
Review Article

An Author's Guide to Publication Ethics: A Review of Emerging Standards in Biomedical Journals

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Universal definitions of ethical issues related to medical publishing have remained somewhat elusive. Training in the art of writing for medical journals is inconsistent and most commonly informal, involving collaborative efforts between mentors and students. This approach inadvertently may perpetuate erroneous assumptions as to what constitutes acceptable behavior. In contrast to instruction on composition, ethical considerations related to the publication of a paper are likely to receive little attention.

Even so, consequent to the ever-increasing scrutiny from the media and government agencies, journals are recognizing the need for greater transparency in peer review and are thus more inclined to enforce ethical standards. Understanding that some apparent ethical contraventions are the result of confusion or a lack of knowledge, some journals are assuming the responsibility of educating their community about ethical issues in publishing. This paper reviews the key ethical issues (eg, authorship criteria, conflicts of interest, redundant publication, data access and biases in data reporting, image manipulation) that authors should consider before submitting a manuscript. It also surveys some of the policies of the most highly cited clinical medical journals. In the future, authors can anticipate that their submissions will be required to meet an expanding array of ethical standards.

Key words: publication ethics, peer review, misconduct, transparency, guidelines

Abbreviations: COPE Committee on Publication Ethics, CSE Council of Science Editors, ICMJE International Committee of Medical Journal Editors, ORI Office of Research Integrity, WAME World Association of Medical Editors

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Although individual journals may present variations in their interpretation and resolution, several ethical concerns are commonplace across medical publishing. Despite the potential severity of the consequences following the discovery of ethical infringements, many authors appear to be unaware of publication guidelines or pay scant regard to adherence to specific standards.¹ This is most unfortunate; beyond career implications for authors, misconduct undermines the validity of peer review and the published literature. Public trust is also weakened as a consequence.

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The biomedical sciences occupy a privileged position, one of self-regulation through peer review, but this is predicated on the ethical sensitivity and scientific integrity of all parties involved in the submission/peer review process.² Failure to adhere to ethical standards – be it due to ignorance, willful deceit induced by a desire for commercial gain or academic advancement, or an apparent disregard for the importance of ethics in publishing – corrodes this trust. Exposed to ever-increasing scrutiny from the media and government agency, along with a sense that improvements within this self-regulated system are required, journals, consequently, are now more inclined to enforce ethical standards.³⁻⁶

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Conflict of Interest: None

This paper addresses several ethical issues authors submitting material to biomedical journals should consider. It is assumed that research standards such as those set forth in the Declaration of Helsinki have been satisfied as mandated during research design and execution. Furthermore, the most egregious examples of misconduct as defined by the Office of Research Integrity (fabrication, falsification, and plagiarism) will not be covered here on the assumption that individuals so motivated to conduct such acts are unlikely to experience an ethical epiphany by reading this paper.⁷ After briefly examining current attempts to bring greater transparency to the peer review process, several ethical standards will be reviewed.

INCREASING THE EFFECTIVENESS PEER REVIEW

Although peer review typically is understood as a process whereby qualified individuals assess the worthiness of a manuscript for publication, effective peer review conveys a responsibility beyond serving simply as a gatekeeper for the published record. To ensure detection of bias, or other attempts to manipulate scientific opinion, effective peer review requires individuals to be well read. Good reviewers alert editors of possible misconduct through the use of confidential comments to the editor, a feature of many peer review forms.

