

Setting standards for medical writing in orthopaedics

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Abstract Once the privilege of few clinical scholars in the field of orthopaedics, medical writing has become a must for career advancement. The number of papers submitted and published yearly has increased steadily, and with the development of the Internet, manuscript and journals have become easily accessible. Medical writing has risen to become a discipline in itself, with rules and standards. However, heterogeneity in the quality of papers submitted still prevails, with large variations in both form and content. With countries such as China and India submitting an exponential number of manuscripts, it is important and helpful that standards of medical writing be emphasised to help writers who do not always have the required support to produce an outstanding manuscript. In this paper, we summarise what may become standards for medical writing in the field of orthopaedics.

Keywords Medical writing · Publication · Notoriety · How to get published · Standards to write a paper · Research · Methodology · How to write a paper · Medical publication · Medical editing · Orthopaedic surgery · Academic orthopaedic surgery · Reference · Impact factor

Recommendations for young writers following the Medical Writing Symposium at the SICOT World Orthopaedic Congress – Hyderabad, India, 19 October 19 2013.

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C. Mauffrey, M. Pećina and M.M. Scarlat (from left to right) during the SICOT Congress in Hyderabad, India, October 2013.

Introduction

Writing a scientific paper that will get published is one of the most rewarding achievement in a medical career. Preparation of the manuscript crowns the mountain of hard work that preceded it, starting from defining a hypothesis-driven research question; writing up a protocol; submitting it to the Institutional Review Board (IRB), often followed by a grant application; recruitment and follow-up of patients and data analysis. Despite these hurdles, success (defined as a published manuscript) is not guaranteed and will depend not only on how the paper is written (the form) but also on the methodology used and therefore the quality of the entire process from research question to data analysis. The intricacies of this

complex process imply that centres with a solid research team, financial support, availability of statisticians and English-speaking writers will have a far greater success rate than those with lesser means. Today, the number of journals and papers published has increased dramatically [1], most of them with arguable clinical impact. The medical-writing environment is becoming increasingly competitive, yet no real standards have been established for such writing. The aim of our editorial is to emphasise a few important steps critical in the manuscript writing process. We hope to set standards that prospective authors can review like a recipe to help planning, preparation and assembly of the ingredients in order to create a sound, high-quality paper.

Get ready

Read The most prolific scientific writers are often the most avid readers. In addition to improving writing skills, reading enables you to identify gaps in knowledge, to be familiar with the literature in the field and to highlight hot topics that may become sources of ideas for future research [2]. Controversial topics or ideas may be recognized in certain manuscripts, such as letters to the editors or instructional courses, and may help you explore and exploit these ideas in your research endeavours.

Meet The concept of peer reviewing and medical writing has been built on principles of transparency and meritocracy. That being said, it is always helpful to talk to editors and reviewers, as this may strengthen your chances of getting it right. Such mentors may suggest topics and provide tips that may make the difference. The publishing industry has become more competitive, and time from submission to publication is one of the most important criteria upon which potential authors select their target journal [3]. One way to reduce this time is for journals to recruit more reviewers. Now is the right time to become a reviewer, which will automatically strengthen your skills and increase your chances of getting published. Therefore, potential authors should contact editorial boards and offer their skills.

Plan Ensure you have a plan and that every step of the way your research is conducted with quality in mind. Some research projects take several years to complete, and not being able to publish a paper because of poor design several years earlier, at the planning stage, is extremely disappointing. For experimental designs, make sure to define your hypothesis; formulate a clear research question; determine the aims of the study and the primary outcome measure; perform a sample-size calculation and project feasibility (based on the numbers in your institution); develop a budget; and finally seek statistical support. This preparation must be written in a mini

protocol before embarking on a grant application, IRB authorisation or even thinking of publishing. Here is an example of why these steps are important: The aim of our study is to show that apples are different to pears. Our primary outcome measure is the shape of the fruit (there can be only one primary outcome measure, and it will be used to perform sample-size calculation. We could have also chosen the colour of the fruit, its weight or taste). Based on previous studies looking at the shape of pears and apples, we will need to study 50 apples and 50 pears to show a statistically significant difference in their shapes (this is our sample size calculation). However, we only have 25 apples and 25 pears in our institution per year; we will therefore need two years to recruit 50 of each fruit, and with attrition rate and lost to follow-up, maybe three years (this is our feasibility study). A useful tool that can assist the researcher in ensuring the adequacy of study design is PICO: Participants (eligibility, inclusion and exclusion criteria), Intervention (surgeon, surgery, rehabilitation), Comparator (operative versus nonoperative, type of surgery versus other type of surgery), Outcome measure [4].

