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## Ethical Considerations of Authorship

Paul A. Anderson, MD,<sup>a</sup> and Scott D. Boden, MD<sup>b</sup>

### INTRODUCTION

Publication is the final affirmation of scholarly accomplishment. Academic advancement, “publish or perish,” as well as prestige, are other important driving forces. There are many financial benefits (direct and indirect) in publishing such as promotion and further research funding. Many of these forces can lead to ethical lapses. All authors have several important ethical obligations. They are guarantors who bear responsibility for the work. This includes not only the truthfulness of the study but also the fairness of the authorship.

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### HISTORICAL PERSPECTIVE

Ethical concerns regarding authorship have been present since antiquity. Isocrates, a Greek philosopher and contemporary of Plato based his teaching of rhetoric on concrete thoughts rather than metaphysics, dogma and mysticism.<sup>1</sup> He railed against unoriginality and plagiarism. However, his personal conflicts of interest may have been an important factor in his views, as he strongly protected his and his school's reputation so as to maintain its profitability. In the Middle Ages, publishing was difficult, often performed in monasteries and largely ignored. Roger Bacon, the 13th century Franciscan monk, began to question the deductive reasoning of Aristotle but was not originally allowed to publish his work. However, his brilliance was recognized, and eventually he was asked to submit a treatise to the Pope.<sup>2</sup> For this effort, he was banned, imprisoned and largely forgotten until four centuries later. The development of the scientific method with its change from deduction and Aristotelian philosophy to inductive reasoning based on observation and experimentation correspondingly led to a greater interest in publishing. The perceived benefits were that publication of natural history would allow science to progress. Publishing could also be hazardous as Galileo, Copernicus and others discovered when they refuted dogma or Aristotelian ideas despite the evidence for their cause.

Francis Bacon, a key figure in development of the philosophy of what is known as the scientific method, recognized the importance of publishing all natural observations.<sup>2</sup> From

this history or data base, he believed progress, based on the inductive study of nature for the use and benefit of man, would follow. His ideas fostered for the first time since Roman age cooperation among investigators and led him to establish The Royal Society. Despite the development of these ideas, scientific advances were still largely made by individuals working alone who at times were loath to publish. Leonardo DaVinci's famous dissertations on science and inventions were largely unknown and lost for centuries. Newton did not publish his revolutionary ideas in the *Principia* until a full 15 years after their discovery and only after challenges from Leibniz and Halley.

Today, authors are eager to publish, their main purposes being to advance science and, they hope, mankind. The author receives acclaim and finds publication of his or her work satisfying. Publication is the final affirmation of scholarly accomplishment. Academic advancement, “publish or perish,” as well as prestige, are other important driving forces. Finally, there are many financial benefits (direct and indirect) in publishing such as promotion and further research funding. Many of these forces can lead to ethical lapses.

Assigning authorship can be a difficult task and can result in disputes and fraud. In the past year the NASS Ethics and Professional Conduct Committee reviewed two cases regarding disputed authorship. This committee felt a review of the ethical guidelines of authorship timely and appropriate.

**ETHICAL ABUSES OF AUTHORSHIP**

Common ethical abuses of authorship and publication fall into several distinct categories (Table 1). The first is the criteria for authorship. Authors may be included who do not meet criteria for authorship, and conversely collaborators who fulfill criteria for authorship are occasionally excluded.<sup>3,4</sup> Senior authors may place themselves as the primary author ahead of the author who contributed the most to the study. Ghost authorship is a second problem, especially seen in clinical trials or with new technology, where industry representatives write and submit manuscripts in physicians’ names. This principle also applies to scientific presentations and abstract submission. A case of ghost authorship has been reviewed by the NASS Ethics and Professional Conduct Committee. Furthermore, investigators have an ethical duty to minimize study bias based on perceived notions, financial interests or to maintain their reputation.<sup>5</sup> Third, investigators should completely declare conflicts of interest. Additionally, they have an ethical duty to minimize study bias based on preconceived notions, financial interests or results which maintain their reputation. Several recent studies have documented the effect of industry funding on the outcomes of reported and published studies.<sup>6-8</sup> Fourth, duplicative (same material in different journals) and redundant publishing “salami slicing” (one study is divided into many despite having the same hypothesis, data and conclusions), are common occurrences.<sup>9,10</sup> Finally, violation of intellectual property rights (plagiarism) is happening both inadvertently as well as with knowledge. Cases of fraud and deceit have been documented in even the most esteemed journals. These cases triggered many journals to publish standards of ethical conduct as articles or editorials. In extreme cases, journal editors have contacted universities and department chairmen to further investigations or for disciplinary action.