Recognizing that reviewers will in all likelihood focus their efforts on assessing the quality of a manuscript, those involved in medical publishing have begun to better define ethical standards and to create tools for editorial offices intended to educate and regulate author behavior. Several non-statutory bodies have produced guidelines for use by journal editors regarding acceptable behavior or standards: the Committee on Publication Ethics (COPE), the International Committee of Medical Journal Editors (ICMJE), the World Association of Medical Editors (WAME), the EQUATOR Network, the Council of Science Editors, and the Office of Research Integrity are a few among many. Several useful web sites provide much original thought and clarity on the peer review process, including the highly informative *Nature Peer-to-Peer* blogs.⁸ Publishers have

even joined the debate in setting standards; Wiley-Blackwell, for example, published a position statement in the booklet “Best Practice Guidelines on Publication Ethics: A Publisher’s Perspective,” based upon an article published in the *International Journal of Clinical Practice*.²

Journals are beginning to adopt publication policies/guidelines. For the purposes of this review article, the policies and practices of the top 50 clinical medical titles ranked by ISI’s Impact Factor were examined. Of these top titles, 16 journals already had distinct policy documents in place, and another 30 incorporated ethical policies into their submission instructions by the end of 2008. After the general failure of authors to provide such information when the request to do so was merely *suggested*, journals are reinforcing policies with *mandatory* requests for ethical declarations. For example, the *Journal of the American Medical Association (JAMA)* found authors were disinclined to share any details of contributorship until the request became mandatory.⁹ Similarly, *Nature* reported that just 4% of authors had complied with their request to disclose conflicts of interest, resulting in the implementation of mandatory requests.¹⁰ The American Headache Society published its first set of Guidelines for Publication in 2009.¹¹ Journals like *Headache* expect authors to be familiar with their publication policies, a task that at the very least requires one read the Instructions for Authors. In providing its own guidelines *Headache* is ahead of many subspecialty titles.¹²

With a peer review process that effectively monitors bias in place and the establishment of a number of “ethical hurdles” that authors must clear, one might assume that faith could be restored in the ability of the peer review process to detect and control unethical behavior. Not so. One problem: journals do not always receive all the information they need or at the depth required. One obvious example involves the comprehensiveness of conflict of interest disclosures. Editors rely upon authors to disclose fully and honestly, as most journals simply are not equipped to validate the information provided.¹³ Indeed, a 2006 study in the *Journal of General Internal Medicine* revealed only 8.8% of 91 journals surveyed from among the highest ranked titles (by impact factor) in

29 specialties actually employed a mechanism to verify the accuracy of an author's declaration.¹⁴ Two obvious solutions to this problem exist. First, journals could request supporting documents to confirm ethical attestations. Second, authors could learn to recognize that questions in support of ethical transparency are not merely an administrative burden but vital mechanisms intended to protect the validity of the published record. In the meantime, all parties can do more to educate themselves on publication ethics so that ethical issues become less of an afterthought.

COMMONPLACE ETHICAL STANDARDS

Ascribing Authorship—Problems of Misappropriation.—

Definition.—The identification of an individual in the author byline implies, in its most basic sense, that that named individual conceptualized, researched, wrote, and edited the paper – the originator of the work in other words. As Rennie noted, such a straightforward conception makes sense with the listing of a single author, but is inappropriate when applied to multi-author articles where individuals contribute elements to the construction of a paper.¹⁵ Within a multi-authored paper, authors typically performed specific roles. Whether these roles merit the presence of an individual on the author byline is a topic receiving increasing attention within journal publishing. As this article will reveal, there is a growing movement toward rethinking our notion of authorship, perhaps abandoning traditional conceptions in their simple forms for a model based on contribution to the development of a paper.¹⁵ The issue has become particularly acute as since the late 1970s, the average number of authors per paper has increased.¹⁶

Ascribing authorship does, however, have implications that extend beyond the identification of authors. Authorship also connotes responsibility and only from assuming responsibility for the content should credit be derived.¹⁷ As Flanagin and colleagues noted, “authorship establishes accountability, responsibility, and credit for scientific information reported in biomedical publications . . . misappropriation of authorship undermines the integrity of the

authorship system.”¹⁹ Appearance on the byline also implies some degree of expertise that may not be the case with an honorary author.

Ethical issues regarding authorship not only involve shifting concepts of the appropriate attribution of authorship, but also extend to unacceptable practices such as inclusion of an individual without consent in the listing or authors, as well as the exclusion of an author that should rightfully have been identified in the author byline.