Know Journal editors look for the most original and high-quality research adapted to the journal's readership. The role of the editor is to improve the citations of articles published in their journals; hence, heavily cited research topics are excellent [2]. Review papers are usually the most heavily cited manuscripts, but they are difficult to publish. Helpful steps for writing a systematic review are described by Sambujak et al. [5]. Case reports are challenging to publish, as they are rarely quoted in subsequent papers, and the space attributed to them in journals is limited. Select your target journal early, and do it with realistic expectations. The quality and topic of your research should be the two criteria that influence your choice. General orthopaedic journals will not publish focused basic science research and vice versa.

Manuscript preparation

The style used is important. Sentences should be short and clear. Be scientific and pragmatic about your writing. Always remember that your ability to get published is largely related to the reviewers' and editors' perception of the quality of your work. This judgment is often made within the first few lines of the manuscript. The topic must be interesting, the research question clear and the method used to answer the question easy to follow and reproduce.

Title Appropriate style grabs the readers' attention and introduces your manuscript to the editors. It must convey the main topic of your manuscript and be specific and concise. The title will serve as a label for indexing your paper in medical

libraries [2]. Be clear with the meaning of your research. The title “Clinical study on rotator cuff deterioration after partial thickness tear and arthroscopic repair in our hospital” is not appropriate, brings no information and does not incite a reader to read your work. A better title would be “Arthroscopic single-row rotator cuff repair provides high satisfaction rate at a minimum of four year follow-up”. This latter title is brief, provides clear information and will help get your paper read fully by the reviewers.

Abstract Think about what you read when you read a journal. Most of us would focus on the abstract and may carry on reading the entire paper if this section drew our attention. It must be able to stand alone and represent an accurate summary of your research and conclusion [2]. Be sure to read the instructions for authors in order to follow the specific requirements for structure and word count. It is challenging to summarize several years worth of research into 150–250 words. This summary must be written once your paper is finished and ready to submit. The Background section must be limited to two punch sentences: the first may expose the problem; the second states the purpose of the study. The Method section should include study design, setting, dates of recruitment and inclusion criteria. The author must identify the primary outcome measure and how measurements were performed. In the Results paragraph, the number of patients recruited and followed up must be stated. Key findings must be identified without data interpretation. The reader must be able to read that the aim of the study highlighted in the Background has been achieved in the Results. The Conclusion is a sentence that sends a powerful take-home message to the reader suggesting a change in practice or confirmation of previously known data.

Key words Complex computer algorithms classify your manuscript using the keywords selected. They are important to improve the visibility of your work for other authors, thus improving citations of your articles. Some institutions now use the Hirsh Index (HI) to measure the impact and productivity of the published work of scientists. The HI depends on the clinician’s most cited papers and the number of citations they receive in other journals. You can influence the number of citations your work receives by paying attention to keywords, as this will impact the visibility of your work.

Introduction Many editors will admit to reading the last sentence of the Introduction of an entire manuscript first. This sentence must act like a punch in the face: no frills, and straight to the point of what the author wishes to achieve. Here is a suggestion on how to build your introduction using seven sentences that will build up in a logical and pragmatic approach.

- Epidemiology of the problem
- Gold standard
- Gap in knowledge and data to show alternatives to the gold standard
- Recent studies on this gap in knowledge
- Purpose of the study
- Null hypothesis
- Study design to answer the question

Materials and methods This section is unarguably the most common cause of manuscript rejection. Put yourself in the brain of an editor who attempts to understand how your study was designed and performed. The methodology must be clear and easily reproducible, leaving no gaps or room for speculation. This must be the most detailed section of your manuscript. Results such as classifications, complication rates, male to female ratio, ages and other characteristics must not appear in this section. Certain “buzz words” must appear, and editors would recommend using subtitles to separate subsections of the methodology.