**Table 1.** Important Ethical Considerations in Scientific Publishing

- The study should advance science or improve medical care
- Study bias is acknowledged and minimized or eliminated
- Patient and/or animal subjects are used in an ethical manner
- The study should be truthful and trustworthy
- All authors must fulfill requirements for authorship
- All authors accept final version of manuscript
- Conflicts of interest need to be documented
- The study should be original and not duplication or redundant

Authorship is a privilege and not a right. The goal of publication is the advancement of knowledge. Responsible and ethical authorship requires that the work be trustworthy, truthful and fair.<sup>12</sup> Truthfulness means that false claims are not present, including the claim of authorship. False claims must be distinguished from errors or inaccuracies, which occur in up to 20% of manuscripts.<sup>13</sup> Trustworthy means that the authors have attempted to eliminate bias in analyzing the truthful information presented to the readers. Fairness is the public disclosure of the affiliations of those who participated in the study and its preparation. This would include all important personnel and exclude those who had a minimal or

only a general role. It is important that all authors agree on the truthfulness, trustworthiness and fairness of the manuscript before submission for publication. Furthermore, authors should be ethical, accountable and independent.

In most cases, research has five distinct activities: (1) conceptualization, (2) planning, (3) implementation, (4) data analysis and (5) writing. Conceptualization is the formation of an idea or hypothesis by a single person or a group. Planning includes literature searches, development of the research plan and securing funding. Implementation is the performance of the investigation and information gathering. Analysis is the transformation of raw data into results usually using statistical methodology. Finally, writing and editing results in production of the final document. These criteria should be used as a template to assess each investigator’s role in the project and whether he or she meets the criteria for authorship.

All authors have several important ethical obligations. They are guarantors who bear responsibility for the work. This includes not only the truthfulness of the study but also the fairness of the authorship. Before manuscript submission, decisions about authorship and order of authors should be reached. Editors can not and should not be expected to arbitrate the decisions regarding authorship.

**INTERNATIONAL COMMITTEE OF MEDICAL JOURNAL EDITORS UNIFORM REQUIREMENTS**

The International Committee of Medical Journal Editors (ICMJE) has adopted standards for biomedical publication, Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication.<sup>14</sup> In the standards, the ethical principles for conducting and reporting of research are outlined.

An author is defined as “someone who has made a substantial intellectual contribution.” The ICMJE has identified three criteria for authorship involving (1) concept, design, data gathering, analysis or interpretation; (2) drafting or critical revision; and (3) final approval (Table 2).

**Table 2.** International Committee of Medical Journal Editors (ICMJE) Criteria for Authorship

An author is a person who has made a substantial contribution and fulfills the following three criteria:

1. Substantial contribution to design, data acquisition, analysis and interpretation.
2. Drafting document or providing critical review of intellectual content.
3. Final approval of publication.

Authors must fulfill all three criteria.

It is ethically important that all listed authors qualify for authorship and that all authors who do qualify be listed. Equally important is that people who do not qualify should not be listed as authors. The securing of funding, data collection, enrolling patients, general group supervision or leadership of a department does not alone qualify one for authorship. An

alternative to authorship is acknowledgment of contributors. Some journals will only allow up to six authors with the remaining listed as contributors. This is commonly seen in multicenter randomized controlled studies that have been recently published. Research groups can be listed as an author or coauthor with specific recognition of the individuals done in an acknowledgement.

