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Authorship Inflation in Medical Publications

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Abstract

The number of authors per manuscript in peer-reviewed medical journals has increased substantially in the last several decades. Several reasons have been offered to explain this authorship growth, including increased researcher collaboration, honorary authorship driven by increased pressures for funding and promotion, the belief that including senior authors will facilitate publication, and the growing complexity of medical research. It is unknown, however, whether authorship has grown over time due to growing complexity of published academic articles, in which case growth could be warranted, or whether it has grown due to pressures of funding and academic promotion, which have created "authorship inflation." To answer this question, we analyzed data on authorship count, study type, and size of study population for the first 50 original articles published in each decade during 1960-2010 in 3 major medical journals. Within each type of study we considered (eg, randomized trials, observational studies, etc), average authorship rose more than 3-fold during this period. Similar growth persisted after adjustment for changes in study population sizes over time. Our findings suggest that increasing research complexity is an inadequate explanation for authorship growth. Instead, growth in authorship appears inflationary.

Keywords

authorship criteria

Introduction

The number of collaborators credited as study authors in peer-reviewed medical journals has increased substantially over time. As early as 1969, Diamond lamented an "explosion" in multi-authored original articles published in the *New England Journal of Medicine* between 1928 and 1968,[1] during which time single-author publications went from comprising the majority of original articles (78.4%) in 1928 to just a fraction (3.1%) in 1968. In the ensuing decades, several others have noted substantial growth in the number of study authors in medical publications.[2-4] Between 1980 and 2000, for example, the average number of authors per article published in 4 leading medical journals increased 53% (4.5-6.9).[3]

A number of factors have been offered to explain authorship growth, including increased researcher collaboration, honorary authorship (driven by increased pressures for funding and promotion), the belief that including senior authors will facilitate publication, and the growing complexity of medical research.[5-9] For example, in a prior survey of academic radiologists, the most common reason for authors to accept honorary authorship was to hasten promotion, and first authors reported giving honorary authorship to others out of obligation or for repayment.[10] Consistent with these data is survey evidence that the offering of honorary authorship is greatest in those with lower academic rank.[11] Not surprisingly, based on these concerns, the rise in credited authors has led to efforts by the International Committee of Medical Journal Editors (ICMJE) and journal editors to redefine and clarify requirements for authorship.[6,12]

Growth in authorship counts over time may, however, also be a by-product of growing research complexity. Clinical trials have become larger and more complex, often involving multi-investigator/institutional collaborations. Observational studies too have become larger and more rigorous, requiring greater computational effort and analytic expertise. It is unknown, however, whether changes in research complexity, in particular shifts from observational studies toward clinical trials as well as increased complexity within study designs, can explain long-term increases in authorship numbers. Put differently, has authorship grown over time due to growing complexity of published academic articles, in which case growth would be warranted, or has it grown due to pressures of funding and academic promotion, which have created "authorship inflation?"

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Table 1. Characteristics of Study Types According to Year of Publishing.

	Year					
Study type (n, % of total in year)	1960	1970	1980	1990	2000	2010
Single-center RCT	2 (1.3)	9 (6.0)	11 (7.3)	15 (10.0)	21 (14.0)	12 (8.0)
Multi-center RCT	3 (2.0)	2 (1.3)	2 (1.3)	7 (4.7)	22 (14.7)	37 (24.7)
Observational study	145 (96.7)	137 (91.3)	132 (88.0)	119 (79.3)	96 (64.0)	80 (53.3)
Decision analysis/cost-effectiveness	0 (0)	0 (0)	2 (1.3)	7 (4.7)	8 (5.3)	5 (3.3)
Meta-analysis	0 (0)	2 (1.3)	3 (2)	2 (1.3)	3 (2.0)	16 (10.7)
Total	150	150	150	150	150	150

Note. RCT = randomized controlled trial.

Methods

We assembled data on authorship count, study type, and size of study population for the first 50 original articles published in each decade during 1960-2010 in the *Journal of the American Medical Association*, the *New England Journal of Medicine*, and the *British Medical Journal*. Studies were categorized as observational, single-center randomized controlled trial (RCT), multi-center RCT, meta-analysis, or cost-effectiveness/decision analysis. Studies with a group authorship name in the author byline were excluded. We computed the mean number of authors per article in each year. We accounted for changes over time in overall research complexity in two ways. First, we analyzed authorship growth *within* each study type. For example, demonstrating growth in authorship count within each study type could suggest a diffuse inflationary process such as growing pressure to publish and include honorary authors, or alternatively, it could suggest growing complexity within study types (eg, observational studies, meta-analyses, or cost-effectiveness analyses could simply be growing more complicated over time). To account for this second possibility, we used size of the study population (eg, the number of patients in a study) as a proxy for the complexity of research design for a given publication. We estimated publication-level linear regression models of authorship number as a function of publication year and study population size. We then reported trends in average authorship counts within each study type, adjusting for growing study population sizes over time.

Results

Study type changed dramatically over the period we examined; observational studies accounted for 96.7% (145/150) of studies in 1960, but only 53.3% (80/150) in 2010. By 2010, multi-center and single-center RCTs accounted for 8.0% and 24.7% of all studies, respectively (see Table 1). Within *each* study type, average authorship rose more than 3-fold and trends were unaffected by adjustment for changes in study population sizes (see Table 2). The increase was greatest in observational studies; for example, from 1960 to 2010, average authorship in observational studies increased from 2.6 to 10.1 authors per study (unadjusted absolute increase 7.5, $P < .001$; adjusted absolute increase 7.4, $P < .001$). Restricted to a more recent time range from 1990 to 2010, increases in average authorship continued to be observed in multi-center RCTs, observational studies, and decision analysis/cost-effectiveness studies ($P < .01$ for average authorship in 2010 vs 1990, in each study type).

