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Manuscript preparation and publication are a cornerstone of medical knowledge. The published manuscript is the "coin of the realm" in academic medicine, the specie by which physicians and scientists alike are judged relative to their peers; it is also considered an indicator of future potential and current achievement. The importance of publications is highlighted by their central role in academic advancement.

There are multiple steps and multiple goals in the preparation of a manuscript and its subsequent publication. Gaining some understanding of these issues is crucial before taking on the actual practical task of turning ideas and concepts into a finished product.

The primary goal of publication is communication. However, the means and form by which the communication takes place may vary widely. The goals of preparation and publication depend in part on the author and the landscape in which crafting the manuscript occurs. Sometimes manuscripts are the outcome of an experiment or research project; at other times, they fulfill a requirement of a training program. Some manuscripts result from a comprehensive review of a subject matter or field (as in a review article). Regardless of the landscape, it is critical to begin by defining what is to be communicated and to whom it will be targeted.

Preparation of a manuscript for publication begins with a clear delineation of what is to be communicated. Once this task is completed, the primary aim is to write a manuscript in a format that attracts editors and reviewers and effectively educates readers. It might be said that an unpublished manuscript and an uncited published article are the 2 ultimate failures of communication and education. Another failure is related and equally important. It results from a series of events that include manuscript preparation and submission followed by several rejections, which a young investigator perceives as failure, becoming discouraged and hesitant to attempt other academic ventures. Achieving the goals and tasks of planning, preparing, submitting, and publishing academic manuscripts is the focus of this article, which is aimed at young investigators.[1–8]

Types of Manuscripts

There are several broad groups of manuscripts. These include original scientific articles, invited reviews and editorials, and case reports.

Original Scientific Articles

Basic or translational research studies may answer fundamental questions about basic mechanisms or physiology of disease by testing specific new hypothesis in in vitro and in vivo experiments, resulting in new findings. They follow rigid, well-defined protocols. These studies include those with "clear biological interest and implications for the treatment of human diseases and represent a novel conceptual advance."[9] The best of this type of research will have broader implications to the scientific community outside cardiology and may be considered for publication in general scientific journals.

Clinical studies that have the highest academic merit are those that are prospective, hypothesis driven, randomized if possible, double blind in design, and adequately powered to address the specific question posed. Such studies form the basis of practice guidelines. All randomized clinical trials must now be registered (eg, with http://www.clinicaltrials.gov) before the trial is begun to ensure that journals will consider their results for publication.

Registry series are a subtype of original research article. They typically involve patient populations in which the outcome, both long and short term, of a therapeutic strategy, new drug, or new device is addressed (ie, large international registries).[10] They may be single-center, multicenter, or multinational studies. As with all scientific manuscripts, a specific hypothesis and adequate sample size are required.

A subset of this type of manuscript is the retrospective observational study from populations at the author's own institution. Many institutions have robust databases of a large number of patient groups. Manuscripts from this source may be ideal for trainees because the data are readily accessible.

Meta-analyses are a kind of publication that has become increasingly popular, and a whole field of study has developed around the methodology. Meta-analyses require considerable statistical skill, multicenter or multinational data, and the ability to combine widely different data sets. Disadvantages of meta-analyses include incomplete data ascertainment in the data sets, the use of disparate definitions for the same terms in different studies, and major differences in statistical design. Optimally, individual patient data should be analyzed.

Review Articles

Such articles[11] serve a very real purpose for younger, mentored physicians early in their careers. They require that the

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author extensively review and master the literature and then develop some general statements and conclusions with implicit implications for patient care strategies. Review articles provide a coherent reference base to the readership. The process of writing a review article can often be an integral part of medical training and mentorship. Review articles are often written as a result of an invitation from a journal. Preparing a review article can occasionally bring to light a clinical problem that then can be addressed prospectively in a well-designed study. Similarly, for a basic science trainee, writing a review article allows complete analysis of the literature in the trainee's specific area of scientific interest.[12]

Editorials

Like review articles, editorials usually are invited. They generally provide scientific or clinical context to concurrently published articles or issues. Often, the invited author has been involved in the review process. Like the review article, writing an editorial can be a mentored experience.

Case Reports

As primary caregivers in academic institutions, young physicians frequently identify unique patient cases worthy of publication. The case report exposes authors early on in their career to the issues of manuscript preparation and publication. They are very well circumscribed and offer the opportunity for creative use of visual graphic material for the case at hand. A disadvantage is that many journals do not publish case reports. Thus, it is very important to have a specific journal in mind before initiating the project.

