Publication practices and responsible authorship: a review article

Elvis E. Tarkang,[1,2] Margaret Kweku,[3] Francis B. Zotor[4]

[1]Department of Population and Behavioural Sciences, School of Public Health, University of Health and Allied Sciences, Ho, Ghana; [2]HIV/AIDS Prevention Research Network, Kumba, Cameroon; Departments of [3]Epidemiology and Biostatistics, and [4]Family and Community Health, School of Public Health, University of Health and Allied Sciences, Ghana

Abstract

Dissemination of research findings through the publication of one's work or a group of contributors is an important part of the research process, as this allows the passing on of benefits to a much wider community. In whatever evocative form this dissemination may take, the onus lies on the author(s) to ensure adherence to the code of ethics as it pertains to the integrity of the information being put out. We publish because we want our findings to be adapted into practice and application, or in some cases may be relevant to policy makers in decision-making. To a large extent in the field of academia, successful publication improves opportunities for academic funding and promotion whilst enhancing scientific and scholarly achievement and repute. A situation may be compromised where intellectual contributions to a scientific investigation do not adhere to the four key guidelines of scholarship, authorship, approval and agreement as well as the protocols of ensuring good publication ethics. The objective of this review is to lay emphasis on universal standards for manuscript authorship and to fostering good practices. This in our view will bring authorship credit and accountability to the attention of our colleagues and readers at large. To achieve this, a systematic and critical review of the literature was undertaken. Electronic databases, academic journals and books from various sources were accessed. Several key search terms relating to responsible authorship, common authorship malpractices, conflict of interest, universal publication guidelines and other authorship related issues, were used. Only references deemed useful from relevant texts and journal articles were included. In this paper, the authors have sought to highlight the pitfalls researchers sometimes entangle themselves within an act of compromise thereby impinging on the ethical and professional responsibilities for the content of a paper under consideration. This article presents the case that authorship has a strong currency that brings not only personal satisfaction but also career rewards based on publication counting. In all cases described here, a universal standard for manuscript authorship will be critical in fostering good practices. As you write and review manuscripts, keep these good practices in mind, and consider ways to bring authorship credit and accountability to the attention of your colleagues and readers.

Correspondence: Elvis E. Tarkang, HIV/AIDS Prevention Research Network, Cameroon (HIVPREC), PO Box 36 Kumba, Southwest Region, Cameroon.
Tel.: +237.677.632064.
E-mail: ebeyang1@yahoo.com

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Background

A research publication is the highest level of dissemination of research findings. This act carries with it social and ethical responsibilities on the part of the author(s). Peer reviewers must be alert to situations which can compromise the integrity of authors seeking publication of their research findings. Scientific and scholarly publications, defined as articles, abstracts, presentations at professional meetings and grant applications, provide the main vehicle to disseminate findings, thoughts, and analysis to the scientific, academic, and lay communities. For academic activities to contribute to the advancement of knowledge, they must be published in sufficient detail and accuracy to enable others to understand and elaborate the results. However, the process of writing scholarly papers for publication is challenging as it requires one to move from spoken and written words to the arena of substantive evidence in attempts to make logical arguments.[1] For the authors of such work, successful publication improves opportunities for academic funding and promotion whilst enhancing scientific and scholarly achievement and repute. At the same time, the benefits of authorship are accompanied by a number of responsibilities for the proper planning, conducting, analysis, and reporting of research, and the content and conclusions of other scholarly work. This review article provides an overview of the issues regarding publication practices and responsible authorship.