- Settings: Describe study design, ethical approval and the environment in which the study was performed.
- Patients: Provide clear inclusion and exclusion criteria based on ages, injury types and classifications, comorbidities, associated injuries and mental capacity to consent. If randomisation occurred, how was it performed?
- Interventions: Describing interventions performed and who the operator was is crucial. Did one surgeon who is a world expert in anterior cruciate ligament (ACL) reconstruction perform the surgery, or were there several surgeons of different skill and grade levels involved in the technical aspects of the study? This latter so-called “pragmatic” approach is a more modern way of performing clinical trials, as it provides results that are more applicable and reproducible by the “reader surgeon”. These qualitative and quantitative metrics are unfortunately underreported in manuscripts, creating results that are difficult to interpret [6]
- Outcome: One primary outcome measure and one or more secondary outcome measures must be identified. Ensure that the selected outcome measures are validated. Clinical studies with no functional outcome measures may not be published. Ensure you select a disease-specific and a generic health outcome measure, such as the Oxford Hip Score for the former and the Short Form Health Questionnaire of 36 Questions (SF-36) for the latter.
- Statistics: This section must start with a sample-size calculation and the method used to calculate it. The reader must understand whether the authors performed a pilot study or based their sample-size calculation on retrospective data. If the latter is so, what was the source of this data

and the software used to calculate the sample size? The use of a statistician will ensure appropriate use of statistical tests based on data-set distribution (parametric or nonparametric) and type (continuous, discrete, qualitative, quantitative) [7]. Remember that p values have statistical value, whereas confidence intervals have a clinical value, which is far more important.

- Follow up: Duration and frequency of follow-up, description of postoperative regime and number of patients available at final clinical encounter must be clearly stated. The reason for loss to follow-up must be explained. Were these patients excluded from data analysis? A minimum of one to two years of follow-up is required for most clinical studies. Depending on the subspecialty, early and midterm results require a follow up of five years, whereas long-term results usually require a minimum of eight to ten years.
- Source of funding: Disclose conflict of interests or source of funding for your project.

Results Keep this section brief and ensure that all results add up to the total amount. A common cause of rejection is when the percentages do not add up to 100 %. This deficit shows a lack of attention to detail and is often associated with other deficiencies. Information presented in tables must not be duplicated in the text and vice versa. Keep a standardised format throughout your manuscript, such as raw numbers first and percentages in brackets or vice versa. It is essential to present the flow of your research using a chart similar to the Consolidated Standards Of Reporting Trials (CONSORT) flowchart [8] so the reader understands what happened to all patients initially identified in the database and how the number dropped from, for example, 100 to 25 at the final follow-up. Ideally 80–90 % of patients should be available at the final follow-up. This chart is divided into enrollment, allocation, follow-up and analysis subsections and is compulsory for randomised clinical trials; however, we recommend its use for any clinical study.

Discussion The Discussion may be the hardest section to write. It must focus on the hypothesis and the research question. Speculation must be avoided. The aim of the Discussion section is to present principles and relationships and attempt generalization of your findings. Do not repeat or overstate the importance of your results. Providing the following information is recommended:

- Answer the research question.
- Support the answer with your findings.
- Explain conflicting results, discrepancies and unexpected results.
- State the limitations of your work.
- Establish the novelty of your results.

- Explain future directions for research and application of your results into clinical practice.

Conclusion State what your findings support and whether they answered the research question. Ensure expressing a clear take-home message. Finish with a sentence that will define future direction for research or implementation of clinical changes based on your results.

References Only cite recent references (less than five years old). If references are older, they should only be used sparsely and for key historical papers. Avoid the reference of book chapters. Do not overreference but ensure that every statement you make is supported by a citation. Reviewers and editors will often verify the accuracy of the bibliography. Follow instructions to authors to ensure that the format used is adequate (alphabetical order versus chronological, brackets versus parenthesis, Vancouver style versus others). The use of computer software, such as Endnote, is recommended. This will facilitate your work should the reviewers ask you to add or delete references during the review process. A hidden rule and advice to all potential authors is to include as many references as possible from the journal you are submitting your paper to. Editors will appreciate this habit, as it will boost the impact factor of their journal.