Why is it a Problem?—With the listing of multiple authors the direct link between credit and responsibility becomes confused. Unless a journal forces those listed in the author byline to state specifically what they contributed (such as through a statement of authorship), it is not clear if all authors can assume equal levels of credit and responsibility. For some readers, this is problematic if particular authors, for example, disclose conflicts of interest.

One strand of the misappropriation of authorship is honorary authorship. The motivations for honorary authorship are varied. At one end of the spectrum where the stakes are highest, uncertainty over authorship associated with the reporting of clinical trials (same raw data, different authors) potentially can bias the published record by, to quote Sismondo, “shaping science to meet particular interests.”¹⁸ Authorship may be bestowed upon high-profile authors simply as a means to enhance the likelihood of a manuscript clearing peer review. This notion also applies at the lower-stakes end of the spectrum, where junior faculty may attach the name of their mentor/recognized thought-leader to enable a gentler passage through peer review (a strategy that, in theory, should not work within a double-blinded peer review system). A pressure to publish, be it for securing future funding support or traditional career advancement via the burnishing of *curriculum vitae* has, perhaps, also led to the habitual bestowment of honorary authorship. While this practice may be a timeworn tradition, the American Psychological Association states explicitly that holding an institutional position is not a criterion for authorship.¹⁹ Additionally, involvement in securing funding does not warrant an authorship credit as stipulated within the ICMJE Uniform Requirements for Manuscripts

Submitted to Biomedical Journals (one of the most commonly referenced guides for editors on ethical standards).²⁰

Sometimes an author does not wish to be included in the author byline; typically this action is provoked by a reluctance to assume credit and responsibility. This could be due to a disagreement over the conclusions of a paper, professional and personal disputes, or concerns over the quality of material. Disagreement over submission to a particular journal also might be a motivating factor. It is the duty of the submitting author to ensure ALL authors listed have read the final draft of a manuscript and given approval for submission. Inappropriate inclusion of an author represents ethical misconduct and, unless it can be proven that the inclusion of an author was an administrative oversight, the submitting or corresponding author may be subjected to disciplinary action.

Individuals expecting authorship credit sometimes may find they have not been included. Requests to add or to remove an author occasionally do occur when a manuscript is still under review. Journals likely will not consider such a request unethical but will want reassurance that the request possesses a legitimate basis. Journals may not grant requests to remove an author until all authors, including the party being excluded, have signed a letter to the Editor-in-Chief explaining the reasons why the author should be removed.

Problems regarding the ascribing of authorship ultimately have severe implications. If a reader cannot progress beyond the author byline without questioning the accuracy of what they are reading, then the message of the article and, potentially, the authors' standing have been damaged.

Journal Responses.—Starting with titles like *JAMA* and *The Lancet* in 1997, many journals have addressed the attribution of authorship by requesting authors delineate individual contributions to the development of a manuscript. As Hames notes – this represents a more *descriptive* approach to authorship, away from traditional *prescriptive* models in an effort to encourage honesty and assure authors assume accountability.²⁰ The ICMJE has responded by offering criteria for defining authorship that have been adopted by many journals:

Authorship credit should be based on

1. substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data.
2. drafting the article or revising it critically for important intellectual content.
3. final approval of the version to be published.

Authors should meet conditions 1, 2, and 3.²⁰

Journals typically request that any individual included in the author byline satisfy these criteria. Twenty-three of the 50 clinical medicine journals top ranked by ISI state explicitly their definitions of authorship, and 7 others mandate the inclusion of individuals if they meet the criteria outlined by the ICMJE. Some go even further and publish contributorship information as part of a Statement of Authorship. Authors, therefore, routinely should collect this information before submission. Indeed, as Benos and colleagues advise, it is probably best to determine authorship as early as possible in a study, revisiting the issue as the personnel involved change.²¹

Please refer to Section 2A of the AHS Journal Publication Guidelines for the Headache Policy on Authorship Definition

