



## Professional article

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## SOME IMPLICATIONS FOR TEACHING SCIENTIFIC MEDICAL WRITING

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### SUMMARY

The students at the Faculty of Medicine, University of Nis have specific demands for English. They have a desire to publish medical articles in respected journals, they want to participate in international conferences and practice abroad. Having this in mind, we have concluded that an analysis of the structure and style of medical research papers and teaching scientific medical writing to students are very useful.

Intercommunication, which means reading and publishing articles, getting involved in research, participating in conferences, following new improvements, is the imperative device for the self-development of a doctor.

**Key words:** IMRAD, scientific medical paper, grammar, language functions

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### INTRODUCTION

English has emerged as the main language of international gatherings of specialists and of scientific exchanges. This trend to use one '*lingua franca*' favors a smoother communication between scientists and, consequently, a rapid progress in science.

As English has turned into the primary medium of international specialized publication, non-English speaking scientists, being aware of the relevance of the medical literature in English to their work and wanting to obtain responses to it, find it more effective to publish in English than in the native language. The increasing tendency toward publishing in English runs parallel to the standardization of research lines and the uniformity of writing style.

#### Medical Research Papers – Style and Structure

##### Objectivity

It is the task of the writer to deal with the topic in a fair, objective and responsible manner, keeping personal feelings out of his/her writing.

Objectivity and impersonal style may be achieved by using the passive voice and by avoiding ambiguous statements. Scientific writing is usually done in an impersonal style. Authors should deal with their topics in a fair, objective and responsible manner, keeping personal feelings out of their writing because information and facts are more important than personal opinions and attitudes. This style is also used to put a certain distance between the writer and the arguments proposed and thus makes them more objective.

##### Clarity

Apart from honesty in reporting the results of the study, the most important element in medical scientific writing is clarity. The students should be taught to write in a plain, clear and straightforward manner. The reader should be told why the study was performed (introduction), what the research question is (introduction), what was done (material and method), what was found (results) and what the results mean (discussion). This presentation style is known as the IMRAD structure. Although it has been

said to restrain the author, thus impeding creativity and personality, the IMRAD structure allows students to answer the fundamental questions.

A medical research paper which is in accordance with the IMRAD structure has the following sections and headings which should be drilled separately and finally as a whole:

### ABSTRACT

First of all, a difference must be made between abstracts and summaries because the terms are not exactly the same.

A *summary* restates the main findings and conclusions of a paper for people who have already read the whole paper.

An *abstract* is a shortened version of the paper written for people who may never read the full version. Since abstracts are often reprinted in abstracting journals separated from the original paper, they need to be self-explanatory.

When writing abstracts, students have to remember that its purpose is to inform readers as concisely as possible what is in the article so that they can decide whether to read it in detail. There are two kinds of abstract:

- **Descriptive abstract** provides information of what will be in the paper; what the reader will deal with or attempt to prove in the article, rather than a synopsis of the actual results. Since it contains general statements, it is more appropriate for longer papers, such as review articles, and can be written before the paper itself is drafted.
- **Informative abstract** does not simply describe what will be in the paper, but also gives a summary of the main factual information, such as methods and materials, results and conclusions. This type of abstract is more suited to papers or reports about original research. It is usually better to write an informative abstract when the writing of the complete paper is finished.

Abstracts contain some of these elements: an expansion or explanation of the title, the purpose of the research, how the research was conducted, what the main findings were, what the findings mean, what recommendations can be made (e.g. for further research), what the limitations of the research were. Abstracts should not contain any information that is not in the paper itself, tables and diagrams, citations from other people's work. It is also advisable in an

abstract to put the most significant idea first.

Students must be aware of the differences between descriptive and informative abstracts. Both abstracts must communicate ideas effectively, preferably with direct, active statements in short, simple sentences. Since grammar is not taught directly, but rather within medical context, abstracts represent a good opportunity to revise the most commonly used tenses in medical research papers. General statements and explanations are in the present tenses whereas past tenses are used to describe the procedure and results of the research. The passive is most commonly used when describing the research. Students may be given an exercise to underline the tenses in an abstract, put the verbs in a correct tense and finally, write their own abstracts.