There are metrics for evaluating the importance of a specific type of manuscript to young investigators. Factors to be taken into consideration include the goal of the manuscript and the goals of the author and the mentor. For academic advancement, manuscripts that require development of a specific hypothesis to be evaluated using new original data are more important than review articles or case studies. However, both of the latter also are important and useful to encourage trainees to develop writing skills and to critically master a body of literature.

Journal Selection

Manuscripts that fit into any of these categories may add significantly to the literature. Initial factors to be considered are the audience toward whom the manuscript is aimed and the nature of the work (clinical, translational, or basic science), both of which direct journal selection. A manuscript that is focused on very general clinical cardiovascular topics is unlikely to be well received by a subsubspecialty journal that deals with, for example, very technical details of procedural performance. Alternatively, an article that deals with basic science may not be well received by a general, widely read clinical journal.

A related subject to consider in selecting a journal is impact factor. This is a quantitative tool for evaluating the impact of a given journal; it measures, in straightforward terms, the frequency with which articles in 1 journal are cited in other articles, in either that journal or any other, in the first 2 years after publication divided by the total number of articles published. A bibliography containing many articles published in journals with high impact factors is considered to be stronger than one comprising articles published in journals with lower impact factors. Seen another way, publishing in journals with higher citation indexes provides a greater opportunity for articles to be widely cited.

Another, more recent, individual measurement of impact is gaining in usage: the h index.[8] The h index considers the total number of publications by an individual researcher and the number of citations of that author's publications. The h index, which is thus a measurement of an individual's as opposed to a journal's impact, may become a tool to assess academic productivity.

Once a journal is selected, its instructions for authors, which are found either on the journal's Web page or in a print issue, should be followed closely. Journal editors expect to receive the best manuscript that the author can write, and they are unlikely to look favorably on articles that do not adhere to their requirements. Early drafts or manuscripts with inconsistencies in style or content are usually not well received.

Defining the Author's, the Coauthors', and the Mentor's Roles

In response to ethical concerns relative to authorship, internationally accepted guidelines now define the requirements for authorship in a biomedical manuscript (http://www.icmje.org/#author). Basically, an author must contribute (1) to the design of the study or acquisition, analysis, or interpretation of the data; (2) to the drafting or revision of the manuscript, and (3) to the final version of the manuscript. More broadly, authors need to have committed the resources in both time and energy to identify the project/subject, to master the background information, and to accumulate the necessary parts, (eg, the scientific data, statistical support, availability of eager coinvestigators or mentors, resources for a literature review, and graphical requirements). The author must be committed to the project, an obvious but sometimes underappreciated requirement. The project must be practical and focused so that there is a reasonable likelihood for a publishable manuscript.

Given the importance of manuscript publication for personal satisfaction and professional advancement, significant attention should be paid to the coauthors. This issue has several perhaps mundane but important components. It is always best to sort out authorship before the manuscript is in its final stage of development because authorship order can be very contentious. The person who writes the article should be the first author; under unusual circumstances, an article may contain a statement that 2 authors contributed equally to the manuscript development and preparation. The senior author, or mentor, should be last. In between, the relative position of the coauthors should be determined by the degree and extent of their participation in the study and the manuscript rather than any other factors such as local political and/or professional issues. If potential coauthors do not participate actively and in a timely fashion, they do not qualify for authorship.

The inclusion of multiple coauthors and the requirement that they play a substantive role in manuscript preparation can

complicate the process. In the era of electronic revisions, multiple authors tracking changes to multiple drafts may confuse the first author who is trying to amalgamate diverse suggestions. Sharing drafts in a PDF format often precludes coauthors from making direct comments. Sharing drafts using broadly accepted software and changing footers on each draft to control versions saves time in the long run.

The mentor's role is critical. Sometimes the work reported in the manuscript is performed in the basic science laboratory of the mentor; sometimes the mentor is the clinician who helps to identify a clinical problem. An active role of the mentor in terms of expert opinion on the subject, study design, review of the data, and constructive suggestions at all stages is essential. Selection of the initial topic, which often results from interactions between trainee and mentor, is extremely important because articles that add new information are much more likely to be well received and published than articles that are repetitive.

