

## Authorship and Characteristics of Articles in Pharmacy Journals: Changes Over a 20-Year Interval

Bryan Dotson, Kevin P McManus, Jing J Zhao, and Peter Whittaker

Studies designed to evaluate authorship patterns in medical journals have demonstrated an increase in the number of authors per article and in the proportion of articles with multiple authors.<sup>1-3</sup> Although there has been no definitive explanation for the increase, there are several theories: for example, increased pressure to publish in academia, along with increased complexity of research and hence a need for increased collaboration among researchers. A positive factor associated with the proliferation of authorship and scientific collaboration is the potential to produce a superior product with a greater impact.<sup>4</sup> However, concerns have been raised about authorship proliferation. The trend of an increasing number of authors per article could dilute the inherent value of authorship.<sup>5</sup> In addition, studies have found that a substantial proportion of articles include individuals as authors who did not adequately contribute to the work.<sup>6-8</sup> Although studies have examined authorship within medical journals, we are not aware of any studies evaluating changes in authorship patterns in pharmacy journals.

To evaluate temporal trends in authorship and characteristics of articles in pharmacy journals, we compared 3 years of published articles spaced 10 years apart from 3 pharmacy journals. Our prima-

**BACKGROUND:** To our knowledge, no studies have evaluated authorship patterns and characteristics of articles in pharmacy journals.

**OBJECTIVE:** To investigate changes over a 20-year period in authorship and characteristics of articles in pharmacy journals.

**METHODS:** All articles published in the *American Journal of Health-System Pharmacy*, *The Annals of Pharmacotherapy*, and *Pharmacotherapy* in 1989, 1999, and 2009 were reviewed. Data collected for each article included article type, number of authors, number of physician authors, whether any author was affiliated with a pharmaceutical company, and source of funding.

**RESULTS:** The number of articles included was 574 in 1989, 659 in 1999, and 589 in 2009. The mean number of authors per article increased from 2.5 in 1989 to 2.8 in 1999 and 3.6 in 2009 ( $p < 0.001$ ). Conversely, the proportion of articles with a single author decreased from 35% in 1989 to 23% in 1999 and 11% in 2009 ( $p < 0.001$ ), while the proportion of multi-authored articles (>6 authors) increased from 2% in 1989 to 3% in 1999 and 9% in 2009 ( $p < 0.001$ ). A physician author was listed on 25% of papers in 1989, which increased to 38% in 1999 and 41% in 2009 ( $p < 0.001$ ). Among research articles with declared funding from industry, there was an increase over time in reported author affiliation with an industry sponsor (10% of articles in 1989, 17% in 1999, and 66% in 2009;  $p < 0.001$ ).

**CONCLUSIONS:** Significant changes in authorship patterns and characteristics of articles were observed from 1989 to 2009. We found an increase in the number of authors per article over time, with fewer single-author papers now published. The explanations for the changes are likely multifactorial, including increased pressure to publish, increased research complexity, and inappropriate authorship. To prevent inappropriate author-number inflation and to preserve authorship's meaning and value, authors should adhere to the criteria for authorship from the International Committee of Medical Journal Editors.

**KEY WORDS:** authorship, journal, pharmacy, publishing, research.

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ry objective was to determine whether the number of authors per article and the proportion of articles with multiple authors increased. Our secondary goals were to evaluate changes in the types of articles and other characteristics of articles published in pharmacy journals.

Author information provided at end of text.

## Methods

### JOURNAL AND ARTICLE SELECTION

Three pharmacists each reviewed all articles published in 1 pharmacy journal for the years 1989, 1999, and 2009. The journals evaluated were the *American Journal of Health-System Pharmacy* (AJHP; *American Journal of Hospital Pharmacy* in 1989), *The Annals of Pharmacotherapy* (*The Annals*; *Drug Intelligence and Clinical Pharmacy* in 1989), and *Pharmacotherapy*. We chose to include these journals because they are high-impact pharmacy journals that are clinically oriented. Journal articles were accessed electronically from the Wayne State University/Detroit Medical Center library Web site for 1999 and 2009. Hard copies of the journals were evaluated for articles published in 1989 because full text was not available online for that year. The study did not involve human subjects and so did not require institutional review board approval.

Articles included in the analysis were original research articles, review articles, editorials, meta-analyses, case reports, and letters to the editor. All other types of articles (eg, guidelines, position statements) were excluded either because they were not published frequently or tended to have a large number of authors and could have biased the data if not distributed evenly among the years.