Discussion

Our findings suggest that credited authorship has grown significantly and likely reflects inflationary growth rather than growth warranted due to increasing research complexity. Within study types and adjusting for size of the study population in each publication, the average number of authors per publication in high-impact medical journals increased dramatically in the last 5 decades. For multi-center clinical trials in particular, it could be argued that participating physicians may only be able to enroll a few patients and thus larger modern trials may require more authors. Two things should be noted, however. First, our results do not validate this hypothesis, as authorship has grown even after adjustment for rising sizes of study populations. Second, and most importantly, simply recruiting patients to a trial does not constitute appropriate criteria for authorship, and is not recognized as criteria for authorship by the ICMJE.[13]

Although it is possible that adjusting for the size of the study population may not fully capture the growing complexity of randomized trials or observational studies, within studies of cost-effectiveness/decision analysis, the average number of authors also increased considerably, from 3.7 in 1990 and 9.6 in 2010. Put together, these findings raise the question of whether increasing research complexity and the shift toward clinical trials can substantively explain authorship inflation. Furthermore, one might contend that, if anything, the increasing importance and power of computerized data analysis would decrease the need for multiple authors in observational studies and cost-effectiveness/decision analyses. Instead, our results suggest precisely the opposite trend in medicine. Our findings therefore support the view that

Table 2. Trends in Authorship According to Study Design.

Study type	Mean no. of authors per article by year and change compared with the baseline year					
	1960	1970	1980	1990	2000	2010
Single-center RCT	3.5	3.3	4.8	11.3	7.0	9.3
Unadjusted difference compared with 1960 (*P* value)		−0.2 (.95)	1.3 (.63)	7.8 (.05)	3.5 (.18)	5.8 (.04)
Adjusted difference compared with 1960 (*P* value)		−0.1 (.96)	1.3 (.63)	5.0 (.05)	3.6 (.18)	5.8 (.03)
Multi-center RCT	5.3	4.5	6.0	8.3	9.1	14.0
Unadjusted difference compared with 1960 (*P* value)		−0.8 (.88)	0.7 (.54)	3.0 (.43)	3.8 (.32)	8.7 (.02)
Adjusted difference compared with 1960 (*P* value)		−0.6 (.92)	0.6 (.52)	2.7 (.59)	3.5 (.39)	8.4 (.03)
Observational study	2.6	3.3	3.9	5.6	7.1	10.1
Unadjusted difference compared with 1960 (*P* value)		0.7 (.17)	1.3 (.01)	3.0 (<.001)	4.5 (<.001)	7.5 (<.001)
Adjusted difference compared with 1960 (*P* value)		0.6 (.14)	1.2 (.01)	2.9 (<.001)	4.4 (<.001)	7.4 (<.001)
Decision analysis/cost-effectiveness	NA	NA	2.5	3.7	4.6	9.6
Unadjusted difference compared with 1980 (*P* value)				1.2 (.68)	2.1 (.48)	7.1 (.03)
Adjusted difference compared with 1980 (*P* value)				1.5 (.61)	2.4 (.43)	8.5 (.02)
Meta-analysis	NA	6.0	1.7	4.0	4.0	5.9
Unadjusted difference compared with 1970 (*P* value)			−4.3 (.17)	−2.0 (.55)	−2.0 (.55)	−0.1 (.96)
Adjusted difference compared with 1970 (*P* value)			−4.3 (.15)	−2.0 (.54)	−2.0 (.54)	−0.2 (.93)

Note. The table reports average unadjusted number of authors per article published in each decade from 1960 to 2010, by study type. It also reports unadjusted difference in the average number of authors per article between the baseline year (1960 in most instances) and subsequent years, as well as adjusted differences estimated from publication-level multivariate linear regression of the number of authors as a function of year indicator variables and sample size of each publication. NA implies no articles of a given study type existed in our sample in that year. RCT = randomized controlled trial.

authorship growth may be inflationary, a result of increased pressures for funding and promotion, as well as the perception that the inclusion of additional senior authors may hasten publication.[5-9]

There are limitations to our analysis. Most importantly, we cannot definitively conclude that the average contribution of authors to manuscripts has declined over time, as other confounding factors may have changed. For example, our approach may not fully account for other sources of increasing research complexity such as new analytic techniques (laboratory or statistical) or the growing need to recruit patients from multiple study sites. Our results may also underestimate authorship inflation in other journals with less stringent authorship requirements than the journals we considered. A small degree of authorship inflation may also simply reflect the desire of established researchers to involve students and trainees in small components of research, with the goal of promoting interest in research. This explanation, although still perhaps inconsistent with recognized authorship criteria, has different implications than authorship inflation for the sole purpose of promotion or obtaining funding.

In summary, the average number of authors per publication in leading medical journals has grown dramatically in the last five decades. Increasing effort required to analyze and publish research is unlikely to be an adequate explanation. Instead, authorship "inflation" due to increasing academic pressure to publish, combined with a relative paucity of incentives to authors to reduce multiple-authorship, appears more consistent with the observed data. Authorship inflation has continued despite efforts of the ICMJE and journal editors to curb inappropriate authorship. Given the importance of authorship accountability, continued efforts should be made to address this issue.

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