Preparing to Write the Manuscript

Many strategies have been proposed to guide the process of manuscript preparation. The approach of Toulmin,[13] which has received considerable attention, continues to be adapted and modified. Gathering the background information is an essential step. A formal literature search, directed at the topic of interest, can identify the crucial relevant articles. In general, articles >5 years old should not be used, nor should abstracts. Instead, concentration should be focused on recent publications, and the publication list should be expanded as new data become available during the course of writing. An exception to this general approach of not referencing articles >5 years old are classic articles that form the basis for the current era of investigation of the manuscript in preparation. Such articles, which have stood the test of time, should be both studied and referenced.

Based on the literature review and discussions with the mentor, the scope of the project can be laid out and the hypothesis and objectives can be formulated. T.H. Huxley[14] wrote that "hypotheses are not meant to be multiplied beyond necessary." Some questions may not be able to be addressed, which may affect whether the project should even be initiated. For example, if large series of articles on the subject have been published, another smaller article will have little value.

An important consideration related to these issues is subgroup analyses as part of the evaluation of a larger group of patients. In building a portfolio of manuscripts, there is the temptation to make each subgroup analysis a stand-alone but very restricted article. That approach has the disadvantage of decreasing the likelihood of acceptance of the primary manuscript in a highly ranked journal. A more optimal approach involves discussing several major observations in the primary manuscript. Ultimately, the quality of publications a young investigator writes is more important than the quantity.

Statistical issues should be addressed early in the process. If the data set will lack the statistical power to address the hypothesis because the sample size is too small, the project should be abandoned. This is very important, particularly for younger investigators in their formative years. A study that lacks statistical power to address the hypothesis and is therefore not publishable often sends a chilling message that can color the attitude of the young investigator toward taking on other projects. It is important to describe the focus of the study correctly as either a prespecified or a posthoc analysis. This has great implications for whether the conclusions are to be considered hypothesis generating rather than definitive.

There are several major components to any manuscript. The main sections of most clinical research manuscripts are the cover letter, title, Abstract, Introduction, Materials and Methods, Results, Discussion, References, and illustrations. This list can vary somewhat; eg, case reports do not include all of these sections. Each section has multiple subcomponents. The order in which the first author writes the sections of the manuscript is a matter of personal preference and writing style. Some authors begin with the Results, others with the Introduction, and some with the Methods, whereas others start with the Discussion. Very little science exists to identify the optimal approach.

Assembling the Components of a Manuscript

Cover Letter

The cover letter is an incredibly important part of "selling" or optimizing the chance of acceptance. Some journal editors use the cover letter to guide their initial decision making as to whether the manuscript is appropriate for their readership. If the editor does not find the subject to be germane for its journal audience, the article may not even be sent out for review.

The cover letter should include the following components:

1. The manuscript title and authors.
2. A concise statement of why this manuscript is important.
3. The fact that the article is not under review by any other journal.
4. The declaration that this is original work and that all authors have participated.
5. The submission of any conflict of interest by the coauthors.

These few but extremely important data can guide the editor in making reviewer decisions. Thus, the letter should highlight the new data presented and provide context for either a clinical or a basic science question. It should distill the background, the relevant subject at hand, the approach taken, and the information presented. The letter needs simultaneously to be concise and to attract editor/reviewer interest. Neill[9] made an interesting editorial suggestion: "Make sure to address your cover letter to the correct journal. We understand where we fall in the hierarchy of journals. . .. Give us the delusion that we were your first choice." (Coming from the executive editor of the prestigious *Journal of Clinical Investigation*, this statement must have an interesting history).

Title

Selection of the title can be complex. The title should draw the reader's attention and identify the background or question to be tested. Excessive length should be avoided. The type of manuscript significantly affects the title; an editorial title

could be provocative, whereas the title of a randomized trial manuscript should be very direct and succinct.

Abstract

Stephen Jay Gould[14] wrote, "I always look to closing paragraphs as indications of a book's essential character." Although that may be germane for books, in the case of manuscripts, it may be just the reverse; it may be that Abstracts are the indications of the essential character of a manuscript. The structure of the Abstract varies depending on the journal's requirements. Some journals specify a structured Abstract; in others, the form must be unstructured. Some journals require a condensed abstract of only a sentence or 2, sometimes no more than 50 words.

Preparation of the Abstract requires a great deal of attention because it is seen first. It may be the most important piece of information in helping the reviewer or prospective reader decide on the merits of the article. The Abstract should set the background stage succinctly in 1 or 2 sentences (why it was done), then identify the study design (how it was done and in whom), and then create a slightly longer section presenting the results before coming to a concise statement about conclusions and implications. Some journals require separate paragraphs for each of these elements.

