

Faculty Development

A Method for Assigning Authorship in Multiauthored Publications

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Background and Objectives: Determining authorship for publications is often a difficult process, even more so when individuals from several disciplines collaborate with community organizations to conduct projects. Although multidisciplinary and community-academic partnerships provide fertile ground for publication efforts, disputes about authorship and ownership of data may hinder efforts to disseminate information. This article describes a process for dealing with authorship in multi-professional collaborations. It provides an authorship scale, similar to a neonatal Apgar scale, to determine order of authorship in multi-professional projects. Key components or activities in the process of authorship are identified, and points are assigned to each component in proportion to an investigator's level of activity in each component/activity. Scores are summed and can range from 1 to 35 for each author. The order of authorship is then determined by the relative score of each participant.

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Many publications have discussed difficulties involved in determining authorship for articles and have provided suggestions about the required components and order of authorship.¹⁻¹² However, the lack of operational directions within existing guidelines and the complex nature of some research and authorship collaborations often make it difficult to translate this information into a useful system for quantifying the contributions of individual authors. In addition, most of the guidelines^{5,6} for authorship are geared toward classic, clinical, or laboratory experiences, rather than community-based and service-oriented experiences. For example, at our institution, the health professions schools (medicine, nursing, professional psychology, social work, and allied health) and community organizations developed a partnership known as the Center for Healthy Communities. The complex nature of

collaborative relationships within the center are such that traditional guidelines for authorship are not readily applicable to the center's partnership structure.

Collaborative partnerships such as ours need a simple way to quantify individual activities so authorship can be determined easily. This report describes a scoring system that can be used for assigning authorship in collaborative centers as well as in classic, clinical, or laboratory settings.

Conceptualization of the Authorship Scale

From a review of the literature,^{2,5-12} we identified the various components of authorship. We added the component "implementation," because community projects frequently require extensive implementation efforts. We then assigned weights to these components using a three-step categorization (minimal, some, significant) and selected the following components of authorship for the scale.

Conception

Development of the initial idea for a particular project or paper is a primary component of an authorship scale. Depending on the type of project, originality of the concept may be the most significant aspect

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Table 1

Authorship Scale: Determining Individual Contribution for Authorship

	Minimal (1)	Some (3)	Significant (5)
Conception			
Design			
Implementation			
Data analysis/interpretation			
Drafting the article			
Revising/reviewing the article			
Public responsibility			

In using the authorship scale, a check mark is placed below the column (minimal, some, significant) that best describes an author's level of involvement with each component listed in the left-hand column. (1), (3), and (5) refer to points assigned based on level of involvement.

of the component. In most instances, contribution to a concept can be determined by the people involved in the project and values assigned appropriately.

Design

Design is included as a separate component because it is often different than the contribution of the original idea. Individuals contributing to the design should be awarded appropriate values that match their contributions.

Implementation

This term signifies the activities, such as attending meetings, establishing timelines, selecting appropriate personnel, allocating resources, completing individual assignments, and solving problems related to a project, all of which are necessary to carry a project from conception to completion.

Data Analysis/Interpretation

Each author's contribution to data analysis/interpretation contributes to completion of a given study. Though contributions may vary from study to study, authors may contribute significantly to the same objective and be awarded the values matching their contributions.

Writing the Article

Writing the first draft is obviously a significant contribution. In some instances, revising/reviewing the article can also become a significant contribution, depending on the sta-

tus of the original article. We give credit primarily to drafting the article and assign additional credit only to significant revising/reviewing tasks.

Public Responsibility

The term "public responsibility" signifies that the author has participated in and is accountable for the research and content being reported.⁸

How to Use the Authorship Scale

As shown in Table 1, each individual's contribution for the seven components, based on the above criteria, is assigned a weight as either minimal (1), some (3), or significant (5). By consensus, our group empirically assigns values to calculate a numerical score for each author's contribution. The scale converts each individual's contribution to a measurable value.

The meaning of "minimal," "some," or "significant" may vary from group to group and discipline to discipline and may depend on the nature of a project. For this reason, we recommend that each authoring group define these terms for its specific project before using the scale to determine the contributions of each author. The assigned points may need to be revised, either during the project or at the end, to accurately determine the contribution of a given author, particularly in instances in which authors are either unable to complete their assignments or contribute less to the project than initially planned.

In case of a tie for first authorship, we would first look at the score for conception. We think conception is the key contributing factor, and the person with the highest score for this item should be the first author. If the authors are tied on this factor, we have a committee of center participants who make the final decision. If there is further dispute, the director of the center would make the ultimate decision.

Table 2

Use of the Scale for This Article

	First Author	Second Author	Third Author	Fourth Author	Fifth Author
Conception	5	3	1	1	1
Design	-	-	-	-	-
Implementation	5	5	3	3	3
Data analysis/interpretation	-	-	-	-	-
Drafting the article	5	3	3	3	3
Revising/reviewing the article	5	5	5	3	1
Public responsibility	5	5	5	5	5
Total score	25	21	17	15	13

Numbers refer to level of involvement with each of the components in the left-hand column: minimal (1), some (3), significant (5).

For ties in second or subsequent authorship, the decision rests with the first author. If controversy remains, a committee will resolve the dispute. Again, the director of the center will determine the order of authorship if there is no resolution. For groups unlike ours, without a committee or center director, a committee of faculty or colleagues could act as arbiters when disputes arise. To date, we have not needed to use these mechanisms for ties.

Some contributions do not merit inclusion as an author, but author(s) of an article may decide to show appreciation by acknowledging assistance in certain areas. These include data collection and providing data, subjects (patients), funding, or administrative support.

Use of the Scale for This Article

Table 2 shows how we used the scale to assign authorship for this article. The chart clearly shows the contributions of each author. Because the group felt strongly about public responsibility, each author was assigned the value of 5, even though it did not change the relative ranking of the author's contributions in terms of the total score. We do not see a problem in some contributors taking a score of some (3) or minimal (1) for public responsibility in certain work or activities. For example, some authors may contribute to a specific area (eg, a statistician who works on data analysis only) and do not need full public responsibility for all aspects of the final project.

Utility of Authorship Scale

We see the authorship scale as useful in several ways. First, the scale helps define the activity assigned to a given author. Second, it helps prevent or resolve differences among authors, especially when order of authorship is in dispute. Third, the scale documents the areas and extent of accountability of any given author. If every authorship group submitted an authorship scale, editors would have a better perception of each author's real contribution. Such a scale would be of particular assistance when issues of public responsibility or accountability arise. Finally, although the purpose of this scale is not to decrease the number of authors for a given paper, it may deter some individuals from being listed as authors when their contributions are negligible. Forcing individuals to

document their contributions may help answer Rennie and Flanagan's question, "After all, how many people can wield one pen?"⁷

Conclusion

The authorship scale is a useful tool for determining the assignment and order of authorship to manuscripts submitted for publication. Although this scale may not be applicable to every working group or every situation, we think it will be useful in most circumstances that include multi-professional community projects or laboratory research.

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