

Authorship trends over the past fifty years in the Journal of the Danish Medical Association (Danish: Ugeskrift for Læger)

Siri Vinther & Jacob Rosenberg

ABSTRACT

INTRODUCTION: Internationally, the number of authors per scientific article is increasing. The objective of this study was to determine authorship trends over the past fifty years in Ugeskrift for Læger (UfL).

MATERIAL AND METHODS: From 1960 to 2010, ten volumes of the UfL, 5,962 articles in total, were studied. For each article, category and number of authors were recorded.

RESULTS: The median number of authors per article (all categories) was one in 1960 (range 1-3), two in 1985 (range 1-9) and three in 2010 (range 1-14). The proportion of articles published by three or more authors constituted 1% in 1960 and 68% in 2010. For original articles, the median number of authors per article was two in 1960 (range 1-3), three in 1985 (range 1-9) and three in 2010 (range 1-9). For reviews, the median number of authors per article was one in 1960 (range 1-2), two in 1985 (range 1-5) and three in 2010 (range 1-14). For case reports, the median number of authors per article was one in 1960 (range 1-2), two in 1985 (range 1-5) and three in 2010 (range 1-6).

CONCLUSION: The number of authors per article increased for all types of articles published in the UfL. This could reflect increases in "gift authorship", but "multiple authorship" could also be fully legitimate. Replacing or supplementing authorship criteria with contribution statements would provide some transparency and accountability. Yet, questions about credit assessment and overall responsibility need to be clarified.

FUNDING: not relevant.

TRIAL REGISTRATION: not relevant.

The number of authors listed on biomedical articles continues to increase. Especially in the field of biomedicine, this trend has been a subject of debate because it may reflect an increase in illegitimate "gift authorship", i.e. the granting of authorship to people who do not fulfil the authorship criteria formulated by the International Committee of Medical Journal Editors (ICMJE) [1-5]. Nevertheless, a growing number of authors per article may be fully legitimate, at least for certain article categories.

The objective of this study was to determine whether multiple authorship has risen in the Journal of the

Danish Medical Association (Ugeskrift for Læger (UfL)) over the past fifty years.

MATERIAL AND METHODS

Ten volumes of the UfL were studied: 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995, 2000, 2005 and 2010. Original articles, case-reports and reviews were included in the study. For each article, category and number of authors were recorded. Data were analysed descriptively. Values are given as medians (ranges), if not stated otherwise. The Friedman variance test and the χ^2 test were used as appropriate. A p value below 0.05 was considered statistically significant.

Trial registration: not relevant.

RESULTS

A total of 5,962 articles were analysed. Overall, the median number of authors per article (all categories) was one in 1960 (range 1-3), two in 1985 (range 1-9) and three in 2010 (range 1-14) (**Table 1**) ($p < 0.001$).

The proportion of articles (all categories) published by three or more authors constituted 1% in 1960 and 68% in 2010 ($p < 0.0005$). Overall, single-authored articles constituted 64% in 1960, but only 7% in 2010 ($p < 0.0005$).

ORIGINAL ARTICLE

Surgical Gastroenterology,
Herlev Hospital

Dan Med J
2012;59(3):A4390



TABLE 1

Characteristics of articles.

Year	Number of published articles	Number of authors per article, median (range)			
		all categories	original article	review	case report
2010	321	3 (1-14)	3 (1-9)	3 (1-14)	3 (1-6)
2005	315	3 (1-9)	3 (1-9)	2 (1-8)	2 (1-6)
2000	386	3 (1-17)	4 (1-17)	2 (1-11)	2 (1-6)
1995	407	3 (1-14)	3 (1-14)	2 (1-8)	2 (1-9)
1990	585	3 (1-25)	3 (1-25)	2 (1-23)	2 (1-5)
1985	568	2 (1-9)	3 (1-9)	2 (1-5)	2 (1-5)
1980	389	2 (1-14)	2 (1-14)	2 (1-8)	2 (1-5)
1975	208	2 (1-7)	2 (1-7)	1 (1-5)	2 (1-5)
1970	118	1 (1-4)	2 (1-4)	1 (1-3)	1 (1-4)
1965	103	1 (1-11)	1 (1-11)	1 (1-1)	1 (1-3)
1960	86	1 (1-3)	2 (1-3)	1 (1-2)	1 (1-2)

For original articles, the median number of authors per article was two in 1960 (range 1-3), three in 1985 (range 1-9) and three in 2010 (range 1-9) (Table 1) ($p < 0.001$). The proportion of single-authored original articles was 47% in 1960 and 3% in 2010 (Figure 1) ($p < 0.0005$). The proportion of original articles published by three or more authors constituted 3% in 1960 and 80% in 2010 ($p < 0.0005$). The maximum number of authors was 25 (article published in 1990).

For reviews, the median number of authors per article was one in 1960 (range 1-2), two in 1985 (range 1-5) and three in 2010 (range 1-14) (Table 1) ($p < 0.001$). The proportion of single-authored reviews was 67% in 1960 and 13% in 2010 (Figure 1) ($p = 0.01$). The proportion of systematic reviews published by three or more authors constituted 0% in 1960 and 62% in 2010 ($p = 0.03$). The maximum number of authors was 23 (article published in 1990).