Typically, an abstract must be written in ≈250 words; the instructions to authors will provide this information. The word limit is very important; few things are more discouraging in a literature search than to come across the phrase "abstract truncated at 250 words" while the reader is still midway through the Results section.

Introduction

The Introduction should be short and focused. Young investigators should avoid the temptation to include in the Introduction much information that should be in the Discussion. An Introduction has several purposes:

1. It should attract the reader's attention. This requires that the author address the needs of the intended audience.
2. It should mention the questions or issues that form the background of the study. Information about the relevant literature with key references to highlight the questions or issues to be addressed should be included succinctly and without elaboration.
3. The final part of the Introduction identifies the hypothesis to be treated and the questions addressed in the manuscript.

Materials and Methods

This section has many required elements.

1. Documentation of Institutional Review Board or Animal Care and Use Committee approval is mandatory. Without it, no article can be published.
2. The population in which the hypothesis is to be tested must be indicated. It may be a patient series, in which case it is optimal to have it be consecutive patients. This portion includes patient selection, the inclusion/exclusion criteria. These criteria can be listed in a table, which is more user friendly. If the subject of the article is an animal experiment, then the specifics are given (eg, species, size, and gender).
3. The details of the study, ie, design and implementation, come next. Details here vary widely depending on the study, whether it was a population-based study, a new device, a new medication or strategy, or an animal experiment. There must be enough detail so that the reader understands the study design and could duplicate it if desired. This may be more crucial for basic science experiments than for clinical registries.
4. The primary end point of the study is stated, which refocuses the hypothesis to be tested. In some studies, the primary end point is a composite (eg, major adverse cardiac events), whereas in other studies it is a single and discrete end point (eg, death). This section also presents secondary end points or end points in prespecified subgroups. This latter point is important because posthoc analyses, although interesting for hypothesis generation, lack the scientific merit of prespecified end-point analyses.
5. Definition of terms is integral so that the reader can put the results into context. Well-accepted definitions should be used; it is important to reference the articles that have defined the terms. Terminology that is unique to the manuscript should be avoided. For example, if the author's definition of cardiogenic shock is blood pressure $<$100 mm Hg but the standard definition in the literature is $<$90 mm Hg, the results may be discounted because the patient population differs from the accepted shock population.
6. The statistical section requires great attention.[15] Part of the educational value of manuscript preparation resides in having the writer learn about the underpinnings of statistical calculations. Study design considerations here include issues related to superiority versus noninferiority, techniques for data analysis such as propensity scoring and bootstrapping, statistical power to detect differences between groups in the study, and sample size calculations. Input from a statistician is essential in this section. The statistician should typically be a coauthor.

Results

The construction of the Results section requires considerable thought. Depending on the study, some results may best be displayed in tabular or graphic form. For example, baseline demographics of patient groups are best placed in a table. The text can then be used to highlight crucial patient characteristics or differences between the groups rather than to completely reduplicate material in the table. The number of tables and figures will vary, depending on the subject, the journal, and the audience.

Gopen and Swan[16] have written extensively on writing with the "reader in mind." The Table illustrates their point that there are several ways to present the same data. For data such as these, tabular form is obviously much more understandable. They have also explored such technical writing issues as subject/verb separation, sentence structure, topic position, and logical gaps.

The Results section should be written to stand on its own merits. After the population has been detailed, the primary end point is the focus of attention. Use of graphic material can be of great value in highlighting specific points, but duplication of information in text and illustrations should be avoided.

Table. Example of 2 Different Layouts for Presentation of Data

Nontabular Presentation of Data

t (time)=45′, T (temperature)=36°; t=30′, T=32°; t=25′, T=30°; t=15′, T=29°; t=10′, T=28°; t=0′, T=27°

Tabular Presentation of Data

Time, min	Temperature, °C
0	27
10	28
15	29
25	30
30	32
45	36

After the primary end point, the secondary end points are then detailed and documented. Some authors make the mistake of repeating or including information that should have been in the statistical portion of the Materials and Methods; this should also be avoided. It must be kept in mind, as Gopen and Swan[16] write, that "we do not start with the strawberry shortcake and work our way up to the broccoli." Thus, some of the very important or potentially controversial secondary end points should be placed at the end of the Results section to continue to stir and keep reader interest.

Illustrations

Graphics are an important part of any manuscript. The number and kind of illustrations vary. Some information is more readily assimilated in tabular form (the Table). Tables should include only relevant material; extraneous data that do not affect the manuscript should not be included. The information presented in graphic or tabular form should not merely repeat what is in the text but should complement and highlight it. Kaplan–Meier statistics are much better presented as graphs.

