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“Equal” Contributions and Credit: An Emerging Trend in the Characterization of Authorship

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Abstract

Background—Scientific manuscripts sometimes have two or more authors explicitly designated as having “contributed equally” to the study. The prevalence and characteristics of this practice are not known. The goal of this study was to identify longitudinal trends and characteristics of the practice of explicitly giving authors equal credit in publications found in major medical journals.

Methods—We conducted electronic keyword searches looking for original research articles with equally credited authors (ECAs) published between January 1, 2000 and December 31, 2009 in the five general medicine journals with the highest impact factors (New England Journal of Medicine, Journal of the American Medical Association, Lancet, Annals of Internal Medicine, and British Medical Journal). The annual prevalence of original research articles with ECAs for each journal.

Results—Original research articles with authors explicitly given equal credit were found in all five journals. Articles with ECAs formed a greater proportion of the total number of articles published in each journal in 2009 versus published in 2000. [NEJM: 8.6% vs. <1%; JAMA: 7.5% vs. 0%; Annals: 3.8% vs. 0%; Lancet: 3.6% vs. <1%; BMJ: 1.0% vs. 0%]. There was a statistically significant increasing trend in yearly prevalence of ECA articles for all the journals [NEJM: $p < 0.0001$; JAMA: $p < 0.001$; Annals: $p < 0.001$; Lancet: $p < 0.001$, BMJ: $p = 0.001$]. The first two authors listed in the byline received equal credit the majority of the time but the practice was also applied to authors in nearly every position in the byline. Finally, none of the journals provided specific guidance regarding this practice in their instructions to authors.

Conclusions—The practice of explicitly giving authors equal credit is increasingly common in original research publications. Scientific journals should consider providing guidance for authors regarding this practice. Furthermore, the potential impact of this practice on evaluations for academic promotion should be assessed.

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Keywords

authorship; credit; equal; contributions; practice

INTRODUCTION

The question of what constitutes the most ethical, transparent and fair way to credit authors for their contributions to an original published work has been a matter of great debate.¹⁻³ In general, it is assumed that the first and last (i.e., senior) author positions in a publication's byline hold special weight.⁴ The outside perception of individual contribution is undoubtedly a critical consideration for researchers, especially given the importance of publications in evaluations for academic promotion. Indeed, recent trends have shown increases in the overall number of authors per publication.⁵⁻⁸

Given the above considerations, it is perhaps not surprising to see publications with certain authors explicitly designated as having “contributed equally” to the manuscript. This could be seen as an approach to effectively increase the number of first or senior authors for a given manuscript, particularly when the contributions of two or more authors are of such similar weight that both could be considered first authors. To our knowledge, the prevalence and characteristics of designating two or more authors as having “contributed equally” (equally credited authors, or ECAs) has not been described. Thus, the goal of this study was to investigate this practice.

METHODS

We focused specifically on the five general medicine journals with the highest current impact factors (ISI Web of Knowledge). These journals were the following: *New England Journal of Medicine* (NEJM), *Journal of the American Medical Association* (JAMA), *Lancet*, *Annals of Internal Medicine* (Annals), and *British Medical Journal* (BMJ). A manual search was first performed through all original research articles published in 2009 on each journal's website, looking for articles with authors who were designated as having “contributed equally” to the work (or any other terminology designed to indicate equal credit). Based on the findings of these manual searches, we then used the keywords “contributed equally,” “first authors,” “last authors,” and “equal contributions” in each journal's online search engine to look for eligible articles published between January 1, 2000 and December 31, 2009. All articles identified by the online search engines were examined to assure that they met the following inclusion criteria: 1) they presented original research, including systematic reviews and meta-analyses but not case reports or clinical reviews; and 2) the keywords were used in the correct context (i.e., designated authors for equal credit). To assess the accuracy of the online search engines, we compared their 2009 results to those of our manual search.

For each journal, the number of articles that met the inclusion criteria was calculated for each year in the study period. For each of these articles, we also noted the following: total number of authors listed; the number of equally credited authors and their position in the byline (i.e. first author, middle author, last author); and year of publication.