### DATA COLLECTION

Data were abstracted using a standardized data collection spreadsheet. The data collected for each article included the journal in which the article was published, the publication year, number of authors, type of article (original research, review, editorial, meta-analysis, case report, or letter), number of authors who were pharmacists, number of authors who were physicians, ordinal position of the corresponding author, whether any author was affiliated with a pharmaceutical company, and the nationality of the lead author's institution (US or non-US). Additional information collected for original research articles included study type (prospective interventional, prospective observational, retrospective, survey, or other), type of study subjects (human, animal, in vitro/compatibility, or other), number of study subjects, whether the study was a multicenter trial, whether a power calculation to determine sample size was listed in the methods section, whether authorship included a study group, and the source of study funding (no funding reported, industry funding, nonprofit funding, or mixed funding). If a source of study funding was industry, we also documented whether an author was affiliated with the industry funding source.

Those of us who reviewed articles and performed the data collection (BD, KPM, JJZ) were familiar with research classification and followed the list of definitions below that was created prior to data collection. We held periodic meetings to

facilitate the classification of articles that were difficult to categorize. In addition, verification of the accuracy of data collection for 30 randomly selected articles from each journal in each year was performed by one of us (BSD).

### DEFINITIONS

Authorship was defined as any contribution that resulted in a name placement on the byline of the article. Authors who were pharmacists were identified by a degree designation of PharmD, BS(Pharm), BPharm, or RPh. Authors who were physicians were identified by a degree designation of MD, DO, MBBS, BMBS, or MBChB. Pharmacy students were counted as pharmacists and medical students were counted as physicians. Individuals with a medical degree and a PhD degree were counted as physicians.

Definitions for types of articles were based on standard accepted definitions and were similar to those used by Singer et al.<sup>9</sup> An editorial was defined as a commentary by the journal editor, editorial board member, or an invited author. A review article was defined as an article that summarized the results of other published studies. An article was considered to be a meta-analysis if it analyzed a set of previously reported studies. A letter was defined as a letter in reference to a prior publication or an author reply to a letter in reference to a prior publication. Research reports and case reports published in a journal's letters section were also counted as letters. An original research article was defined as an article containing original data with a defined study objective. A case report was defined as an article in which the primary focus was 1 or more individual.

A prospective study was defined as a study in which data were collected at the time of occurrence, and a retrospective study was a study in which data were collected from past records. Studies were considered to be interventional if they focused on the outcome of a deliberate intervention under the control of the investigators and were considered to be observational if the assignment of subjects into a treated group or a control group was outside the control of the investigator. A multicenter study was a study conducted at more than 1 site. A power calculation was defined as a calculation performed to estimate the number of patients needed to demonstrate a statistically significant difference between groups. Group authorship identified individual authors in the byline who were writing for a group.

Funding for original research studies was classified in a manner similar to previous reports either as no funding reported, industry funding, nonprofit funding, or mixed funding.<sup>10,11</sup> Mixed funding was defined as a combination of industry and nonprofit funding. If the sponsor of the study was an industry or a mixed source, and the identity of the sponsoring pharmaceutical company matched the affiliation of 1 or more authors, an author was considered to be affiliated with an industry-funding source.<sup>11</sup>

**STATISTICAL ANALYSIS**

Continuous variables are reported as mean (SD) or median with an interquartile range (25th-75th percentiles) and comparisons made with a 1-way analysis of variance (ANOVA) or a Kruskal-Wallis ANOVA. Categorical variables are expressed as a percentage and differences between groups were evaluated with a  $\chi^2$  test (or Fisher exact test where appropriate). A Bonferroni correction was used for multiple comparisons. Statistical significance was defined as a p value of <0.05. Statistical calculations were performed using Prism 5.0 (GraphPad Software Inc., San Diego, CA).

**Results**

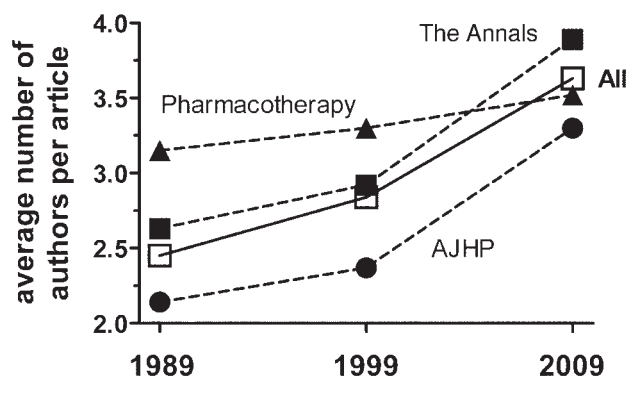
After the exclusion criteria had been applied, the number of articles from the 3 journals included in the analysis was 574 (1989), 659 (1999), and 589 (2009). An independent validation of the accuracy of data collection for 30 randomly selected articles from each journal in each year revealed no discrepancies.