The reader must be kept in mind when constructing legends. All pathological/histological material should be labeled explicitly, which often requires a more detailed legend than usual. Definitions of any acronyms and abbreviations should be included in the legend for a table or figure.

It is important to remember in this age of electronic manuscripts that color printers are not universally available. Accordingly, the lines on graphs should allow the reader to understand the data in black and white using, for example, dots and crosses or dashed lines (Figure 1).

The scale used in graphs is also important to highlight differences in populations; the vertical scale should be adjusted accordingly. Alternatively, this can be accomplished with an inset in a graph to point out differences in population outcomes (Figure 2).

Pathological or histological figures often require color. Given the cost of printing color in most journals, which is usually the responsibility of the author, great care should be taken to optimize the number of examples.

Discussion

There is significant literature on the components of an optimal Discussion section, including what should be avoided. The list is extensive. Jenicek[17] and others[18,19] have identified multiple issues. Key components include the following.

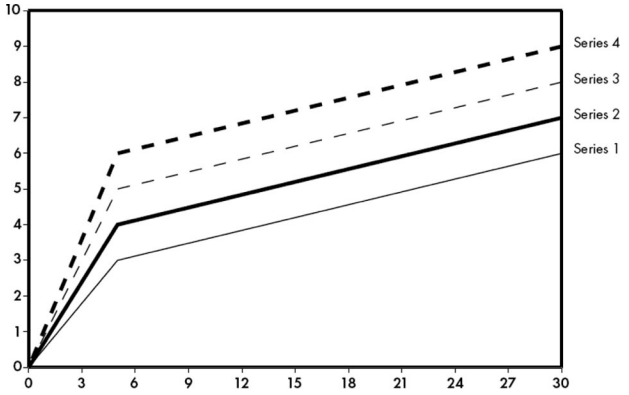

Figure 1. Simplicity is key in scientific illustration. This graph demonstrates how readily information can be transmitted without extraneous material such as symbols (×, ●, ▽) that can distract the reader.

1. A recitation of the major findings of the study. This should appear in the first paragraph of the Discussion and is often in a point format (eg, the major findings of this study are A. . ., B. . ., C. . .). It is neither necessary nor advisable to include statements such as "This is the first report of X."
2. Positioning of these findings against the background of published information, highlighting areas of concordance and discordance. Other studies should not be denigrated. However, the shortcomings of other studies, either gaps or unrecognized biases, should be noted in this section.
3. Exploring the basic mechanisms of the findings of the study. This may involve the underlying pathophysiology in an animal model or social or technical issues arising in and from a clinical study.
4. Application of the findings to other populations. It is important not to overstate the findings of the study or make unwarranted speculations. However, some applications to broader patient populations are reasonable. It is also reasonable to call for more information in a larger patient base to further study the issues.
5. Limitations. This is an exceedingly important section. A discussion of the shortcomings of either the experimental design or the statistical methods, as well as the generalizability of the findings, is crucial. This is important for reader understanding and the reviewers' evaluations of the manuscript. For an experimental study, issues that should have been dealt with by an improved study design should not be identified as limitations.
6. Conclusions. This requires a succinct re-presentation of findings. It can be accompanied by statements of the need to gather more data either from larger series or from other patient groups, although this should be limited. It is optimal to concentrate on the presentation of the findings from the data set studied.

References

References should receive considerable attention. In general, published manuscripts are preferred in any reference list. If for any reason there is a long delay between planning and completing a manuscript, the literature search should be