Authorship

It is a contradiction to be an author but then plead ignorance if there is controversy regarding data in your published paper.[2]

Authorship is about publicly putting your name to your research achievements. Researchers reap many personal and professional rewards from their research activity in general and their publications in particular. Authorship has a strong currency that brings not only personal satisfaction but also career rewards based on publication counting. Beginning to become an author can be daunting for new academics and so for beginners, it is critical to start with reading papers from past publications of your targeted journals, drawing experiences from colleagues who are in the business of publishing, and ensuring that you obtain feedback from colleagues and experts on your writing.[1] These are important because both the number of publications and the quality of the journal are often used to judge research reputations, to assess achievement for promotion, and to measure *track record* for granting bodies who allocate research funds. According to Riggs *et al.* (2011), publication productivity is defined as the number of peer-reviewed articles one has published and the frequency with which such articles are cited.[3] These are used as important criteria for assessment of tenure positions and promotion.[3,4] For these reasons alone, researchers rarely turn down an

opportunity to co-author a paper.[5]

The notion also exists where gift authorship seem to give credence to a manuscript because a junior author believes the inclusion of a more experienced colleague increases chances of the manuscript's publication.[6,7]

With so much at stake, making a decision about authorship can be the most sensitive part of writing a paper. In recognition of this, standard criteria for authorship have been developed. Whatever criteria are used, authorship should always be linked to an identifiable contribution. Journal editors often despair about authorship lists that include people who have done little, if anything, towards the conduct of the study and exclude people who have done much work, even if they cannot claim responsibility for the entire study.

It is reasonable to make decisions about who will be authors and the order in which they will be placed before you begin writing or, even better, before the actual study gets underway. Early decisions tend to be less problematic than decisions made later because the potential for conflict increases as the rewards attached to authorship increase and co-authors lobby for a higher position in the pecking order. For this reason, collaboration from all parties from the start is critical with guidelines and agreements that are signed to adhere to the guidelines.

The objective of this review is to lay emphasis on universal standards for manuscript authorship and to fostering good practices. This in our view will bring authorship credit and accountability to the attention of our colleagues and readers at large.

Methods

To achieve this, a systematic and critical review of the literature was undertaken. Electronic databases, academic journals and books from various sources were accessed. Several key search terms relating to responsible authorship, common authorship malpractices, conflict of interest, universal publication guidelines and other authorship related issues, were used. Only references deemed useful from relevant texts and journal articles were included.

Uniform requirements for authorship

Authorship is best decided by standard guidelines rather than reliance on favouritism. Many research teams use the widely renowned Vancouver guidelines.[8] Following series of guidelines and protocols is important especially for the writer who wants to publish his/her work in terms of ensuring good publication ethics.[9]

According to the International Committee of Medical Journal Editors (ICMJE) recommendations, an author is an individual who has made substantial intellectual contributions to a scientific investigation. All authors should meet the following four criteria, and all those who meet the criteria should be authors.

Scholarship: substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work;

Authorship: drafting the manuscript or revising it critically for important intellectual content;

Approval: final approval of the version to be published; and

Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.[8]

According to these guidelines, those who do not meet all four criteria should be acknowledged. These authorship criteria are intended to reserve the status of authorship for those who deserve credit and can take responsibility for the work. The criteria are not intended for use as a means to disqualify colleagues from authorship who otherwise meet authorship criteria by denying them the opportunity to meet criterion numbers 2 or 3 as stated above. Therefore, all individuals who meet the first criterion should have the opportunity to participate in the drafting, review, and final approval of the manuscript.

The individuals who conduct the work are responsible for identifying those who meet these criteria and ideally should do so when planning the work, making modifications as appropriate as the work progresses. They will also be expected as individuals to complete conflict-of-interest disclosure forms. It is the collective responsibility of the authors, not the journal to which the work is submitted, to determine that all people named as authors meet all four criteria; it is not the role of journal editors to determine who qualifies or does not qualify for authorship or to arbitrate authorship conflicts. If agreement cannot be reached about who qualifies for authorship, the institution(s) where the work was performed, not the journal editor, should be asked to investigate. If authors request removal or addition of an author after manuscript submission or publication, journal editors should seek an explanation and signed a statement of agreement for the requested change from all listed authors and from the author to be removed or added.

An administrative relationship, acquisition of funding, collection of data, or general supervision of a research group alone does not constitute authorship, according to the ICMJE guidelines. These individuals and their contributions could be cited in the acknowledgments section instead.[8]

Contribution ambiguity

The specific roles of individual authors in a research project are not always clear, especially when a manuscript is attributed to a large group. To address this problem, several journals require public disclosure of the specific contributions of each author.[10-12] This tracking is particularly relevant because the scholarly output is increasingly defined by metrics beyond paper citations.