For case reports, the median number of authors per article was one in 1960 (range 1-2), two in 1985 (range 1-5) and three in 2010 (range 1-6) (Table 1) ($p < 0.001$). The proportion of single-authored case reports was 74% in 1960 and 10% in 2010 (Figure 1) ($p < 0.0005$). The proportion of case reports published by three or more authors constituted 0% in 1960 and 56% in 2010 ($p < 0.0005$). The maximum number of authors was nine (article published in 1995).

DISCUSSION

From 1960 to 2010, the number of authors per article rose for all types of articles published in the UfL. While single-authored articles have become a rare occurrence,

the proportion of articles with three or more authors has grown substantially.

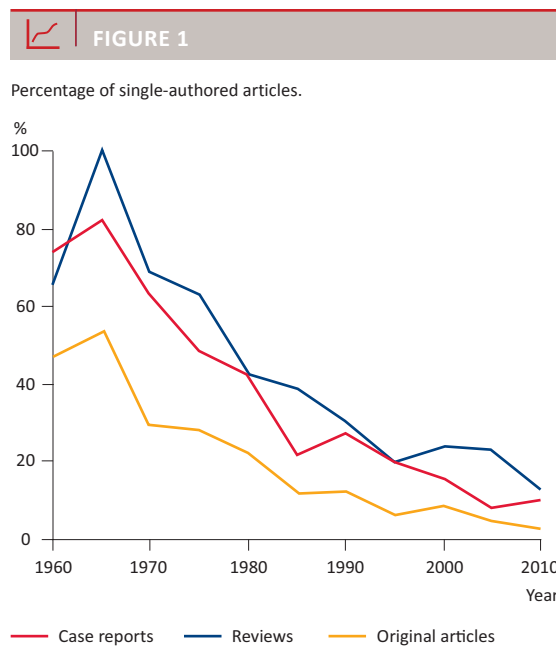
The increase in multiple authorship has been demonstrated before in English-language journals. In biomedicine, the number of articles with more than 100 authors is increasing [6]. For instance, one article published in the *New England Journal of Medicine* listed 972 authors [7]. The increasing trend can also be demonstrated in other fields and disciplines such as engineering, social sciences, economics, arts and humanities [2, 8]. In high-energy physics, it is not unusual to see hundreds of authors listed in the same byline; thus, an article published in 2008 had 2,926 authors from 169 different institutions [9].

The fact that the byline is sometimes as long as the article itself seems to cause more debate in biomedicine than in other fields of research. Multiple authorship is problematized to a larger extent, and discussions about (multiple) authorship tend to focus on illegitimate gift authors (guest authors or honorary authors) who do not meet the authorship criteria, but are listed on the article anyway [2, 10-12].

A discussion about authorship, legitimate or not, presupposes a definition or at least a mutual understanding of the concept of biomedical authorship. There is, however, no formal or official definition, but several "criteria" and guidelines do exist [3, 13-15]. The authorship criteria formulated by the ICMJE are probably those most often referred to when the subject of authorship is discussed, and the criteria have been implemented by numerous biomedical journals around the world [3]. In the latest edition (2010) of the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*, published by the ICMJE, it is stated that: "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; and 3) final approval of the version to be published. Authors should meet conditions 1, 2, and 3" [1].

Originally, one might have hoped that such criteria would discourage the increase in the number of authors listed on biomedical articles, thereby reducing illegitimate gift authorship. In this present study, several case reports had nine authors and one review had 23 authors. In such cases, it seems unlikely that every listed author made substantial intellectual contributions to the work and met all authorship criteria.

However, a long byline should not automatically make one conclude that the scientific value and integrity of that particular work is compromised. Increases in the number of authors could be fully legitimate, at least for certain article categories. Conducting research is getting increasingly complex, often requiring contributors from



many different disciplines, fields, institutions and nations. Initial procedures such as obtaining necessary permissions and getting funded are much more laborious than previously. Additionally, there are more medical scientists and relatively less time for each scientist to conduct research; administrative tasks and pressure to increase production (e.g. to treat more patients) means that relatively less time can be spent on research [16].

In other words, a division of responsibilities is necessary: it is no longer possible to plan, perform and publish original research independently.

In research groups, especially the very large ones, it may sometimes be difficult for all authors to meet all authorship criteria. The usefulness of the current authorship criteria has therefore been questioned and various alternative measures have been tried in order to solve the "authorship problem". Making authors sign statements has not proved to be effective in terms of reducing byline lengths. Restricting the acceptable number of authors per article and requiring justification if the number of listed authors exceeds the allowed maximum has only resulted in many more articles being group-authored or having exactly the maximum number of authors [11, 12].