To estimate the overall number of original research articles published each year in each journal, we utilized an online bibliographic and citation database (ISI Web of Science). We limited the search to publications listed under the headings “articles” and “reviews”, excluding non-relevant document types from the count (e.g. letters, editorials, news items, corrections and proceeding papers). We then calculated the annual proportion of articles with equally credited authors (ECAs) using as a denominator the total number of original research articles published

in each journal per year. The chi-square test for trend was used to assess trends in the proportion of ECA articles for each journal over time. In addition, a median was determined for both the total number of authors and the number of equally credited authors per ECA article for the entire study period. Finally, we reviewed each of the five journals' instructions to authors, noting if they required authors to specify their individual contributions. We also assessed whether the journals provided any guidance regarding the practice of giving authors equal credit.

RESULTS

Original research articles with authors explicitly given equal credit were found in all five journals. The most common statement used in this practice was that certain authors “contributed equally to the study (work, article, or manuscript)” or some variation of this language. Much less commonly, authors were specifically indicated as co- “first authors” or even co- “last authors.” As aforementioned, we manually searched through all original research articles published in 2009 on each journal's website in order to assess the accuracy of their online search engines. With the exception of NEJM, each online search engine identified all articles that had been discovered in the preceding manual search. NEJM's online search engine identified only 29 of the 43 articles from the manual search. There was no clear explanation for the poorer performance of search engine for NEJM compared to the other journals. Specifically, the wording used to describe equal attribution was similar for NEJM compared to the other journals. In addition, the location of the equal attribution language in the article itself was similar across journals. Recognizing this potential underestimate of ECA articles for NEJM, all of the data regarding the number of ECA articles from 2000-2009 was obtained solely via each journal's online search engine.

For all five journals, original research articles with ECAs formed a greater proportion of the *total* number of articles published in 2009 versus published in 2000: [NEJM: 8.6% vs. <1%; JAMA: 7.5% vs. 0%; Annals: 3.8% vs. 0%; Lancet: 3.6% vs. <1%; BMJ: 1.0% vs. 0%] (Table 1). There was a statistically significant increasing trend in yearly prevalence of ECA articles for all journals.

Among the ECA articles published during the study period, it was the first two authors listed in the byline who received equal credit the majority of the time [NEJM: 59.6%; JAMA: 63.8%; Annals: 86.2%; Lancet: 64.4%; BMJ: 56.5%] (Table 2). In the case of NEJM, JAMA and *Lancet*, the second most common finding was for the first three (or more) authors to be credited equally. Of note, both *Lancet* and BMJ had articles where *all* the authors listed received equal credit (Table 2). Among ECA articles, the median number of equally credited authors in all five journals was 2 (Table 3). ECA and non-ECA articles did not differ substantively with regard to subject area, type of paper (e.g., article, review), and total number of authors. Finally, all the journals except NEJM required authors to specify their contributions in some way but only *Lancet* made any clear reference to equally crediting authors saying, “if all authors contributed equally, please state this” in their author form.

COMMENT

Our results demonstrate that the practice of explicitly giving authors equal credit for original research published in major medical journals has increased significantly in the past decade. The first two authors listed received this designation the majority of the time. However, this practice has also been applied to authors in nearly every position in the byline. It is also not uncommon to have more than two authors designated as equal contributors. These findings seem to emphasize the difficulty in accurately discerning the contributions of authors based solely on their byline position in multi-authored papers.⁹

With the exception of NEJM, the journals all require authors to specify their contributions in some way—a policy that was in place in each journal by the beginning of the study period.¹⁰⁻¹⁷ However, as aforementioned only *Lancet* makes any reference to equally crediting authors, stating in their author form that it is permissible to have *all* authors credited for having “contributed equally” to a study.¹⁸ This might explain why *Lancet* had more articles with all authors given equal credit than the other journals. Nevertheless, although the practice of equally crediting authors is relatively common in most of these major journals, none have a detailed policy regarding it. Interestingly, even with policies in 4 out of the 5 journals requiring publication of individual contributions, the authors in these articles still chose to explicitly state who should be given equal credit. Further study is necessary to elucidate the goals behind these choices. Moreover, given the increasing prevalence of this practice, it may be desirable for scientific journals to provide guidance for authors with regard to when, how (and if) “equal” authorship should be designated.

Another important implication of our findings is how designations of equal attribution of authorship may be interpreted by academic promotion committees. In reviewing an individual for academic promotion, the first and last (i.e., senior) author positions in a publication's byline are particularly important.⁴ It is unclear how an author given a position in the byline that is not the first or last, but identified as having contributed equally, would be assessed in the promotions process. The increased use of equal attribution of authorship suggests committees on appointments and promotions should explicitly consider their approach to this practice. Indeed, a reasonable first step might be a survey of such committees across various institutions to review what, if any, approaches have been undertaken. In assessing the potential interpretation of equal attribution of authorship for promotion, it is useful to consider recent trends at the National Institutes of Health (NIH). In the NIH Roadmap for example, there is a clear emphasis on collaborative research teams. Similarly, grant applications now often permit dual principal investigators. These initiatives focusing on close research collaborations suggest that the number of manuscripts for which multiple authors (investigators) have made essentially equal contributions will likely continue to increase.