Over the past few decades, the listing of many coauthors has become more common.<sup>9</sup> This practice is ethical if all fulfill criteria for authorship. Studies examining author inflation have attributed it to the increase in the number of empirical studies that require several investigators and multicenter collaborative studies.

Duplicative or redundant publication of the same material is increasing in frequency. This practice is unethical and currently there are several steps taken to identify it. When submitting articles to musculoskeletal journals, for example, journal editors perform a literature search to assess duplication. Additionally, an affirmation signed by the authors that the manuscript is original is often required before it can be submitted.<sup>5,14</sup> Authors who violate this principle may be banned from publication in that particular journal. This could also result in a complaint to the NASS Ethical and Professional Conduct Committee. Duplicate publishing is not only unethical but problematic. Readers trust that the work is original. Copyright laws may be violated, and duplications waste precious resources such as readers' time and space that could be used for other primary investigations. Finally, duplication can lead to double counting and weighting of results of a single study.

All conflicts of interest, especially financial, should be clearly stated at the time of submission of the manuscript. Sources of funding and other assistance need to be described. The journal editors should take these functions into consideration during the review process and decide if this information should be made available to the readers and reviewers. Additionally, in sponsored studies, the authors should disclose the role that the sponsor had in design, data acquisition analysis and authorship. Authors should at all times remain independent from the sponsor. Scientists should not be party to relationships that interfere with their access to data, their ability to analyze results independently or their ability to publish manuscripts. Ethical lapses can also occur in government-sponsored investigations which are thought to be theoretically more "pure." The need for satisfactory research outcomes to help ensure further funding is as important to these investigators as those from industry-sponsored research.

Although much of the focus nowadays is on potential financial conflicts of interest, it is important to remember that other "pressures" could result in bias in reporting of results by authors. One example is the pressure to publish in order to achieve and maintain academic promotions. Another example is the simple understandable desire to have one's hard work

in performing a study translated into a meaningful abstract, presentation and paper. It is essential not to underestimate nonfinancial conflicts. The mere disclosure of potential conflicts of interest does not preclude bias in reporting. Thus, in the end, the integrity of the individual author in objectively analyzing and presenting his or her data is paramount to protecting the public.

Authors should be assured that these ethical concerns apply also to reviewers and editors of journals.<sup>14</sup> The work must remain confidential and all conflicts or potential conflicts of reviewers must be identified. Reviewers should disqualify themselves when warranted. Similarly, editors with financial interests must regularly publish their conflicts and disqualify themselves when appropriate.

In spine surgery, the appropriate interaction of surgeon inventors and investigators with industry to design and clinically test new technology is an important phenomenon. Unfortunately, this opens up the door for ghost authorship where someone from the company writes an abstract or paper on behalf of the clinicians.<sup>3</sup> If the clinicians have full access to raw data, statistical analysis and editorial rights, then the company employee should be considered for coauthorship. If the research summary is written by a company employee and the clinician authors never see the manuscript, review the raw data or have say in the conclusions, this could constitute ghost authorship and would violate basic ethical principles of authorship. Clinician authors collaborating with industry must be cognizant of the potential for bias when data are analyzed and summarized by company employees. Authors collaborating with industry in these situations must be especially vigilant in ensuring objective and ethical analysis of raw data and presentation in abstracts, presentations and papers.

#### ADDENDUM

by Paul A. Anderson, MD, Associate Editor, SAS Journal

The SAS Journal endorses these ethical principles and the recommendations set out by the International Committee of Medical Journal Editors. We expect that all authors, reviewers, and editors will be vigilant and maintain these high ethical standards. Only by holding to these guidelines can the integrity of new information be maintained.

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