Despite wide recommendations for use of the ICMJE guidelines, many research groups do not necessarily use them, often because they find them quite restrictive.[13] It has also been suggested that guidelines for authorship should not be externally imposed but should be developed in-house by senior researchers in collaboration with their team.[14]

Because the Vancouver guidelines require that authors conform to all four criteria rather than one or more of them, they may encourage researchers to exaggerate the contributions of colleagues, perhaps for their own career development.[15] Participating solely in the acquisition of funding, the collection of data or the general supervision of the research team does not justify authorship. However, the Vancouver guidelines do not address the problem of researchers who have contributed to the work but whose names are not included as authors.[16]

Deciding where to draw authorship lines can be contentious in studies involving many people in which each person makes a specialised contribution, and large research teams often decide that meeting only one or two of the Vancouver criteria is sufficient. This more encompassing approach means that junior team members who are being trained into more senior roles need not be excluded. Also, by planning a series of publications from a single study, junior researchers or students can be included as an author in at least one paper to which they are able to make an intellectual contribution. There have been incidents of unfair

and unethical distribution of author credit in research collaborations when it comes to publications.[4] In student-faculty collaborations, for instance, the American psychological association (APA) reported in 2002 annual report as cited by Sandler and Russell that unethical author credit incidents affected students, females, and those who did not have tenure more than faculty who had tenure.[4] It is, therefore, important that fair credits for work done be given as these provide an invaluable training opportunity and a way of sharing the rewards of authorship with the entire team.

Responsibilities of authors and co-authors

Researchers should have an understanding of who among them will have primary responsibility for the writing, submission, and editing required for a paper. *First authorship* is important in the biomedical sciences and public health, because the first author's name is used by indexing bodies to cite the paper.

The position of the last author may be reserved for the principal investigator in some fields. In others, the senior person is first, with the last author having the smallest contribution. Each party should establish an understanding beforehand, regarding what kind of work merits authorship, with the knowledge that, as the research project progresses, authors and the positions of their names in the list may change.

Lead author

As a practical matter in the case of publications with multiple authors, one author should be designated as the lead author. The lead author assumes overall responsibility for the manuscript, and also often serves as the managerial and corresponding author, as well as providing a significant contribution to the research effort. A lead author is not necessarily the principal investigator or project leader. The lead author is responsible for:

Authorship: Including as co-authors all and only those individuals who meet the authorship criteria set forth by ICMJE.

Approval: Providing the draft of the manuscript to each individual contributing author for review and consent for authorship. The lead author should obtain from all co-authors their agreement to be designated as such and their approval of the manuscript. A journal may have specific requirements governing author review and consent, which must be followed.

Integrity: The lead author is responsible for the integrity of the work as a whole, and ensuring that reasonable care and effort has been taken to determine that all the data are complete, accurate, and reasonably interpreted.

Takes primary responsibility for all aspects of publishing the paper

Maintains ownership of the master document

Submits the paper to a journal for publication and takes primary responsibility for communication with the journal during the manuscript submission, peer review, and publication process, and typically ensures that all the journal's administrative requirements, such as providing details of authorship, ethics committee approval, clinical trial registration documentation, and gathering conflict of interest forms and statements, are properly completed, although these duties may be delegated to one or more co-authors.

Responsible for archiving and documenting all data and files

Although the corresponding author has primary responsibility for correspondence with the journal, the ICMJE recommends that editors send copies of all correspondence to all listed authors.[8]

Co-authors

All co-authors of a publication are responsible for:

Authorship: By providing consent to authorship to the lead author, co-authors acknowledge that they meet the authorship criteria set forth by ICMJE. A co-author should have participated sufficiently in the work to take responsibility for appropriate portions of the content.

Approval: By providing consent to authorship to the lead author, co-authors are acknowledging that they have reviewed and approved the manuscript.

Integrity: Each co-author is responsible for the content of all appropriate portions of the manuscript, including the integrity of any applicable research.