This study has several potential limitations. As noted, the NEJM online search engine only identified 29 of the 43 articles found by manual search. Therefore, the number of ECA articles per year in NEJM from 2000-2009 is almost certainly higher than what we report. By only being able to limit our search of the online database to “articles” and “reviews,” articles that did not actually present original research were potentially counted. Thus, we most likely overestimated the number of original research articles published in each journal per year (i.e., the denominator). Again, this would likely result in a higher yearly prevalence of ECA articles than what we report. Finally, this study focused on the five major general medicine research journals with the highest impact factors and may not be representative of other journals, particularly those from other disciplines.

In conclusion, the practice of explicitly giving authors equal credit is increasingly common in original research publications. It may be desirable for scientific journals to provide guidance for authors regarding this practice. Finally, the potential impact of this practice on future evaluations for academic promotion should be assessed.

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REFERENCES

1. Editors ICoMJ. , editor. Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication. Updated October 2008; <http://www.icmje.org>. Accessed April 28th, 2010
2. Rennie D, Yank V, Emanuel L. When authorship fails. A proposal to make contributors accountable. *JAMA* Aug 20;1997 278(7):579–585. [PubMed: 9268280]
3. Smith R. Authorship: time for a paradigm shift? *BMJ* Apr 5;1997 314(7086):992. [PubMed: 9112837]
4. Steneck, NH. ORI Introduction to Responsible Conduct of Research. <http://ori.hhs.gov/documents/rcrintro.pdf>. Revised August 2007. Accessed May 7th 2010
5. Stossel TP. Volume: papers and academic promotion. *Ann Intern Med* Jan;1987 106(1):146–149. [PubMed: 3789559]
6. Wren JD, Kozak KZ, Johnson KR, Deakyn SJ, Schilling LM, Dellavalle RP. The write position. A survey of perceived contributions to papers based on byline position and number of authors. *EMBO Rep* Nov;2007 8(11):988–991. [PubMed: 17972896]
7. Baerlocher MO, Gautam T, Newton M, Tomlinson G. Changing author counts in five major general medicine journals: effect of author contribution forms. *J Clin Epidemiol* Aug;2009 62(8):875–877. [PubMed: 19473810]
8. Drenth JP. Multiple authorship: the contribution of senior authors. *JAMA* Jul 15;1998 280(3):219–221. [PubMed: 9676660]
9. Shapiro DW, Wenger NS, Shapiro MF. The contributions of authors to multiauthored biomedical research papers. *JAMA* Feb 9;1994 271(6):438–442. [PubMed: 8295318]
10. JAMA. Instructions for Authors: Authorship Criteria and Contributions and Authorship Form. <http://jama.amaassn.org/misc/ifora.dtl#AuthorshipCriteriaandContributionsandAuthorshipForm>. Accessed April 17th, 2010
11. Rennie D, Flanagan A, Yank V. The contributions of authors. *JAMA* Jul 5;2000 284(1):89–91. [PubMed: 10872020]
12. BMJ. Resources for Authors: Authorship and Contributorship. <http://resources.bmj.com/bmj/authors/article-submission/authorship-contributorship>. Accessed May 11th, 2010
13. Smith R. Authorship is dying: long live contributorship. *BMJ* Sep 20;1997 315(7110):696. [PubMed: 9314747]
14. Lancet. Information for Authors. <http://download.thelancet.com/flatcontentassets/authors/lancet-information-forauthors.pdf>. Accessed April 17th, 2010
15. Horton R. The signature of responsibility. *Lancet* Jul 5;1997 350(9070):5–6. [PubMed: 9229669]
16. Annals of Internal Medicine. Instructions for Authors: Authorship Issues - Criteria and Policy. <http://www.annals.org/site/misc/ifora.xhtml#criteria-and-policy>. Accessed April 17th, 2010
17. NEJM. Author Center Instructions for Submitting a New Manuscript: Authorship. <http://authors.nejm.org/help/NewMs.asp#authorship>. Accessed April 17th, 2010
18. Lancet. Author Signature Form. <http://www.download.thelancet.com/flatcontentassets/authors/tl-author-signatures.pdf>. Accessed April 17th, 2010