Writing Support.—

Definition.—Writing support typically involves the employment of a professional writer to assist in the drafting of a manuscript. This may simply mean unifying, in written form, the input of several contributors. It may also mean that a skilled writer has aided composition in cases where the first language of the authors is not the language of the intended journal for publication of a submission. In its most extreme form it may be the case that the named authors contributed little beyond their final approval of the manuscript and a few ideas about the direction a paper should take. Modest writing support is not necessarily an unethical practice, but it should always be acknowledged. When writing assistance is *not* acknowledged, many consider this to be an element of what we understand as ghostwriting, with its insidious implication that the named authors may be deceiving readers, especially in regard to assuming accountabil-

ity for the content published.¹⁷ The true extent of ghostwriting is not fully known, but after examining 6 well-known medical journals, Flanagan and colleagues estimated 11% of the papers had been ghostwritten.⁹

Why is it a Problem?—To reiterate, *writing support* is not a problem per se, if properly acknowledged. Indeed the employment of professional writers may very well lead to a better-produced paper that conveys research findings or new concepts more effectively. With medical journals, *ghostwriting* is more problematic. Typically it involves the employee of a medical communications company assuming control over composition, presumably in consultation with the expert authors who appear in the author byline. The unease over ghostwriting again is related to whether authors are taking sufficient responsibility for the work published under their name. Some parties express concern that this practice also distorts the literature, especially so if high profile individuals are named authors. Toward the end of 2008, the issue received considerable attention following concerns raised by US Senator Chuck Grassley over the role of a drug company in the writing of a paper published in the *American Journal of Obstetrics and Gynecology*. The US Senate Committee on Finance has begun a probe into the influence pharmaceutical companies exercise on the health care industry – ghostwriting of journal articles represents a part of that investigation.^{22,23} The WAME condemned the practice of ghostwriting, using strong language (“dishonest,” “unacceptable”).¹⁷ The popular media clearly appear alarmed at the practice; “Revealed: how drug firms ‘hoodwink’ medical journals” was a headline in a British newspaper, *The Observer*.²⁴

Journal Responses.—How the practice of writing assistance should be treated ethically provokes a common agreement that proper acknowledgment is critical, though with some divergence in opinion on the level of acknowledgment. The European Medical Writers Association, along with many journals, advocates the inclusion of information regarding the involvement of a medical writer in the acknowledgments section of a manuscript. As Jacobs and Wager note, this practice enables readers to understand the development of a manuscript.²⁵ Furthermore, the WAME actively encourage journals to state, if policy

dictates, that medical writers can be legitimate contributors if acknowledged.¹⁷ *Neurology* extended such acknowledgment a stage further, announcing in 2008 that individuals providing writing assistance would receive full author credit, and failure to disclose writing support was a violation of policy with attendant consequences.²⁶

Consequences.—To avoid violating policy, familiarity with a journal’s rules regarding writing support prior to submission is strongly recommended. If a journal has no stated policy, request information from the editorial office.

Please refer to Section 2.A.ii of the AHS Journal Publication Guidelines for the Headache policy on Ghostwriting and writing assistance

Disclosing Conflicts of Interest.—

Definition.—Behavior that is construed as creating a conflict of interest usually is interpreted to mean actions potentially taken to satisfy private interests that may not serve the best interests of the wider community. Journals do not assess the behavior of authors relative to each specific submission but instead publish a disclosure statement so that readers are aware of the potential for bias. It is important to remember that although manuscripts may be cleansed of the most obvious examples of bias through the process of peer review, it cannot be claimed that simply to publicize disclosures legitimizes the data that are published. The potential for bias is still present.