An individual retains the right to refuse co-authorship of a manuscript if s/he does not satisfy the criteria for authorship.

The list of co-authors may include team members, such as the statistician, database manager, librarian, study coordinator, and student supervisor. Whatever their positions in the author list, co-authors always have both ethical and professional responsibilities for the content of the paper. Thus, only the people who have participated sufficiently in the research project to take public responsibility for the content should be included. Once the authorship list is finalised, an agreement can be reached on the role of each co-author and the work that they will put into the paper. There are no formal guidelines, so negotiations and expectations have to be resolved amongst co-authors.

It is best to limit authorship to colleagues who make a true academic contribution. Although the number of authors on journal articles has tended to increase in recent years, four or five authors is usually optimal. Limiting the number of authors may be particularly important for the career advancement of students who are undertaking a higher degree and who are required to make a very substantial contribution to their papers. Having fewer authors also avoids diluting the responsibility that each author must take for the paper. In practice, more than four authors should be included only if there is a good reason for doing so and some journals set author limits.

Some major medical journals will not review or publish articles based on studies that are conducted under conditions that allow the sponsor to have sole control of the data or to withhold publication.[17] The journals that are members of the ICMJE now routinely require authors to disclose details of their own role and that of their sponsor.[18] Authors are asked to sign a statement that they accept full responsibility for the conduct of the study, had access to the data, and controlled the decision to publish. If the authors cannot satisfy these points, the paper will not be published. These moves are intended to prevent the publication of research results that reflect their financial backing.

Authorship order

In many disciplines, the author order indicates the magnitude of contribution, with the first author adding the most value and the last author representing the most senior, predominantly supervisory role. In this model, disputes may arise regarding who merits sole or shared first authorship. The Committee on Publication ethics recommends that researchers discuss authorship order from project initiation to manuscript submission, revising as necessary, and record each decision in writing.[19]

The order of authors is a collective decision of the authors or study group. In conjunction with the lead author, co-authors should discuss authorship order at the onset of the project and revise their decision as needed. All authors must work together to make these informed judgments.

An additional problem in deciding authorship can be the order in which co-authors are listed. The first author is always the person who does the writing and who coordinates the team of co-authors. The last author is usually the senior member of the

team and is often the person who conceived the initial idea for the study and/or obtained funding. It is a common policy that the authors in between the first and last are ranked in order of the magnitude of their input into the paper.[16] However, there is no consensus on these widely used positions. On some papers, the last author may be the person who contributed the least in intellectual terms rather than the most.

Without any internationally recognised standard criteria for author order, no system seems fair. Senior researchers are occasionally criticised for being only second or final authors when the system of using author order as an acknowledgment of mentoring, intellectual, and/or management credentials is not recognised. Until a consensus on the meaning of author order is achieved, researchers who strive to gain recognition for their own intellectual contribution whilst mentoring junior staff in the processes of writing and publication will always be disadvantaged. To deal with this issue, researchers applying for promotion often specify the exact contributions that they made to publications listed in their curriculum vitae.

Role of statisticians

Statisticians often have a special place in the authorship of a paper that reflects their contribution to the design and/or reporting of the study.[20] As such, they are a good example of how a person with specific expertise can support a study in either a minor or a major way. A statistician's role may vary from the development of the study design and study protocol to helping prepare the grant application, implementing the study, planning and performing the data analyses, and/or interpreting the results.

Abuses of publication practices

Several cases of abuse of publication practices are identified here.

Simultaneous submissions

One example of abuses of publication practices is the simultaneous submission of manuscripts to multiple journals with the intent of withdrawing the manuscript as soon as one of the journals indicates acceptance. This is an inappropriate and unethical publication practice.

In general, journals require that manuscripts submitted for publication should be original work that has not been previously published elsewhere. If an article has been previously published or is concurrently submitted to any other peer-reviewed publication, a substantial additional material should be included to warrant consideration.[21-23] Substantial generally means that at least 25% of the paper is material not previously published.[24] A paper presented at a workshop or conference without formally reviewed proceedings, a paper posted on a website, or printed as a technical report, however, does not disqualify the paper from a journal publication.