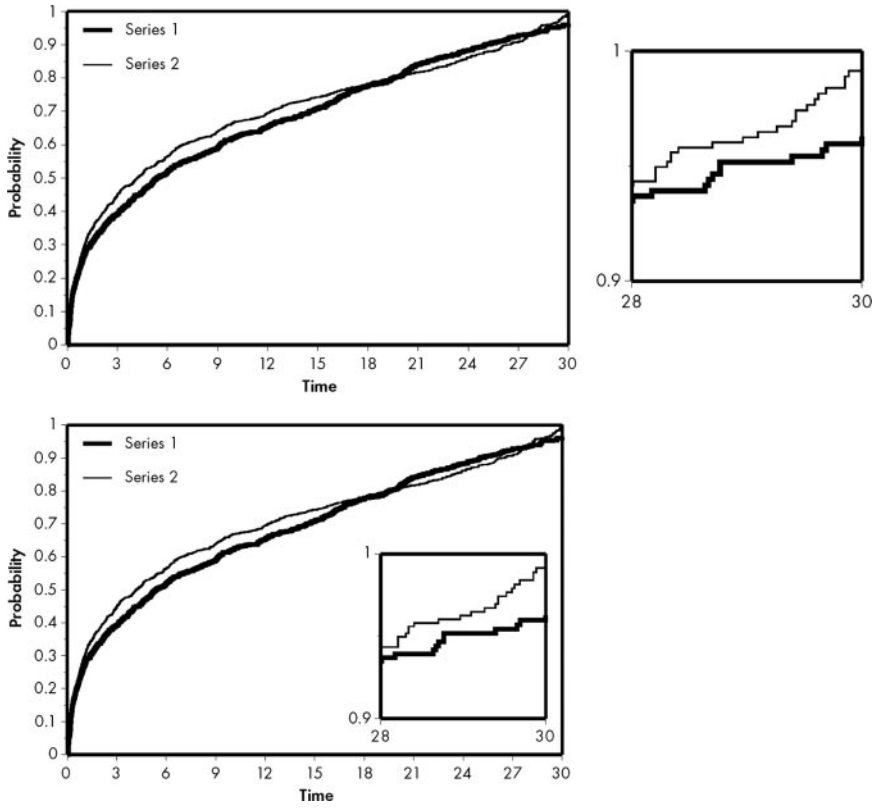

Figure 2. This series of 3 hypothetical Kaplan–Meier curves demonstrates the importance of scale. Although the top graph is accurate, important information (a difference in outcomes in 2 populations that achieves significance because of the large sample size) is lost. The middle graph takes a different approach by zooming in on the final significant difference, but both axes are foreshortened and the sequence of follow-up is lost. Finally, in the bottom graph, a compromise is reached by insetting the smaller graph within the original Kaplan–Meier curve.

repeated; a missing piece of published information that is not referenced is often picked up by reviewers and can become a significant issue in eventual publication.

The format for the references varies from journal to journal. Journal requirements must be reviewed before submission. Even apparently minor issues that affect journal evaluation (eg, references not in the appropriate format) may impede or delay acceptance.

Peer Review

The peer-review process is impressive.[20–22] It takes busy, usually academic clinicians with excellent credentials and requests their time and expertise to determine the publishability of a manuscript. Reviewers are not paid for this work and at times are badgered for tardy reviews.

Most journals in the medical sciences have a similar process of review. Because most of them also provide (or require) online submission, reviewing is smoother and quicker than in the past.[23]

An editor opens and reviews the cover letter and manuscript, assigns a classification according to the subject (eg, electrophysiology or interventional cardiology), and designates an associate editor who will see the manuscript through the steps in its review. The associate editor reads the letter and manuscript and then chooses either to reject the manuscript summarily (wrong journal for the subject matter, poorly written article, failure to adhere to journal requirements, eg, lack of a registration number for a randomized clinical trial) or to review it. In the latter case, the associate editor selects several reviewers, usually more than necessary because of the common unavailability of reviewers, and sends them a link to the manuscript and any supporting documents. Reviewers are given a deadline, usually 2 weeks unless the authors have requested and the editor has granted fast-track status (in which case 24 to 48 hours is the norm). Some online manuscript management systems automatically remind reviewers as the deadline passes; other journal managing editors handle this task.

When at least 2 reviews are received, the associate editor is notified. The reviews are read, as are the confidential comments to the editor, and the associate editor makes a recommendation on disposition. Some editorial offices have regular meetings at which associate editors and the editor make joint decisions on manuscripts; others leave it to the editor to render a final decision based on associate editors' recommendations. That decision is then transmitted to the author, along with any reviewers' suggestions for revision. The authors of manuscripts that are rejected should review the comments and make changes to their manuscripts to enhance the possibility of acceptance at another journal. In rare cases, the same reviewers have received the same manuscripts from 2 different journals; they frown on an author's complete lack of attention to their initial comments when they receive the unrevised manuscript from the second journal.

It is wise to give timely attention to reviews, revising and resubmitting as soon as the coauthors can manage. This shows interest in improving the manuscript and being published in the journal of choice.