Precise definitions of what constitutes a conflict of interest are somewhat difficult to construct. Common financial conflicts include: equity interests; corporate relationships (eg, employment); patent rights; consultancies (such as speakers bureau and advisory board); family relationships and funding provided for research grants. Other conflicts include personal relationships that are not financial, along with political and religious beliefs. These definitions may seem straightforward until additional, modifying, criteria are applied. For example, how long does a conflict remain? Regarding equity stakes, what is the threshold amount above which a conflict must be reported? Many journals do not set an expiration date on the relevancy of a conflict of interest; 28 of the

50 highest ranked clinical medicine journals provide no such time limit. *JAMA*, alternatively, sets a 5-year limit.²⁷ *The Lancet* differs by requiring declaration of interests with a 3-year period predating initiation of the work submitted for publication (a policy which is similar to a general declaration for all Elsevier-published journals that a conflict is relevant if it occurs within 3 years since the start of the submitted work).^{28,29}

Conflicts of interest are not just restricted to authors. It is also important that readers understand the role of a study sponsor. As the WAME notes: “Organizations that pay for research may have a vested interest in the results.”³⁰ Consumers of scientific literature may identify such organizations to be pharmaceutical companies, but it is worth remembering that charitable foundations and government agencies also may hold “vested interests.” The WAME recommends inclusion of a statement in the methodology of a paper that outlines the sponsor’s role in the study from conception, through execution, to the composition of the manuscript. It is worth noting, however, that some journals may collect Conflict of Interest data but do not publish this information. Data are simply collected for editorial use.

Why is it a Problem?—Journals wish to ensure objectivity in the research they publish, and readers need to be fully informed of any potential influences that may have been introduced into a manuscript. It is important to remember a conflict of interest is not what the author believes to be a potential bias but how others will perceive the author’s ability to be impartial.

Journal Responses.—Most obviously, journals request a conflict of interest declaration as an effort to increase transparency. As Cooper and colleagues note, media attention and public scrutiny have been 2 motivating factors behind journals making disclosure a mandatory part of the submission process.¹⁴ A conflict of interest statement is intended to provide readers with the necessary information to make a judgment on potential bias. It is advisable that authors familiarize themselves with a journal’s specific Instructions for Authors as the required comprehensiveness of disclosure statements vary. Most journals require authors to disclose their relationship

to the study sponsor or product under discussion. Other titles, like *Neurology*, insist on *complete* disclosure of all potential conflicts regardless of whether they are perceived to apply to the subject matter of the manuscript.

Consequences.—The COPE provides 2 scenarios for the resolution of non-disclosure of a conflict of interest.³¹ If an omission is noted ahead of publication, they advise journals to send a strongly worded rebuke to the authors and request the necessary disclosure before continuing with peer review. If an omission is noted after publication, COPE advises publication of the omitted statement as an erratum. Lee and Bero argue for tougher sanctions, highlighting the disciplinary policies of the *Journal of Thoracic and Cardiovascular Surgery* where authors may be barred from publishing in the journal for 1-2 years depending on the severity of the case.^{32,33} The *Journal of Clinical Oncology* goes further still, imposing punishments such as prohibition from presenting at society meetings, exclusion from society boards and committees and revocation of society membership.³⁴

It is recommended that authors ensure a disclosure statement is a standard component of their manuscripts, regardless of whether it was requested. Authors also should ensure that they disclose conflicts for every author listed, not just those with conflicts to declare (ie, if there is nothing to declare, authors should state this fact). When a proxy submits a manuscript on behalf of an author, the authors should ensure that the proxy appreciates the importance of including the full conflict of interest disclosure with the submission, as administrative oversight is not likely to constitute an acceptable defense for lack of disclosure.

Please refer to Section 3 of the AHS Journal Publication Guidelines for the Headache Policy on Conflicts of Interest

Access to Data.—

Definition.—Issues surrounding access to data relate to 2 concerns. The first involves ascertaining the nature and extent of an author’s ability to independently review study data. The second concerns the degree of access to data that may be afforded a

journal as part of its peer review process so reviewers may validate results, discussions, and conclusions. The Council of Science Editors suggests that submission of a manuscript should imply an understanding that research sponsors are prepared to release data to editors and reviewers.³⁵ Speaking to both concerns, the ICMJE is even clearer on the subject: “sponsor(s) must impose no impediment, direct or indirect, on the publication of the study’s full results, including data perceived to be detrimental to the product”.³⁶ In their opposing argument, study sponsors contend that data are proprietary, which implies certain rights to confidentiality. Sponsors, therefore, sometimes place impediments before independent researchers seeking access to their data.