Once submitted for review, the paper should not be submitted to another venue until the acceptance/rejection decision is known. However, submission of synopses of manuscripts currently in preparation, under review, or accepted for publication elsewhere (as extended abstract or poster) is often permitted.

Redundant publication and self-plagiarism

Labelling data as a new finding in order to republish one's work is a form of deception in publication. According to ICMJE, a redundant publication is a form of inflating the publication record of an investigator or research team.[25]

Regarding the use of a previously published material in a subsequent journal submission, redundant or duplicate publication is typically not acceptable except when previously published data is needed to adequately communicate the intent of the research being presented. A guideline in that situation might be that at least 80% of the data presented in the paper should be new and not previously reported and that any overlap with work that was previously published should be clearly documented in the manuscript submission and appropriately acknowledged in a literature reference.

Such cases, in which data are duplicated and then published as new findings, are called *self-plagiarism*. However, it is important for readers to distinguish *self-plagiarism* from *secondary publication*. When previously published data is relevant to a new finding from the same investigator or research team, it may be permissible to resubmit the data for publication, provided that the repetition is disclosed in print and all authors of the previous publication have consented.[20]

However, the actual amount of previously published data that is allowed is dependent upon the specific journal's guidelines. The previous presentation of data in a scientific meeting as a platform presentation or scientific poster is generally not considered a previously published work, even if an abstract has been printed for distribution or published in a journal.[26]

Plagiarism

Plagiarism is an unethical publication practice and can be readily detected with relatively inexpensive software at the disposal of journal editors and associate editors. Whereas avoiding plagiarism of any sort is the responsibility of the authors, journal editors should have the tools to routinely screen for plagiarism.

According to the committee on publication practice, this practice requires the author(s) to read the original papers that are cited in the submitted manuscript rather than using reference citations based on someone else's review article. When using figures from prior publications, obtaining permission from the publisher, or copyright holder, is required and, as a courtesy, informing the original author is of the essence. Republishing one's own publication in another language needs to be carefully considered in order to avoid loss of fidelity of the meaning in the translation. Republishing of another's manuscript in an alternative language needs, even more, care and should always involve the original authors with appropriate full approval and support of the editor of the second journal.[27]

Adding and changing list of authorship during resubmission

This section presents issues regarding adding to, or changing, the listing of authorship upon resubmission of a paper following an initial peer review by a journal. According to ICMJE, this step is acceptable in situations where there is further work on manuscript revision in response to peer reviewers' questions and comments or in situations in which individual authors are no longer readily available to provide additional contributions and someone else is required to play a major role in resubmitting the manuscript. When changing authorship or author order upon resubmission, the corresponding author should inform the co-authors and journal editor of the reason(s) for the change.[25] It is immoral where a junior researcher is made to write a manuscript as part of a team and the principal investigator uses their prerogative and decides who is placed on the author list. The excuse usually is based on the fact that the junior researcher is being paid to do a job and so has no say in the choice of authorship.

Ghost, gift and guest authorship

Guest, gift, and ghost authorship are all inconsistent with the definition of authorship and are unacceptable. Gift authorship is credit, offered from a sense of obligation, tribute, or dependence, within the context of

an anticipated benefit, to an individual who has not contributed to the work. Ghost authorship is the failure to identify as an author, someone who made substantial contributions to the research or writing of a manuscript that merited authorship, or an unnamed individual who participated in writing the manuscript. Ghost authorship may range from authors for hire with the understanding that they will not be credited, to major contributors not named as an author.[20]

In rare cases, researchers or sponsors offer financial or other tangible goods in exchange for the use of a credible researcher's name on a publication in order to add the appearance of credibility to the findings. This form of deception involves awarding authorship to someone who is either unrelated or only peripherally related to the project.

Ideally, academic authority is established by producing credible contributions to the scientific literature. In line with this, the APA outlined in its code of ethics that authorship and publication credits must reflect accurately relative scientific or professional contributions of the individuals involved, regardless of their relative status.[4] This means that mere obligation or tribute as in the case of gift authorship and ghost authorship should not get credit. However, some institutional or social leaders will use their authority to become authors without doing the appropriate work related to the article's content. It is a deceptive practice to grant co-authorship to an individual because of his or her status.