Students are also instructed to use generalized vocabulary and phrases for descriptive abstracts while the informative abstract will have more precise, specific language, including numbers. Both abstracts use extended sentences in order to condense information.

Moreover, students are drilled in writing a special kind of abstract that accompanies medical papers - **structured abstract** (1) which describes a study using specified content headings rather than pure paragraph format. It follows the IMRAD formula but its writing often presents a problem to students. The most common mistakes concern lack of a fundamental move (e.g., the objective, the methods, the results, the conclusions of the study), illogical structuring (methods precede the statement of purpose, objective presented after the results). The format of the medical structured abstract is the following:

1. *Objective*: states the question addressed in the paper;
2. *Design*: indicates the basic design of the study;
3. *Setting*: mentions the place where the research was carried out;
4. *Patients or participants*: indicates the number of patients who were enrolled in the study, how they were selected and how they were distributed per group;
5. *Main outcome measures*: explains the treatment
6. *Results*: mentions the study end – points;
7. *Conclusions*: refers to the main conclusions, including direct clinical applications.

### SUMMARY

A summary is a condensation of the main ideas in an article or in a section of someone else's writing. In their summaries, students should provide a clear, objective, accurate and balanced account of

an article. It is also important to avoid adding extra information or ideas that are not in the text.

Both abstract and summary writing can be practiced in groups and pairs which is an opportunity to develop team work. Students are first instructed to read each other's texts in order to gain impression of the content and relevance. Note taking and note making skills are developed when students make their own notes as they read. Next, they should form complete sentences out of their notes. Summary starts with a statement of the main idea and includes all the relevant information. When checking their own writing, students should first of all find out whether it contains a clear thesis statement. Next, they need to make certain that their summary would give a reader a clear idea of the text. It is also important to check whether all the main points are included and all the unnecessary details and examples are left out.

## INTRODUCTION

In research papers, the introduction should be direct and concise. It should tell the reader what the paper is about and explain why the research is important and worth reading. The introduction presents the topic in general and makes a clear thesis statement. The thesis statement expresses the central idea of the paper which has to be proved through evidence and examples. It needs to be clear, and concisely and precisely stated.

When checking their writing, students must make sure that the topic and purpose of the research are stated and whether the hypothesis or thesis statement is expressed clearly, concisely and precisely.

Some of the sample phrases that can be used in introduction include:

*In this paper, it will be shown that...*

*The present paper examines/presents...*

*In this article, we report on...*

*Our intention is to highlight...*

*This article will concentrate/focus on the arguments...*

*The issue of ... has become controversial recently.*

*The question of... has been thoroughly researched over the last few years.*

## MATERIAL AND METHODS

This section of a research paper mentions all the specifics of the research. Every detail is important and needs to be included. The reason that this section must be completely documented is so that other researchers can duplicate the studies and hopefully duplicate the findings. Variables are also

important and need to be detailed. The failure to list relevant particulars will throw all of the research and conclusions into question. A useful guideline for verifying whether this section is well written is checking if it answers the three basic questions: *Where?* (location of the work, if relevant); *What?* (equipment and other materials used in the research need to be thoroughly specified); *How?* (procedures and methods used in the research).

## RESULTS

The next section in a research paper is *Results* and it presents the precise data and findings from the research. Data may be effectively presented in charts, tables, graphs, diagrams. These should be accompanied by explanatory text to highlight and interpret significant facts. Describing tables and graphs within *Results* section requires the use of specific vocabulary which refers to trends or movements. Some of the useful vocabulary items for describing tables and graphs include:

*an increase, a rise, a growth, an improvement, an upturn, an upward trend*  
*to increase, to rise, to grow, to improve, to go up*

*a decrease, a fall, a drop, a decline, a downturn, a downward trend*  
*to decrease, to fall (off), to drop, to decline, to go down, to slip*