Response to Reviewers

Most authors will have an opportunity to respond to reviewers. Responding to reviewers' concerns or suggestions is an

essential part of the publication process. There are several responses that the journal may render: acceptance, acceptance with revisions (minor revision), de novo submission (major revision), and rejection. It is uncommon for manuscripts to be accepted without any change. Neill[9] writes that on average for the *Journal of Clinical Investigation*, it takes 1 to 2 revisions before a piece of work is acceptable.

The revision should include a letter to the editor that stresses the care and attention paid to the reviewers' and editors' concerns. In the accompanying response, each and every one of the reviewers' concerns should be addressed specifically, and changes in the text should be referenced by page, paragraph, and line. It is important to add new data to address concerns or to say why new data are not available to address those concerns. Often, statistical questions must be addressed, which emphasizes the importance of statistical input into the design and preparation of the manuscript.

The response letter should be as concise as possible. Receiving a 10-page letter from the author about reviewer comments is sometimes problematic. It is important that each reviewer be responded to directly and completely. As Neill[9] suggests, referring reviewer 1 to a response given to reviewer 2 may alienate reviewer 1.

Taking Part in the Peer-Review Process

Young investigators will soon be asked by their mentor or a colleague of their mentor to review a manuscript for a journal. Although this task may seem daunting at first, there are a number of guidelines that will help dispel some of the mystery and make the job more manageable and palatable.

The peer-review process is confidential. Referees are expected to read and comment on manuscripts they are sent to review and then to destroy or delete them. The contents are not to be borrowed or shared with others. Reviewers are not expected to tell others about manuscripts they have reviewed, even after publication.

Peer review is expected to be timely. Journals give a time limit when they invite a review, and reviewers either agree to meet the deadline or turn down the opportunity because they cannot review on time.

Peer reviewers are not expected to review outside their comfort zone. When a manuscript mysteriously arrives on a person's desk and is not about a topic the person is schooled in, politely turning down the review is the best option. Suggesting a peer who has the needed expertise is welcomed by journals, but the journal should decide whether to use that person.

Most journals close the loop in the peer-review process. Once all reviews are received and a decision is made about a given manuscript, reviewers are usually informed of the decision and sent the comments of other reviewers. This aspect of reviewing is especially helpful for those early in their career as reviewers because it is a reasonable way to determine how congruent one's ideas are with those of others considered expert in the subject matter.

This brings us to the first and final matter, which is how one reviews the work of another person. Answering several questions is a reasonable start. Is this manuscript appropriate for the journal that received it? Is the material interesting and useful and therefore perhaps appropriate for a second-tier journal, or is it groundbreaking and therefore might be published in a first-rank journal? Are the methods presented fully and clearly so that another researcher could reproduce the study? Are the statistical methods correct for the study described and the conclusions the authors reached? Is the manuscript readable, or does the reviewer have to struggle to understand it? Unfortunately, reviewers must also consider the following questions: Is this research unique and credible, or is its familiarity a sign of plagiarism? Is the manuscript so close in content to another article by the same group that it might be "salami science," wherein authors create 2 or 3 manuscripts from a single data set when just 1 manuscript was warranted?

Plagiarism

Writers must ensure that the words in their manuscript are original or are accompanied by permission from the copyright holder to use them. Reuse of published figures or tables has the same requirement of requesting and getting permission from the publisher. When an author uses the published words of another person or even reuses his or her own published words without permission from the copyright holder (usually the publisher of the journal), the result is plagiarism. It can be tempting when reviewing the literature to take notes of precisely what authors wrote in their manuscripts, and at times, those words flow directly into a new manuscript. Plagiarism such as this is not excusable and is often discovered by reviewers, either because they were plagiarized or because they used other publications to refresh themselves on the subject at hand and those publications were plagiarized. Journals deal seriously with plagiarists, prohibiting them from submitting manuscripts for a period of some years, notifying the author's supervisor, and publishing a notice of plagiarism in the next available issue.

Conflict of Interest

Conflict of interest has been the subject of intense scrutiny. Although it can exist in many forms, the critical aspects for scientific writing are to be capable of judging intellectual content and results on their own merit while acknowledging potential biases. Great care and attention should be paid to the policies of the journal considered for publication. An overriding principle is that overdisclosure of conflicts is better than underdisclosure.

When a manuscript results from a study that is industry funded, the principal author has the responsibility of writing the manuscript and ensuring that the data are clean and the presentation is unbiased. This is true not only for the principal author but also for all coauthors and is a crucial responsibility. The personal integrity of the authors is much more important than any additional publication.

Some manuscripts include coauthors who are employees of industry. If these authors have played a significant role in preparing an unbiased manuscript, it is appropriate to include them. They should not be the first author, and the cover letter and title page must disclose that they are employees of the company.

