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# Writing Good Abstracts

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## Key Words

Abstracts, stroke · Peer review · Outcome

## Abstract

**Introduction:** Writing an abstract means to extract and summarize (AB – absolutely, STR – straightforward, ACT – actual data presentation and interpretation). Thousands of abstracts are submitted to stroke conferences each year. The following suggestions may improve the chances of your work being selected for presentation, and to communicate results in the most efficient and unambiguous way. **Title and Structure:** Make the title dynamic and informative, rather than descriptive. Structure the abstract following the IMRaD (Introduction, Methods, Results and Discussion) principle for your future original paper where background would become Introduction and conclusions would enter Discussion. Select the appropriate category for submission carefully. This determines which experts grade the abstract and the session where your competitors represent their work. If selected appropriately, your abstract is more likely to be graded by peers with similar interests and familiarity with your work or field. Methods should describe the study design and tools of data acquisition shortly, not data. **Results:** Provide data that answer the research question. Describe most important data with numbers and statistics. Make your point with data, not speculations and opinions. Abbreviations should be avoided and only be used after they have been spelled out or defined. Common mistakes include failure to

state the hypothesis, rationale for the study, sample size and conclusions. Highlight the novelty of your work by carefully chosen straightforward wording. **Conclusions:** Conclusions have to be based on the present study findings. Make sure your abstract is clear, concise and follows all rules. Show your draft to colleagues for critique, and if you are not a native English speaker show it to a person who can improve/correct your text. Remember that accepted abstracts of completed original research should be followed by published original papers – if this is not intended or fails, it may indicate an impaired ability to succeed in scientific writing and an academic career.

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## Introduction

Congratulations! You joined a stroke research team, got your first data set and analyzed a database by yourself using statistical software or, preferably, together with an expert in biostatistics. You discussed data and statistics with your colleagues. Your mentor tells you that you got results worth reporting. It is time to draft an abstract. Although the recommendations below come from experiences in writing about stroke, they could be applied to any medical field.

Wondering where to start? You should have taken notes when you conceived the project, selected methods, analyzed data and came up with conclusions while work-

ing with your mentor and co-authors in the past several months. If not, ask your mentor again what the research question was, why the project is important, how subjects and methods were selected, why certain tools of analysis were most appropriate, and what the meaning of the results is. And write these thoughts down, particularly if you are new to research or trying to multi-task on several projects.

Think about the title of your abstract since it sells your submission. Make the title dynamic and conclusive, rather than descriptive. Try to avoid questions in the title, unless the issue remains unsettled or you came up with a clear answer. Think about the 'take home' message you'd like to deliver with your abstract.

Writing an abstract means to extract and summarize (think AB – absolutely, STR – straightforward, ACT – actual data presentation and interpretation). Introductory statements sum up what is known or remains unsettled in the field, and a goal of your study. Try to compress these messages into one or two sentences. Thousands of abstracts are submitted to stroke conferences each year. Follow the European Stroke Conference [1] or the American Stroke Association recommendations [2], and you may improve the chances of your work being selected for presentation. Preparation of conference abstracts is mainly a responsibility of the researcher with virtually no possibilities for a rater of conference abstracts to check for data quality (there is nothing else available, no manuscript). Abstracts linked to scientific papers are peer reviewed, and it is possible to assess if the abstract adequately reflects what is stated and concluded in the manuscript body. Although this paper mainly provides advice how to prepare a conference abstract, similar principles can be applied to drafting abstracts for original paper submissions, though format and requirements may differ between peer-reviewed journals. In any case, the goal is to report and convey research findings in the most efficient and unambiguous way.

All authors must have contributed to the work, approved the text and given permission to submit the abstract including copyrights to the conference publishers. The presenting authors should be named first – if the abstract is submitted for oral presentation, this person should be able to discuss your contribution in a lively discussion – both from his knowledge of the subject as well as the conference language. Carefully consider specific regulations made by the conference organizers which are different for many meetings in style and context. If you do not adhere to these rules, your submission is at high risk to fail.