The average number of authors per article increased in all journals (Figure 1). For the 3 journals combined, the mean (SD) number of authors per article in 1989 was 2.5 (1.5), 2.8 (1.7) in 1999, and 3.6 (2.1) in 2009 ( $p < 0.001$ ). Both *AJHP* and *The Annals* had a statistically significant increase in the number of authors per article ( $p < 0.001$  for both comparisons; Figure 1). The average number of authors per article increased over time in *Pharmacotherapy*, but this difference was not statistically significant ( $p = 0.45$ ).

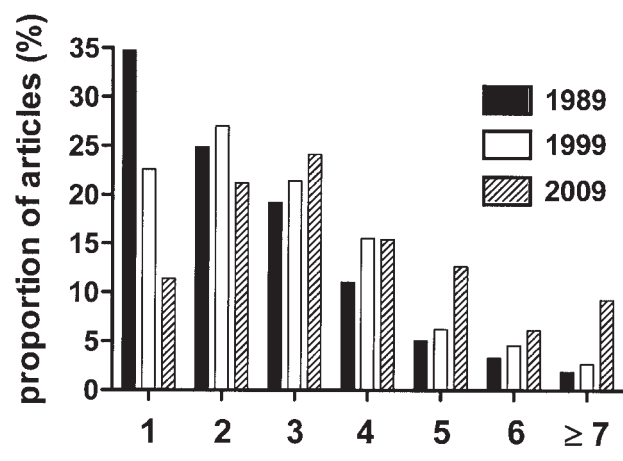
For all journals combined, the proportion of articles with a single author decreased from 35% in 1989 to 23% in 1999

and to 11% in 2009 ( $p < 0.001$ ; Figure 2). In addition, the proportion of articles with multiple authors increased (Figure 2). This increase was primarily driven by an increase in articles with 5 authors and those with  $\geq 7$  authors. The proportion of articles with >6 authors increased from 2% in 1989 to 3% in 1999 and to 9% in 2009 ( $p < 0.001$ ). The mode for the number of authors per article also increased from 1 in 1989 to 2 in 1999 and 3 in 2009 (Figure 2).

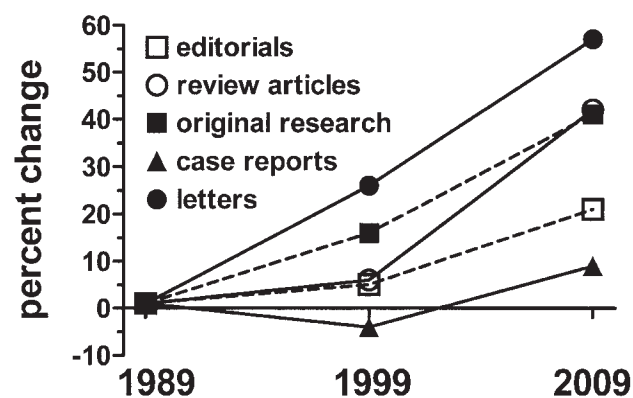
Figure 3 shows the percent change in number of authors per article for specific article types. A statistically significant increase in the number of authors per article was observed for original research (3.4 [1.6] in 1989, 4.0 [1.9] in 1999, and 4.8 [2.1] in 2009;  $p < 0.001$ ), reviews (2.0 [1.0] in 1989, 2.1 [0.9] in 1999, and 2.8 [1.4] in 2009;  $p < 0.001$ ), letters (1.8 [1.1] in 1989, 2.3 [1.4] in 1999, and 2.9 [1.6] in 2009;  $p < 0.001$ ), and editorials (1.1 [0.3] in 1989, 1.1 [0.3] in 1999, and 1.3 [0.5] in 2009;  $p = 0.048$ ). The average number of authors per article for case reports was higher in 2009 (3.6) than in 1989 (3.3), but this difference



**Figure 1.** Average number of authors per article, by journal and year. For all 3 journals combined (unshaded squares, solid line), there was a significant increase in author number for each time period ( $p < 0.001$ ). For the individual journals (shaded symbols, dashed lines), the values for 2009 for both the *American Journal of Health-System Pharmacy* (AJHP) and *The Annals of Pharmacotherapy* (The Annals) differed significantly from the other 2 periods ( $p < 0.001$ ), while there was no significant difference between the values for 1989 and 1999. There was no statistically significant difference between any period for *Pharmacotherapy*.