Why is it a Problem?—Concerns have arisen over bias in analysis as well as data suppression, especially in the event of negative or inconclusive outcomes. Can the results be trusted and validated—especially if the study sponsor provided the analysis?³⁷ Related to that concern is a question of whether the named authors had access to raw data or if access was restricted to *parts* of the data set. Indeed, whether authors are aware of their true level of access often is debatable. In a case from the United Kingdom where an author was challenged on his prior attestation to full access to data, his defense was that he had received full access to all data *he had requested to see*, rather than the data set in its entirety.³⁸

Journal Responses.—Journals are tackling this situation by creating their own policies, both by requesting authors to declare their level of access to data and by ensuring access to study data for independent reviewers. Regarding the latter, by the end of 2008, 15 of the 50 top-ranked clinical medical journals had in place explicit statements regarding access. In supporting all elements of the ICMJE Uniform Requirements, another 7 titles sought from authors assurances relating to access.

JAMA implemented one of the most comprehensive policies: a manuscript’s publication requires that a statement confirming full access be signed *and* included in the acknowledgments. *JAMA*, like a growing number of titles, also insists that drug company employees not be responsible for statistical analysis.³⁹

Consequences.—Journals are increasingly likely to publish a statement of concern – or invite authors to explain (perhaps publicly in the journal) why they misstated their access to data. In the case from the United Kingdom referenced above, an editorial from the editor-in-chief and publication committee chair of the *Journal of Bone and Mineral Research* was published to reaffirm the journal’s position on access to data.⁴⁰ No disciplinary action was reported and, indeed, the author in question has had work published subsequently in the journal.

Please refer to Section 7 of the AHS Journal Publication Guidelines for the Headache Policy on Access to Data

Redundant Publication.—

Definition.—Redundant publication, most usually detected by reviewers during peer review, involves the substantial republication (or ‘overlapping,’ according to ICMJE definitions) of data with little new material supplementing the author’s work previously published elsewhere.²⁰ The journal *Gut* specifically has defined what constitutes overlap: more than 10%.⁴¹ Duplicate publication is a subset of redundant publication involving the reproduction of data with nothing new contributed to the literature. This clearly comes close to plagiarism or, perhaps more typically, self-plagiarism. Though redundant papers may contain differences in how they are written, the data, outcomes, and conclusions are the same. With duplicate publication, the only difference may be a change of title or, as Benos and colleagues note, the order of authors.²¹ Redundant publication may be overt by referencing back to prior published material, or concealed by avoiding self-citation.

Why is it a Problem?—Redundant and duplicate publication is a problem because it can distort the importance of a single study, biasing the literature generally, especially so when meta-analyses are performed. Several studies in various specialties have suggested that redundancy is prevalent at surprisingly high levels – the motivating factor for such behavior seemingly being the pressure to publish.⁴²

Journal Responses.—Journals have responded by creating policies that define what constitutes prior publication. To confuse matters there are no standard

definitions employed across publishing. To publish data presented in abstracts and posters at conferences, verbally at meetings, or on clinical registration sites typically is *not* considered redundant publication. Direct translations from another language may or may not be considered prior publication depending on an individual journal's policy. When submitting a translated manuscript, it should be noted that the material has been published elsewhere and that permission has been granted to translate and reproduce material.

Consequences.—The ICMJE advises editors that in cases where redundant publication is detected during submission, the manuscript must be summarily rejected. In cases of redundancy established after publication, the ICMJE recommends publication of an editorial notice informing the readership of redundancy/duplicate publication. At their discretion, a statement from the authors may accompany this notice. The COPE suggests that editors consider reporting the infraction to the author's or authors' institution(s).⁴³

Please refer to Section 6 of the AHS Journal Publication Guidelines for the Headache Policy on Redundant Publication

Dual Submission.—

Definition.—Dual submission involves simultaneous submission of a manuscript to more than one journal.