## Methods

Various scientific conferences may provide different rules regarding the recommended structure of abstract submission. Keep in mind that whatever the rules are, you must follow up the conference abstract with an original manuscript submission. We view the conference abstract and the final original manuscript abstract as part of the same process. So, try to make the first one as good as the final one.

Unstructured abstracts challenge quick understanding what was accomplished in the project. A structured abstract has advantages [3, 4] and can include Introduction (or Background and Purpose), Methods, Results and Conclusions. This closely follows the IMRaD (Introduction, Methods, Results and Discussion) principle introduced early in the 20th century [4] and currently used in about two thirds of structured abstracts published in major medical journals [5, 6]. This format is recommended for original papers [7, 8] where D stands for discussion instead of conclusions in your abstract. Even if structured abstracts could appear longer, they are considered more informative and judged to be clearer by their readers [9].

When drafting the first sections of the abstract, think about where you are going with this, i.e. key results and conclusions. Ask your mentor and co-authors for suggestions. Avoid writing points for discussion in your abstract, or statements like 'this is the first study to demonstrate ...'. Chances are that ten other groups are doing similar projects and five more have already presented their results at meetings you did not attend. To overcome the initial 'writer's cramp', i.e. the mental inability to start scientific writing, you may download an abstract on a similar subject or comparable study design that was published in proceedings of a previous stroke conference or a peer-reviewed paper. Abstracts presented at major international meetings are generally of high quality since they passed competitive review with less than 30% chance of acceptance. Look how previous authors described their subjects and methods, and follow the lead: after all, imitation is the best form of flattery. Add specifics of your patient population so that reviewers can understand the novelty or applicability of your findings. Be specific, yet brief. Remember, space (number of words or characters allowed) is limited and so is the readers' and reviewer's attention span. Reviewers often have to rate >100 abstracts, not all are native English speakers and they appreciate a clear, simple and straightforward style strengthening the originality of your work and statistically sound presentation of the results reported.

State the type of study conducted, i.e. retrospective analysis, case series, cohort, phase I or II clinical trial. Describe subject selection criteria and data collection tools concisely, yet with enough details for peers to understand what was done. There is no need to add a literature reference that describes study methods; it is often not even wanted. As many conferences tend to avoid peer reviewer's bias, anonymous reviews are common (e.g. for many years for the European Stroke Conference). Thus, any hints at the organization submitting the abstract are considered unfair and against the rules. Avoid presenting actual data in this section, i.e. number of subjects and their baseline characteristics. Presentation of data belongs to the Results section. Instead, describe scales or methods used for assessment and recruitment as well as outcomes or dependent variables.

Protection of research subjects is implied, yet often omitted in abstracts due to space limitations. You have to have a local ethics committee approval before study initiation. With abstract reports, it is assumed that this is the case. When you present data at a meeting, clearly mention local ethics or institutional review board approval and informed consent signed by participants for human studies.

The most important factors for abstract acceptance to a prestigious and competitive meeting are the quality, novelty, reliability and scientific or clinical importance of your work. Also, a bias was noted that reviewers may favor well-written abstracts like those submitted from the USA or English-speaking countries [10], so if you are not a native English-speaking person, show your draft to those who can edit spelling, grammar and style. Clearly state the type of study design that largely implies the choice of statistical analysis tools and saves space for the following key section.

## Results

Your results are the most important part of the abstract. Present them clearly, avoid long and confusing sentences, and follow simple logics. Start here by describing your study subjects with actual numbers for study demographics. Then lead the reader to the main findings.

Accurate presentation of data in the abstract is extremely important. A recent survey of 243 abstracts for original research articles published in selected pharmacological journal issues identified 25% of abstracts containing omissions, a third containing either an omission or inaccuracy with a total of about 60% of abstracts classified as deficient in terms of accurate data reporting [11]. Another group suggested the need for journals to include in their editing processes specific and detailed attention to abstracts [12].