Table 1
 Number of original research articles with authors given equal credit and annual prevalence

Year	NEJM ^a	JAMA ^b	Annals ^c	Lancet	BMJ ^d
2000	3/362 (<1%)	0/349 (0%)	0/200 (0%)	4/795 (<1%)	0/579 (0%)
2001	1/362 (<1%)	1/364 (<1%)	1/204 (<1%)	7/716 (1.0%)	1/586 (<1%)
2002	7/372 (1.9%)	8/357 (2.2%)	0/176 (0%)	16/637 (2.5%)	3/590 (<1%)
2003	20/361 (5.5%)	5/372 (1.3%)	1/196 (<1%)	21/531 (4.0%)	1/643 (<1%)
2004	11/299 (3.7%)	5/340 (1.5%)	5/180 (2.8%)	18/498 (3.6%)	1/623 (<1%)
2005	20/306 (6.5%)	5/307 (1.6%)	5/178 (2.8%)	15/396 (3.8%)	4/514 (<1%)
2006	19/283 (6.7%)	9/257 (3.5%)	3/159 (1.9%)	10/330 (3.0%)	3/333 (<1%)
2007	17/338 (5.0%)	10/229 (4.4%)	3/158 (1.9%)	13/326 (4.0%)	1/292 (<1%)
2008	19/328 (5.8%)	9/211 (4.3%)	4/156 (2.6%)	18/311 (5.8%)	4/260 (1.5%)
2009	29/336 (8.6%)	17/226 (7.5%)	7/186 (3.8%)	10/279 (3.6%)	5/525 (1.0%)
Total	146/3347 (4.4%)	69/3012 (2.3%)	29/1793 (1.6%)	132/4819 (2.7%)	23/4945 (<1%)
<i>Trend</i>	p < .001	p < .001	p < .001	p < .001	p < .001

^aNew England Journal of Medicine

^bJournal of the American Medical Association

^cAnnals of Internal Medicine

^dBritish Medical Journal

Table 2

Number of original research articles with authors given equal credit categorized by byline position

Byline position of authors receiving equal credit	NEJM ^a (n=146)	JAMA ^b (n=69)	Annals ^c (n=29)	Lancet (n=132)	BMJ ^d (n=23)	Total ^f (n=399)
First two authors	87 (59.6%)	44 (63.8%)	25 (86.2%)	85 (64.4%)	13 (56.5%)	254 (63.7%)
First three or more authors	20 (13.7%)	8 (11.6%)	1 (3.4%)	15 (11.4%)	1 (4.3%)	45 (11.3%)
Last two authors	11 (7.5%)	3 (4.3%)	0	6 (4.5%)	0	20 (5.0%)
First and last author ²	2 (1.4%)	5 (7.2%)	0	3 (2.3%)	6 (26.1%)	16 (4.0%)
First two <i>and</i> last two authors	8 (5.5%)	1 (1.4%)	2 (6.9%)	4 (3.0%)	0	15 (3.8%)
Middle authors only	7 (4.8%)	4 (5.8%)	1 (3.4%)	8 (6.1%)	0	20 (5.0%)
First three (or more) authors <i>and</i> last three (or more) authors	3 (2.1%)	1 (1.4%)	0	2 (1.5%)	0	5 (1.3%)
All authors ³	0	0	0	7 (5.3%)	2 (8.7%)	9 (2.3%)
Other	8 (5.5%)	3 (4.3%)	0	2 (1.5%)	1 (4.3%)	14 (3.5%)

^f cumulative total across all 5 journals

² including but not limited to articles with only two authors

³ excluding articles with only two authors

^aNew England Journal of Medicine

^bJournal of the American Medical Association

^cAnnals of Internal Medicine

^dBritish Medical Journal

Table 3
 Median total authors and equal authors in original research articles with authors given equal credit, 2000-2009

	NEJM ^a	JAMA ^b	Annals ^c	Lancet	BMJ ^d
Median (range) Number of Authors Listed in Byline	13 (4-46)	11 (2-69)	8 (3-23)	11 (2-33)	4 (2-29)
Median (range) Number of Equally Credited Authors	2 (2-10)	2 (2-14)	2 (2-4)	2 (2-23)	2 (2-12)

^aNew England Journal of Medicine

^bJournal of the American Medical Association

^cAnnals of Internal Medicine

^dBritish Medical Journal