Why is it a Problem?—Most editors consider dual submission an ethical transgression. It typically constitutes either an attempt to secure publication ahead of competitors or an attempt to increase the odds of a positive result from the peer review process. Authors typically withdraw a submission from one journal in favor of another that has accepted the paper more expeditiously, requires less revisions, is considered more prestigious academically or some combination thereof. Apart from concerns about the quality of the material published, editors quite rightly take umbrage at the time taken to perform a review when the author has not submitted the paper in good faith.

Journal Responses.—Curbing such practices has led journals to require authors to provide a detailed explanation in support of a request to withdraw a manuscript. Journals with sufficient resources may

follow up on any statements made by authors when withdrawing a submission by subsequently reviewing the published literature. Authors should expect to testify before submission that their manuscript is not under consideration by any other publishing source. In the absence of a stated policy on dual submission, it is debatable if one can declare whether an ethical transgression or just “bad manners” has transpired. If a stated policy does exist and dual submission is discovered, then a violation of one of the warranties of submission has occurred.

Consequences.—Discipline seems to be at the discretion of individual editors. If a case of dual submission is presented, they may simply reject the manuscript with a sharp letter about good author practices. Others may severely reprimand an author, perhaps even banning an author from submitting to their journal for a period of time.

Please refer to Section 6 of the AHS Journal Publication Guidelines for the Headache Policy on Dual Submission

Salami Publishing.—

Definition.—“Salami publishing” involves the inappropriate division of study outcomes into several articles, most often consequent to the desire to plump academic vitae. Each article, an unnecessary compartmentalization often referred to as the Minimum Publishable Unit (MPU) or Least Publishable Unit (LPU), provides a minor incremental increase in understanding and could reasonably have been published within one larger article.^{13,44} Some forms of splitting articles are acceptable (such as separating out the literature review) and indeed may be encouraged by journals to avoid exceeding word limits.

Why is it a Problem?—Salami publishing leads to the proliferation of mediocre papers and, as with redundant publication, may lend undeserved significance to a given study.

Journal Responses.—Most typically, journals simply outlaw the practice. The reality is, however, that salami publishing is difficult to detect, especially across a series of journals, and detection relies primarily upon the alertness of reviewers and editors.

Consequences.—Authors should disclose in their cover letters when the papers under review are part

of a series. Periodically, journals receive a paper that is labeled “Part I.” If “Part II” is not submitted simultaneously, journals may refuse to place the manuscript in peer review. If a journal detects salami publishing is occurring via its peer review system, editors are likely to reject subsequent submissions and request that authors merge several papers into one authoritative study.

Please refer to Section 6.iii of the AHS Journal Publication Guidelines for the Headache Policy on Salami Publication

Image Manipulation.—

Definition.—The advent of digital technology has enabled authors to alter or enhance originally captured images with relative ease. Some cases of image manipulation appear relatively “innocent,” involving beautification techniques such as removing stray hairs or minimal adjustments in color and contrast. Others such as insertion and deletion of visual data into the original image file clearly are fraudulent.

Why is it a Problem?—Once again the issue involves ensuring integrity of the published record. The substance of the original image must be preserved. To make inappropriate or deceptive alterations is unethical.

Journal Responses.—Journals which are adopting strategies to educate authors as to acceptable ethical behavior often include policy statements that require authors to guarantee the authenticity of any images submitted.⁴⁵ Thirteen journals out of the top 50 clinical medical journals have a specific image manipulation policy. The *Journal of Cell Biology* commonly is regarded as leading the way on the framing of industry discussion on the topic and developing specific responses.⁴⁶ In a paper that effectively brought the issue to the fore, Rossner and Yamada suggested authors pose the following question before submission:

Is the image that results from this adjustment still an accurate representation of the original data? If the answer to this question is “no,” your actions may be construed as misconduct.⁴⁷