There are several options how to present data. If two or more groups of subjects were studied, present data consistently so that you can save space on repeating which finding was seen in which group. Name groups clearly, i.e. target or controls, or A, B and C for brevity. If too many analyses were generated, present only key data points and leave the rest for writing a paper. For example, if pretreatment characteristics of patients in a controlled clinical trial were similar between the groups, there is no need to show all of them for each group. Overall key median or mean values would suffice with a statement NS, i.e. nonsignificant.

A table or figure can be uploaded with electronic abstract submission. Include a table or figure only if data presentation is markedly improved this way; however, if understanding the figures/table takes more time than reading the abstract, you should not consider them. If you

choose to do so, select the most representative data set that delivers the key message or summarizes most important data and leaves space for other details in the text.

Discuss results with your mentor and co-authors since this internal review will help to determine if generated data were sufficient to answer the research question in the abstract. Most importantly, stay focused by including data relevant to the research question. Packing one abstract with data is better than splitting data and submitting two or three weaker abstracts from the same data set.

Avoid statements like 'two groups were significantly different'. Instead, show absolute numbers and percentages. Then add p values, coefficients, ratios and confidence intervals after these absolute numbers so that reviewers can judge the significance of observations. Mention statistical tests if space permits. Details of statistical analysis are usually left to the research paper and presentation at a meeting. Abstracts without such data are given low priority! Make your point with data, not arguments. While drawing conclusions from your results, remember that statistically significant difference does not necessarily translate into clinically significant difference.

## Conclusions

Your conclusions should be straightforward, brief and specific to your observations. Quite often they consist of two sentences. The first concisely summarizes the main findings, and the last states interpretation or clinical implications. Readers and reviewers commonly check the title and, if become interested, skip right to the last sentences before they read the full abstract in detail.

Clear formulation of conclusions attests to your ability to interpret data and understand the evidence-based approach. If space permits, you may begin with an opening statement: 'Our study showed ...' and lucidly summarize *your* study findings. Avoid repeating data. There is no reason to stress how novel or terrific your results are – let them speak for themselves. On the contrary, there is also no need to say that 'further research is needed'. Scientists never stop explorations, even if a subject is considered written in stone.

Do not overestimate the importance of your research findings. Avoid broad claims and strong statements since even pioneer breakthrough studies require independent confirmation. Instead, be specific and focused on your study findings and what they mean. There is no need to discuss findings by others in this section, or what questions remain unsettled. Conclusions logically connect the

title, study methods and results all together to deliver the 'take home' message.

Your abstract is the first step towards publication, communication and dissemination of research results that is imperative for advancement of science [13]. The scientific community reads more abstracts than full-text papers since simply there is not enough time to read all published papers. Instead, scientists screen abstracts and select which papers are essential to read in full text. Providing a clear, accurate and lucid abstract would help to get your research noticed.

Several clinical specialties noticed that 60–75% of abstracts presented at national meetings are not followed by publication of original papers [14–16]. Although not directly applicable to major stroke conferences, a survey of orthopedic investigators who had not had a full-text article published after presenting the abstract at a national meeting showed that the failure to publish was due to one of three main reasons:

- 1 investigators did not have enough time to prepare a manuscript for publication (the reason most frequently given);
- 2 almost one third of the studies that had not been submitted for publication were ongoing;
- 3 relationships with co-authors sometimes presented a barrier to final publication [16].

The authors concluded that thorough preparation before the study and the establishment of stricter guidelines

to limit presentations of preliminary data at major meetings may improve publication rates [16]. Also, there is a publication bias that often only positive findings get published, and negative results are less likely to be accepted as original papers, although they are needed to avoid mistakes in interpreting positive studies or planning new trials.

Finally, remember that shortly after submission of your abstract, your mentor should ask you to draft a research paper regardless whether the abstract is going to be accepted or not. Although conferences may accept work-in-progress, interim reports and other communications that are not suitable for original papers, completed original research has to be communicated with more than a conference abstract. Successful researchers follow abstracts with original paper submission to peer-reviewed journals. Failure to do so may result in problems with your academic career. Advice on how to write a research paper is available [7, 8, 17]. The greatest risk here is not trying to write at all.

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