**Figure 2.** Proportion of articles in each year by number of authors.



**Figure 3.** The relative percent change in number of authors per article for different article types. Values are expressed relative to the number of authors in 1989. There was a significant increase in author number in 2009 versus 1989 for all article types except case reports.

was not statistically significant ( $p = 0.14$ ). Meta-analyses were published infrequently, with 1 published in 1989 and in 1999, and 8 published in 2009. Therefore, statistical analysis was not performed.

The classification and other characteristics of articles for each year are presented in Table 1. Results from individual journals are not shown, since they followed the same trend as the combined data from all 3 journals. There was an increase in the number of review articles and case reports published in 2009 compared with 1989, along with a decrease in the number of letters (Table 1). The first author was the corresponding author for the majority of manuscripts and did not change over time (69% in 1989, 70% in 1999, and 72% in 2009;  $p = 0.52$ ). Pharmacist authorship was not significantly different between the 3 years, and approximately 15% of all articles did not include a pharmacist author (Table 1). The percentage of articles that included a physician author significantly increased (Table 1). Articles with a physician first author increased from 7% of articles in 1989 to 14% in 1999 and 2009 ( $p < 0.001$ ). The proportion of articles with a physician corresponding author increased from 5% in 1989 to 13% in 1999, and to 14% in 2009 ( $p < 0.001$ ). In addition, the proportion of articles with a first author from a non-US institution significantly increased (Table 1).

Table 2 lists the characteristics of original research articles by publication year. In vitro and compatibility studies were published less frequently, while the number of studies with human subjects and number of retrospective studies increased. Studies with animal subjects were rare, occurring in 1 article in 1989, 3 in 1999, and 2 in 2009. The number of studies that listed study groups was also uncommon, occurring in 1 article in 1989, 4 in 1999, and 2 in 2009. In addition, the percentage of research articles that were multicenter studies, the number of subjects per article, and the percentage of articles that included a power calculation increased (Table 2).

**Table 1. Classification and Authorship Characteristics of Articles by Publication Year**

Characteristics, n (%)	1989	1999	2009	p Value
Articles	574	659	589	
Original research	189 (33)	201 (31)	218 (37)	<0.05
Reviews	87 (15)	170 (26)	170 (29)	<0.001
Case reports	46 (8)	114 (17)	93 (16)	<0.001
Letters	220 (38)	139 (21)	72 (12)	<0.001
Editorials	31 (5)	34 (5)	28 (5)	0.88
Pharmacist author	494 (86)	560 (85)	493 (84)	0.53
Physician author	143 (25)	250 (38)	242 (41)	<0.001
First author from non-US institution	53 (9)	103 (16)	121 (21)	<0.01
Author with industry affiliation	37 (6)	44 (7)	48 (8)	0.46

Approximately a third to a half of the published research articles reported that funding was obtained (Table 2). The percentage of research articles that reported a nonprofit funding source significantly increased, and pharmaceutical industry funding was more common in 1999 than in 1989 and 2009. Furthermore, reported author affiliation with an industry funding source dramatically increased (Table 2).

## Discussion

We found significant changes in authorship patterns and characteristics of articles in pharmacy journals. There was an increase in the number of authors per article and multiple authorship of articles, with fewer single-author articles published. The increase in author number was observed in most article types (eg, original research, reviews, letters, editorials).

Our findings are similar to results from studies of authorship in medical journals.<sup>1-3</sup> In our study, the percent increase in number of authors per article from 1989 to 2009 was 44%. Weeks et al. evaluated authorship patterns in prestigious medical journals and found a 53% increase in number of authors per article from 1980 to 2000.<sup>1</sup> Another study of publications in medical journals reported a 23% increase in author number from 1995 to 2005.<sup>2</sup>

There are several possible explanations for the increasing number of authors per article. The first is that there is