Several biomedical journals have found it useful to ask each author to state his/her specific contribution(s), thus making it clear to both readers and editors who actually did what [17]. Such a descriptive system takes into account that study design, collection, analysis and interpretation of data and, finally, manuscript writing can be completely separated processes. Moreover, contributors who do not fulfil the ICMJE authorship criteria can be credited [18]. For a long time, it has been common practice to state contributions of those identified in the acknowledgement section; requiring the same kind of information from authors would seem reasonable. In theory, replacing or supplementing authorship criteria with contribution statements provides transparency and accountability. Today, some journals encourage or require that authors sign contribution statements. However, as long as authorship is pivotal for scientists' academic careers and funding, supplemental contribution statements will probably be inadequate in terms of eliminating illegitimate authorship [18-20].

For a system of contributorship (instead of authorship) to function as intended, several important issues need to be addressed. First of all, it should be clear how contributions are used for credit assessment. Journals and indexing services need to agree on how contributions are recognised, published and cited. The same applies to professional societies, academic institutions and funding agencies. Besides clarity about credit assessment, the question of overall responsibility should also be unambiguous. It is debatable whether it is possible for

one person to "organise, oversee and double check all parts of the completed manuscript" [18], especially when it comes to cross-disciplinary or multicentre studies. Yet, it is important that at least one "guarantor" is able and willing to take ultimate responsibility for the work as a whole, not least because of increased awareness of the possible legal implications of scientific findings.

CONCLUSION

In conclusion, the number of authors per article published in the UfL has risen over the past 50 years, thus following the same trend as larger, international English-language journals. This increase may be acceptable, given the fact that biomedical research has become a collaborative effort rather than the work of a single person. On the other hand, the increasing trend may also reflect that illegitimate authorship is increasing. Requiring contribution statements for all those listed in the byline is one way to promote accountability and transparency. Yet, replacing the concept of authorship with contributorship will raise questions and cause problems that need to be addressed.

CORRESPONDENCE: *Siri Vinther*, Kirurgisk Gastroenterologisk Afdeling D, Herlev Hospital, 2730 Herlev, Denmark. E-mail: sirivinther@hotmail.com

ACCEPTED: 3 January 2012

CONFLICTS OF INTEREST: Disclosure forms provided by the authors are available with the full text of this article at danmedj.dk

LITERATURE

1. ICMJE. Uniform requirements for manuscripts submitted to biomedical journals. www.icmje.org/ethical_1author (21 Oct 2011).
2. Baethge C. Publish together or perish. *Dtsch Arztebl Int* 2008;105:380-3.
3. Wager E. Recognition, reward and responsibility: Why the authorship of scientific papers matters. *Maturitas* 2009;62:109-12.
4. Weeks WB, Wallace AE, Kimberly BCS. Changes in authorship patterns in prestigious US medical journals. *Soc Sci Med* 2004;59:1949-54.
5. Levisky ME, Rosin A, Coon TP et al. A descriptive analysis of authorship within medical journals, 1995-2005. *South Med J* 2007;100:371-5.
6. Regalado A. Scientific publishing – multi-author papers on the rise. *Science* 1995;268:25.
7. Gusto I. An international randomized trial comparing four thrombolytic strategies for acute myocardial infarction. *N Engl J Med* 1993;329:673-82.
8. Wuchty S, Jones BF, Uzzi B. The increasing dominance of teams in production of knowledge. *Science* 2007;316:1036-9.
9. Aad G, Abat E, Abdallah J et al. The ATLAS Experiment at the CERN Large Hadron Collider. *J Instrum* 2008;3:S08003
10. Cronin B. Hyperauthorship: A postmodern perversion or evidence of a structural shift in scholarly communication practices? *J Am Soc Inf Sci Technol* 2001;52:558-69.
11. Claxton LD. Scientific authorship Part 1. A window into scientific fraud? *Mutat Res* 2005;589:17-30.
12. Claxton LD. Scientific authorship Part 2. History, recurring issues, practices, and guidelines. *Mutat Res* 2005;589:31-45.
13. Committee On Publication Ethics. Guidelines. www.publicationethics.org/resources/guidelines (21 Oct 2011).
14. Council of Science Editors. CSE's White Paper on Promoting Integrity in Scientific Journal Publications. www.councilscienceeditors.org/i4a/pages/index.cfm?pageid=3313 (21 Oct 2011).
15. European Medical Writers Association. European Medical Writers Association (EMWA) guidelines on the role of medical writers in developing peer-reviewed publications. www.emwa.org/Mum/EMWAguidelines.pdf (21 Oct 2011).
16. National Committee of Health Research. Clinical research in Denmark – time for action. www.biopeople.dk/fileadmin/filer/Per/report_2009_clinical.pdf (21 Oct 2011).
17. Rennie D, Flanagan A, Yank V. The contributions of authors. *JAMA* 2000;284:89-91.
18. Rennie D, Yank V, Emanuel L. When authorship fails – a proposal to make contributors accountable. *JAMA* 1997;278:579-85.
19. Bates T, Anic A, Marusic M et al. Authorship criteria and disclosure of

- contributions – comparison of 3 general medical journals with different author contribution forms. *JAMA* 2004;292:86-8.
20. Ivanis A, Hren D, Sambunjak D et al. Quantification of authors' contributions and eligibility for authorship: Randomized study in a general medical journal. *J Gen Intern Med* 2008;23:1303-10.