Guest authorship

According to the Committee on publication ethics, guest authorship is defined as granting authorship out of appreciation or respect for an individual, or in the belief that expert standing of the guest will increase the likelihood of publication, credibility, or status of the work.[19]

Guest authorship is given to an individual despite a lack of substantial contributions to a study. Guest authorship may be used for multiple purposes, including to increase the apparent quality of a paper by adding a well-known name or to conceal a paper's industry ties by including an academic author.

Additional issues regarding guest authorship are the inclusion of an author on a manuscript without his or her permission (which is often prevented by journal guidelines that require the consent of all authors) and coercive authorship, which typically consists of a senior researcher (such as a dissertation advisor) forcing a junior researcher (such as a graduate student) to include a gift or guest author.

From the standpoint of journals, lists of specific contributions may help to minimize this practice, as could reminders that all authors are accountable for the integrity of a published work. The institution of double-blind peer review could also decrease the influence of authors' prominence in the field on journal acceptance.

Gift authorship

Gift authorship occurs when someone who has not made an intellectual contribution to a paper accepts an authorship. This type of authorship often develops because both the author and the *gift author* benefit from the relationship. Senior *gift* authors are often enrolled because they tend to confer a stamp of authority on a paper.[28] The *gift* author may gain prestige by being associated with the publication, and the author may gain approval for their work from the senior academic. Many researchers are willing to cite senior authors if they think that this will facilitate the publication of their work or enhance their career prospects.[29] However, this practice can lead to scandal when the results of a journal article cannot be substantiated.[30] For this reason, a head of department or a senior academic should not be included as an author when they have not made an academic contribution to the paper and are not able to take responsibility for the content. Most of all, gift authors should definitely not be included *because everyone does it*.[28]

Ghost authorship

Ghost authorship, on the other hand, is the practice of omitting authors who have made a major contribution to a paper. Professional ghost authors are sometimes engaged in writing papers on which a clinical investigator, or *guest* author, is included but has not been involved in the data analyses or preparation of the manuscript.[31] This practice is most often attributed to drug companies who may pressure writers to use certain phrases to position a product more favourably.[32] Such practices may also be used to fast track the publication of clinical drug trials, but they reduce the independence of the research team and they do not conform in any way to the Vancouver guidelines. Although *guest* authors may have final control over the manuscript, they may not thoroughly review the paper if it does not have high priority in their workload. Given that science must be based on truth and trust, practices of *gift* and *ghost* authorship are to be avoided at all costs.

Acknowledgments

Deciding who to formally acknowledge in your paper requires almost as much consideration as deciding authorship and contribution, although the criteria are less contentious.

Individuals who may have made some contribution to a publication, but who do not meet the criteria for authorship, such as staff, editorial assistants, medical writers, or other individuals, can provide a valuable contribution to the writing and editing of publications. Since those contributions do not meet the criteria for authorship under Vancouver criteria, those individuals should be listed in an acknowledgment section of the article.[8]

Listing names in the Acknowledgments section is a means to give credit to those who, for example, provide technical contributions or who facilitate the publication by their overall supervision of a large group, by acquisition of funding for the research, or for their encouragement and insightful discussions centered on the research and its presentation in publication form. Formally acknowledging individuals to gain credibility and adding individuals without their prior consent is not acceptable publication practice.[18]

Contributors who meet fewer than all 4 of the above criteria for authorship (see section on uniform requirements for authorship) should not be listed as authors, but they should be acknowledged. Examples of activities that alone (without other contributions) do not qualify a contributor for authorship are the acquisition of funding; general supervision of a research group or general administrative support; and writing assistance, technical editing, language editing, and proofreading. Those whose contributions do not justify authorship may be acknowledged individually or together as a group under a single heading (*e.g. Clinical Investigators* or *Participating Investigators*), and their contributions should be specified (*e.g.*, *served as scientific advisors*, *critically reviewed the study proposal*, *collected data*, *provided and cared for study patients*, p*articipated in writing or technical editing of the manuscript*).[8]

Because acknowledgment may imply endorsement by acknowledged individuals of a study's data and conclusions, editors are advised to require that the corresponding author obtains written permission to be acknowledged from all acknowledged individuals.