The *Journal of Cell Biology* also defined a clear policy that should act as a standard for all journals: that no part of an image should be enhanced,

removed, relocated, or introduced after original image capture. Such requirements can be enforced by simple detection techniques (data forensics). For example, by simply adjusting contrast settings in software like Adobe Photoshop™, imported visual data can be detected. Public domain software is available to assist in detecting image manipulation (NIH Image and Image J), and this and other software may be routinely applied to all submissions in the future. As described by the Office of Research Integrity, however, such efforts only “deauthenticate” the image. Access to the original data is required to support an investigation.⁴⁸ Authors should, therefore, routinely retain a copy of the original digital image file in the event a journal challenges the authenticity of an image.

To complicate matters, this policy has not been adopted uniformly. The journal *Cancer Research*, for example, states:

The American Association for Cancer Research allows that minimal image adjustment is acceptable for publication in its journals; however, the final image must remain representative of the original data.⁴⁹

Consequences.—The Council of Science Editors advocates that editorial offices first attempt to resolve the issue with the author(s), presumably because most instances are not considered serious ethical breaches.⁵⁰

Please refer to Section 2.B.xiv of the AHS Journal Publication Guidelines for the Headache Policy on Image Manipulation

GUARANTEEING YOUR SUBMISSION

This paper has focused on some of the most serious ethical issues we in medical publishing currently face. As is evident, no standard policy yet exists across all journals . . . and most likely never will. Even with demand for greater accountability from authors, journals simply will not be equipped to police every attestation to confirm adherence to journal policy and/or good practice. Consequently, the notion of trust must prevail once again, with editors, reviewers, and readers relying upon authors to provide full and fair information in good faith. To be sure authors take this responsibility seriously, the submitting or corre-

Table.—Author Guarantee Statement

Author Guarantee Statement

By signing this form you guarantee that:

1. The manuscript contains original material that will not be submitted elsewhere concurrently.
2. All authors have contributed to the work and are familiar with the primary data; each has read the final manuscript, and approved its contents.
3. All authors have agreed to have their names added to the paper.
4. The manuscript is free of falsification, fabrication, plagiarism, and self-plagiarism. All applicable principles of scientific integrity, including ethical treatment of human subjects and humane treatment of animals, have been followed. In signing this form you testify that an appropriate institutional or public board approved the protocols for human or animal subject use.
5. All funding sources that supported the work are acknowledged. Any potential conflicts of interest on the part of any authors have been supplied as part of the submission process. By signing this form you agree you will examine typeset proofs as supplied by the publisher prior to publication to ensure all relevant financial disclosures and other potential conflicts of interest have been accurately included within the manuscript.
6. You have followed all the requirements for submission as requested in the Instructions for Authors and set forth in the AHS Journal Publication Guidelines.

sponding author may be required to sign a statement that attests to the honesty and validity of the submission. Signing that form while knowingly attempting to deceive a journal by not supplying all information requested will constitute a breach of journal policy with possible disciplinary repercussions. Depending on the scale of the misconduct, the clarity of the culpability involved, and the nature of stated policies on expected behavior, authors may find the responses from journals ranging from a robustly worded letter expressing disappointment at their behavior to specific and detailed disciplinary action (eg, notifying the author's employer or institution of the misconduct).

An example of such an author guarantee statement (taken from the *Headache* Journal Publication Guidelines) is reproduced in the Table.

Any author assigned the task of signing an author guarantee statement must be certain he/she can trust all declarations from their co-authors or otherwise risk embarrassment at best or loss of professional credibility at worst.

CONCLUSION

Headache has engaged in a series of exercises to increase the transparency of its peer review process and has implemented a number of steps to ensure authors take full responsibility for their work. Some of these steps are policy measures backed up with disciplinary actions. Others, such as this paper, attempt to educate authors on the issues in the hope

this will help avoid unethical behavior that is based simply on lack of knowledge. In doing so, *Headache* is following in the steps of several leading medical journals, and authors should anticipate our policies, or some variation thereof will become commonplace across journals within the near future.

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