*a surge, an upsurge, a jump, a leap*  
*to surge, to take off, to soar, to jump, to leap*

*a plunge, a slump, a crash, a tumble*  
*to plummet, to plunge, to slump, to crash, to sink, to tumble*

*to remain stable, to stay at the same level, to remain constant, to stagnate, to stabilize*  
*to peak, to reach a peak*

Describing the degree and speed of change may provide a useful grammar exercise covering adjectives and adverbs:

*dramatic/dramatically, considerable/considerably, sharp/sharply,*  
*significant/significantly, substantial/substantially, moderate/moderately, slight/slightly.*

*abrupt/abruptly, sudden/suddenly, rapid/rapidly, quick/quickly, steady/steadily, gradual/gradually, slow/slowly.*

## DISCUSSION

In this section students are taught how to write about their interpretation of the findings and an evaluation of the research. They give their opinion as to whether the work supported and proved the hypothesis. The section may also include the success or failure of various research methods and how the studies might have been done differently to investigate the problem better.

The students may check their *Discussion* section by determining whether it answers the following questions:

1. Did the research support the hypothesis?
2. What interpretations can be made from the results?
3. Were the research methods adequate?
4. How could the research be done differently to cross check the findings?

## CONCLUSION

The conclusion is the last part of the research paper where students should present a summary of the main points. It contains an evaluation of the main topic, an amplification or extension of the thesis statement, a solution to the problem which the work discusses, results of the research and suggestions for further investigations into the topic or issue. Some of the phrases which can be used in conclusions are:

*This research paper has clearly shown that...*

*In conclusion, we can say that...*

*In this paper, we have seen that...*

*This paper has provided a systematic study of...*

*Finally, it is worth pointing out that...*

*Clearly, further studies are needed to understand/prove...*

When students have mastered writing individual sections, the next step is writing the whole research paper. They have to bear in mind all the characteristics of medical language and scientific medical research papers.

### Grammar Points

It should be pointed out that teaching grammar focuses on its remedial function because it is taught not as a goal but as a tool. The emphasis is not on grammar points without medical relevance. In other words, the teaching of grammar is based on the minimum necessary for understanding academic texts. Generally, the tenses used in medical research works include: present simple, past simple and rarely the past perfect tense when writing about the history of the disease. Another characteristic of medical

discourse is the frequent use of the passive voice because the form is impersonal and objective. Impersonal style is used to put a certain distance between the writer and the arguments proposed.

Modal verbs are also frequently used. The use of modal verbs is significant for hedging which represents the expression of tentativeness and possibility and plays a critical role by allowing the student to present statements with appropriate accuracy, caution and humility, expressing possibility rather than certainty and prudence rather than over-confidence (2, 3,4). Hedging is used for expressing uncertainty, skepticism and open – mindedness and it plays a major role in medical discourses (6, 7). In a context where the accreditation of knowledge depends on the consensus of the research community and the need to evaluate evidence, to comment on its reliability, and to avoid potentially hostile responses, expressions such as *might*, *perhaps* and *possible* are helpful in gaining the acceptance of research claims. Medical papers provide interesting and useful examples of the use of hedging in scientific discourse because they relate to matters which influence significant issues of our lives.

The hedges allow students to convey their attitude by presenting unproven claims with prudence and softening categorical assertions. In medicine, writing is necessarily a balance of fact and evaluation as the writer tries to present information as fully, accurately, and objectively as possible. Another reason for using hedges concerns the writer's desire to anticipate the possible negative consequences of being proved wrong and the eventual overthrow of a claim (3, 7).

Hedges are particularly prevalent in the introduction, discussion and conclusion sections of research articles. In order to avoid over-generalizing or to avoid being too critical or direct, there are a number of hedging phrases and other techniques that can be used to help students establish better communication with the reader.

It *might* be of interest to examine...

Our data *would* be expected to show...

From these results we *may* conclude...

Hedging is also achieved by using *impersonal verbs* such as: *seem*, *appear*, *suggest*.