Conflict of interest

As part of the desire for transparency, signed conflict of interest statements are typically required from all authors prior to actual publication.[25] The concern present within the scientific community centres on the potential for introduction of bias based on financial or personal considerations that might influence how the study results are presented or interpreted. Financial disclosure includes place of employment, consultancies, payment for expert opinions, and receipt of honoraria related to the submitted work. In the interest of complete transparency, full disclosure may go beyond documentation of potential conflict of interest in identifying funding sources and be extended to the authors providing full access to all study data.

Acknowledgment of funding sources such as pertinent grants or industry-sponsored funding is actively encouraged to maintain transparency and is required by many journals as one important way of avoiding the criticism of concealing potential *conflicts of interest*. Alternatively, some journals require a categorical financial statement separate from the acknowledgment section.[11,12]

According to the Committee on publication ethics, authors shall fully disclose, in all manuscripts to journals, grant applications, and at professional meetings, all relevant financial interests that could be viewed as a potential conflict of interest.[19] Support includes research and educational grants, salary or other support, contracts, gifts, and departmental, institutional and hospital support.

Research sponsorship may result in outcomes favourable to the sponsor's product.[33] Industry sponsors may design the study, control the data, suppress dissent, exert editorial power, and withhold permission to publish. Easily identifiable conflict of interests in financial relationships includes employment, consulting, stock ownership, and patents.[34]

Conclusions

The inclusion of an author on a research paper should be based on the extent of their contributions to the conception, design, analysis and interpretation of data or acquisition of data.

The principal investigators bear overall responsibility for the conduct of a study, including future publications, and must inform all participants of their roles, train them in the responsible conduct of research, and obtain a written confirmation that they have done so.

In order to avoid a misunderstanding, it is important for research teams to discuss early on how credit and recognition will be shared once the work is completed. The process of responsible authorship begins before the writing of a manuscript, with good scientific study design and with researchers abiding by the ethical guidelines of their respective institutions regarding conflicts of interest and the humane treatment of animals and human subjects.

What does not constitute authorship or *who should not be a co-author*. The latter includes individuals providing general overall supervision of a research group, the general acquisition of funding for the laboratory, administrative approval of manuscript submission for organizational accounting purposes, or simply collecting or providing data without providing analysis or interpretation. Although automatic honorary or obligatory inclusion of these individuals may be common practice in some organizations, when they have not actively participated in the study being submitted for publication, including them as authors is not advisable within the available guidelines. There was some concern expressed about research papers on which a larger than a usual number of authors appears in an effort to give credit to all study participants, regardless of the magnitude of their individual contributions. If each individual author has made a substantial contribution, then this practice is perfectly defensible, but where there may be some cultural reasons for this practice, honorary, guest, admiration, or coercion authorship is discouraged. All authors should qualify for authorship based on the quantity and quality of their substantial contribution to the research and to their willingness to take public responsibility for, and the ability to defend, their contribution to the publication. Individuals who do not qualify for authorship but who may have provided critical scientific advice, manuscript review, technical support, or other material input into the work should always be considered for formal acknowledgment. Academic writing is creative activity but challenging and must follow laid down protocols and guidelines. For this reason, it is important that university departments in which academic writing is offered ensure that these protocols and guidelines become an integral part of their academic writing curricula 9. The importance of publishing and acquiring appropriate and ethical authorship credit is re-echoed by Chen (2004) in a statement that academics need to publish for tenure, promotion, for disseminating ideas, for self-learning, and for salary increment.[35]

In all the cases described here, universal standards for manuscript authorship will be critical in fostering good practices. As you write and review manuscripts, keep these good practices in mind, and consider ways to bring authorship credit and accountability to the attention of your colleagues and readers.

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