstract, see Writing Centre: How to Write an Abstract (Writing Centre & The University of Adelaide, 2014).
- For further tips on writing concisely, consider books such as ‘To the Point’ by Fiske (Fiske, 2002).

- If evaluating research for a critical abstract, CASP checklists can be used - see the Critical Appraisal Skills programme website (CASP, 2018).

7 Conclusion

Writing an abstract that contains all the necessary information needed to summarise research within a tight word limit is a skill that is a challenge for many students - and, indeed, even later career researchers. It is key to remember the structure of the particular type of abstract you are aiming to write and the content you need to include in your abstract. Other skills, such as writing formally and concisely, are developed mainly through practise, and you may need several drafts before it is ready for submission. This article helps facilitate students to select and construct the correct type of abstract for their various pieces of research, as well as provide them with a framework upon which they can build their own unique style of concise academic writing.

Author statements

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No conflicts of interest have been declared by any authors.

Authorship statement
All authors fulfill ICMJE authorship criteria, which can be accessed at http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and -contributors.html. All authors have read and approved the final version, and accept responsibility for information published in this article.

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References