Illustrations Figures and tables must be understandable without the main body of text. Their use is encouraged, but the quality must be good. Ensure that legends are clear and that you follow instructions to authors for presentation of your tables and figures.

Tips and tricks

Instructions for authors Few submissions follow these guidelines to the letter. Deviation from the instructions can be perceived as a lack of attention to detail and a cause for immediate rejection. Take time to read your manuscript several times and be sure to be very methodical.

Ethics and fraud One in 13 original articles in the *Journal of Bone and Joint Surgery* (British volume) (JBJS Br) are duplications or fragmented publications [9]. Editors are very well aware of this issue, having in their armamentarium computer software that will detect plagiarism and duplications. Such occurrences must be avoided at all cost to preserve and maintain your and your institution's integrity. Committees such as the Committee on Publication Ethics (COPE) deal with such issues and provide editors and publishers with guidelines and action measures to be taken when fraud occurs. The

consequences for the author range from a warning to a ban to submit papers and more, depending on institutional policies. Falsification of results is challenging to identify [10], but experienced editors are able to read between the lines and expose the coverup. Such unethical behaviour on your part may result in a permanent ban on submission to most journals.

Language Clarity of language is crucial. For countries in which English is not routinely spoken or written, this creates a real barrier to getting your paper accepted. The number of submissions from China has risen tremendously in the last few years, and language is a common issue. We urge authors to have their manuscript read and written by native English-speaking writers before submission. Reviewers reading a poorly written manuscript will have a tendency to reject the paper if it is not written in clear, concise language. The message that the author wishes to share with the reviewer may not come across clearly due to the language barrier. Spelling and grammar errors are seen once again as a lack of attention to detail.

Cover letter This may be the first item that the Editor in Chief reads about your work. Make it personal and explain why you performed your study. Address it to the journal, and include the date of submission and the title of your manuscript.

How to answer to reviewers Be polite and acknowledge their remarks. Respond in a humble manner, trying not to argue with their comments. On occasion, reviewers may get it wrong, and it is worthwhile in these instances to politely make your case and explain to them why you disagree. Make their lives easier by highlighting your changes in the manuscript and writing a letter of rebuttal in which you answer all of their questions.

Conclusion

Medical writing requires a methodical approach with an obsession for detail. Remember that your ability to publish will in large part be related to the perception of the reviewer regarding the quality and usefulness of your work. This decision is often based on a first impression. Following this guide should provide you with a framework and scaffold when approaching the writing phase of your work. Focus on language clarity and quality. Choose an appropriate title and write an introduction that flows. Remember there will be more

rejections than published papers, but as Winston Churchill said: “Success is the ability to go from one failure to another with no loss of enthusiasm”.

Good luck.

Conflict of interest Short parts of this manuscript were inspired by a PowerPoint presentation on medical writing (Springer-Verlag).

References

1. Larsen PO, Von Ins M (2010) The rate of growth in scientific publication and the decline in coverage provided by Science Citation Index. *Scientometrics* 84(3):575–603
2. Springer eds. Scientific medical writing ppt
3. Søreide K, Winter DC (2010) Global survey of factors influencing choice of surgical journal for manuscript submission. *Surg* 147:475–480
4. Schardt C, Adams M, Owens T (2007) Utilization of the PICO framework to improve searching PubMed. *BMC Med Inform Decis Mak* 7:16
5. Sambunjak D, Franic M (2012) Steps in the undertaking of a systematic review in orthopaedic surgery. *Int Orthop* 36(3):477–484
6. Bowles RJ, Mauffrey C, Seligson D (2011) Analysis of performance metrics reporting in papers comparing treatments or materials/devices in four important orthopaedic journals for the year 2009. *Injury* 42(12):1480–3
7. Ramachandran M (2006) Basic Orthopaedic Sciences: The Stanmore guide. Hodder Arnold publication 2006. ISBN-10:0340885025
8. Rennie D (2001) CONSORT revised—improving the reporting of randomized trials. *JAMA* 285:2006–2007
9. Gwilym SE, Swan MC, Giele H (2004) One in 13 'original' articles in the Journal of Bone and Joint Surgery are duplicate or fragmented publications. *J Bone Joint Surg Br* 86(5):743–745
10. Pecina M, Hall A (2009) Fraudulent submissions. *Int Orthop* 33(2): 299

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