Some of the useful adverbs are: *probably*, *possibly*, *apparently*, *certainly*.

Other *modifying expressions* include:

*a little*, *rather*, *somewhat*, *about*, *approximately*, *quite*, *nearly*, *almost*, *rather*, *fairly*.

The advantage of teaching modality and hedging to students is that it enables them to achieve greater delicacy of meaning.

## Language Functions

### Agreeing and Disagreeing

Agreeing and disagreeing are elements which often appear in scientific writing. Students need to be taught how to express their agreement or disagreement so as to be able to compare their findings with those of their peers.

Varying degrees of agreement can be expressed by the following verbs and phrases:

*We entirely with his views on ...*

*We are in complete agreement with...*

*Our findings support those of ...*

*We would (strongly) endorse his opinion...*

Students also learn how to express disagreement. Some of the useful examples include:

*We completely disagree with him on this point.*

*We are in total disagreement with...*

*We are unable to accept their conclusions.*

*We have to say that their arguments are somewhat unconvincing.*

*We agree with their findings up to a point, but ...*  
(partial disagreement)

Some linking phrases for contradicting:

In actual fact, ...

In point of fact, ...

On the contrary, ...

### Comparing and Contrasting

When writing research papers, students will have to compare and contrast their own findings to those of their peers. In order to be able to do that, they need to master a wide variety of expressions used for this purpose. Some of the useful comparing and contrasting expressions include:

*be about/almost/roughly/essentially the same as*

*be similar to*

*be like*

*be equal to*

*be no different from*

*be compared directly to*

*be identical*

*be alike*

The following linking words and phrases may also be used to express similarity:

*like/ as well as/ both...and/ just as/ In the same way, .../ Similarly, ...*

Contrasting is a specific kind of comparison in that it aims at identifying the differences. Here are some useful sentence structures:

*It is common to distinguish between ...*

*It is useful to differentiate between...*

*It is valuable to make a distinction between...*

*Unlike/ In contrast to/ As opposed to/ As distinct from/ As against*

Some common conjunctions and sentence linkers for expressing contrast:

*While/ Whereas/ On the other hand...*

## CONCLUSION

Medical writing enjoys the attention of both medical and linguistic communities of interest. The international nature of the readership requires that research should be written clearly and concisely and the need for better quality in medical communication is now widely recognized and has given rise to a growing number of suggestions and guidelines for quality improvements targeting the structure, style and rhetoric of medical communication.

This paper deals with teaching written communication to medical students, more precisely with writing scientific medical research papers following the IMRAD structure. It also examines the style of research papers (objectivity, clarity, hedging) and focuses on the most important language functions (agreeing and disagreeing, comparing and contrasting) and grammar points (tenses, passive, modals) that frequently occur in medical research papers.

Teaching scientific medical writing to students is meant to offer guidance and support in their needs to write more effectively in English. The newly acquired competencies are intended to give the future professionals a greater confidence in performing their working tasks in the internationally competitive working environment.

A continuation of this study and a suggestion for further research would consist of a thorough grammatical and lexical analysis of medical research papers.

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## PODUČAVANJE PISANJU NAUČNIH MEDICINSKIH RADOVA

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### SAŽETAK

Studenti Medicinskog fakulteta Univerziteta u Nišu imaju specifične potrebe u odnosu na engleski jezik. Oni žele da objavljuju radove u stručnim časopisima, da učestvuju na međunarodnim konferencijama, ali i da nastave sa obrazovanjem i praksom u inostranstvu. Imajući u vidu navedene činjenice, zaključili smo da su analiza strukture i stila medicinskih naučnih radova i podučavanje pisanju naučnih radova iz oblasti medicine veoma korisni.

Komunikacija među lekarima, koja uključuje čitanje i objavljivanje članaka, učestvovanje u istraživanjima i na konferencijama, praćenje novih dostignuća predstavljaju imperativ u ličnom usavršavanju svakog lekara.

**Ključne reči:** IMRAD, medicinski naučni rad, gramatika, jezičke funkcije

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