Conclusions

Carl Wiggers, a prominent doyen of physiology who organized and edited the new journal *Circulation Research* in 1952, wrote, "Any research effort is not complete until the results are carefully written, thoroughly edited, and promptly published in a form that is both clear and useful to others."[24] This remains as true today as it was >50 years ago. The process of manuscript development and eventual publication is a dynamic one—rewarding for the author (who learns the most), the coauthors, and the intended audience, who will use the information and the science to move the field of medicine along and to optimize medical care.

Disclosures

None.

References

1. Huth EJ. *Writing and Publishing in Medicine*. 3rd ed. Baltimore, Md: Lippincott Williams & Wilkins; 1999.
2. Browner WS. *Publishing and Presenting Clinical Research*. 2nd ed. Baltimore, Md: Lippincott Williams & Wilkins; 2006.
3. Zeiger M. *Essentials of Writing Biomedical Research Papers*. 2nd ed. New York, NY: McGraw-Hill; 2000.
4. Rosenfeldt FL, Dowling JT, Pepe S, Fullerton MJ. How to write a paper for publication. *Heart Lung Circ*. 2000;9:82–87.
5. Kliewer MA. Writing it up: a step-by-step guide to publication for beginning investigators. *AJR Am J Roentgenol*. 2005;185:591–596.
6. Cetin S, Hackam DJ. An approach to the writing of a scientific manuscript. *J Surg Res*. 2005;128:165–167.
7. Marusic A, Marusic M. Teaching students how to read and write science: a mandatory course on scientific research and communication in medicine. *Acad Med*. 2003;78:1235–1239.
8. Hirsch JE. An index to quantify an individual's scientific research output. *Proc Natl Acad Sci U S A*. 2005;102:16569–16572.
9. Neill US. How to write a scientific masterpiece. *J Clin Invest*. 2007;117:3599–3602.
10. Lagerqvist B, James SK, Stenestrand U, Lindback J, Nilsson T, Wallentin L, for the SCAAR Study Group. Long-term outcomes with drug-eluting stents versus bare-metal stents in Sweden. *N Engl J Med.* 2007;365:1009–1019.
11. Siwek J, Gourlay ML, Slawson DC, Shaughnessy AF. How to write an evidence-based clinical review article. *Am Fam Physician*. 2002;65:251–258.
12. Pan S, Kleppe LS, Witt TA, Mueske CS, Simari RD. The effect of vascular smooth muscle cell-targeted expression of tissue factor pathway inhibitor in a murine model of arterial thrombosis. *Thromb Haemost*. 2004;92:495–502.
13. Jenicek M. *A Physician's Self-Paced Guide to Critical Thinking*. Chicago, Ill: American Medical Association Press; 2006.
14. Gould SJ. *The Richness of Life: The Essential Stephen Jay Gould*. New York, NY: W.W. Norton; 2007:172.
15. Altman DG, Goodman SN, Schroter S. How statistical expertise is used in medical research. *JAMA*. 2002;287:2817–2820.
16. Gopen GD, Swan JA. The science of scientific writing: if the reader is to grasp what the writer means, the writer must understand what the reader needs. *Am Scientist*. 1990;78:550–558.
17. Jenicek M. How to read, understand, and write "Discussion" sections in medical articles: an exercise in critical thinking. *Med Sci Monit*. 2006;12:SR28–SR36.
18. Skelton JR, Edwards SJL. The function of the discussion section in academic medical writing. *BMJ*. 2000;320:1269–1270.
19. Hess DR. How to write an effective discussion. *Respir Care*. 2004;49:1238–1241.
20. DeMaria AN. How do I get a paper accepted? *J Am Coll Cardiol*. 2007;49:1666–1667.
21. DeMaria AN. How do I get a paper accepted? Part 2. *J Am Coll Cardiol*. 2007;49:1989–1990.
22. Kern MJ, Bonneau HN. Approach to manuscript preparation and submission: how to get your paper accepted. *Catheter Cardiovasc Interv*. 2003;58:391–396.
23. Welch AJ. Preparing manuscripts for online submission: basic information and avoidance of common pitfalls. *Chest*. 2006;129:822–825.
24. Landis EM. *Carl John Wiggers: May 28, 1883–April 29, 1963*. Washington, DC: National Academies Press; 1976:362–398.

KEY WORDS: manuscripts, medical ■ peer review, research ■ publications