**Table 2. Characteristics of Original Research Articles by Publication Year**

Characteristics, n (%)	1989	1999	2009	p Value
Research articles	189	201	218	
Human subjects	127 (67)	158 (79)	181 (83)	<0.001
In vitro/compatibility	40 (21)	28 (14)	15 (7)	<0.001
Prospective interventional	20 (11)	30 (15)	28 (13)	0.44
Prospective observational	29 (15)	32 (16)	27 (12)	0.54
Retrospective	52 (28)	71 (35)	98 (45)	0.001
Survey	23 (12)	22 (11)	34 (16)	0.34
Multicenter	12 (6)	33 (16)	33 (15)	0.005
Subjects, median, n (interquartile range)	44 (19-164)	74 (21-300)	154 (50-1293)	<0.001 <sup>a</sup>
Power calculation	5 (3)	17 (8)	31 (14)	<0.001
Funding not declared	129 (68)	93 (46)	118 (54)	<0.001
Nonprofit funding	18 (10)	32 (16)	62 (28)	<0.001
Pharmaceutical industry funding	33 (17)	62 (31)	36 (17)	<0.001
Mixed funding	9 (5)	14 (7)	2 (1)	0.007
Author with industry sponsor affiliation <sup>b</sup>	4 (10)	13 (17)	25 (66)	<0.001

<sup>a</sup>Kruskal-Wallis analysis of variance.  
<sup>b</sup>Reflects proportion of original research articles with industry funding or mixed funding only.



an increased complexity in research and hence an increased need for collaboration among researchers and institutions. Although this may explain some of the observed increase in authors, our results suggest that other factors are responsible for the proliferation of authorship because the percent increase in author number for review articles was almost identical to that for original research. In addition, there was a significant increase in author count for both letters and editorials. Second, in recent years there has been an increase in the number of faculty members employed at colleges and schools of pharmacy.<sup>12</sup> With the emphasis on publications for promotion and retention of faculty members, academic institutions may be creating increased pressure on faculty to publish more articles. Third, honorary authorship may contribute to the increasing number of authors per article. Honorary authorship is defined as the naming of an individual as an author who does not meet authorship criteria.<sup>6</sup> In 1985, the International Committee of Medical Journal Editors (ICMJE) established authorship criteria to help curb misappropriation of authorship.<sup>13</sup> The ICMJE currently recommends that authorship credit 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.<sup>14</sup> Authors should meet all 3 conditions.<sup>14</sup> However, despite standards and procedures designed to curb inappropriate assignment of authorship, studies have found that approximately 20-30% of articles published in peer-reviewed journals include honorary authors.<sup>6-8</sup> Our study was limited in that we could not assess whether all authors fulfilled authorship criteria.

We also observed a significant increase in physician authorship over the years studied. One other study evaluated physician authorship in pharmacy literature and found that only 7% of articles published in pharmacy journals in 1966 included a physician author.<sup>15</sup> In our study, 25% of articles published in 1989, 38% of articles published in 1999, and 41% of articles published in 2009 included a physician author. It appears that physicians are now collaborating on research more often with pharmacists.

Another finding from our study is that the proportion of articles with a first author from a non-US institution significantly increased over time. Other studies have reported a decrease over time in the proportion of articles published by American authors.<sup>16-18</sup> Potential explanations for this finding include an increased emphasis on clinical care over research in the US due to economic constraints, and an increase in the quality of submissions from abroad.

The order in which authors are listed on a manuscript is important in academia. In general, the first and last authors are the key positions, with the middle authors having lesser roles. The first author usually contributed the most to the work and writing of the article, while the last author is of-

ten the senior author. The designation of an author as the corresponding author also holds prestige and is of importance. The first author was the corresponding author for the majority of papers in pharmacy journals for each of the years studied. Similar findings have also been observed in medical literature. One study of authorship in medical journals found that the first author was the corresponding author in over 60% of articles published in 1995 and 2005, and the last author was the corresponding author in only 12% of articles.<sup>2</sup>

We also observed more multicenter studies in 2009 compared with 1989, along with a larger number of study subjects per article and more studies performing power calculations. These findings may reflect an increased ease of communication and the increased availability of statistical analysis software over the last 20 years.

Another finding from our study is that acknowledgment of nonprofit funding has increased. We also found that studies with industry funding frequently include authors who have affiliations with the industry funding source, and this has increased. This may be explained by an increased awareness of ghost authorship (individuals who contribute substantially to an article but are not named as authors) in recent years, as well as an increase in disclosure of individuals from industry who contribute to published articles.<sup>19,20</sup>

There are several limitations of our study. First, we chose to review articles from 3 high-impact pharmacy journals and can not extrapolate our results to other pharmacy journals. Second, we evaluated only 3 years of published articles (1989, 1999, and 2009). Therefore, we were not able to detect peaks or troughs in authorship and characteristics of articles that may have occurred in the years between these 3. Third, interrater reliability between all reviewers for all articles published in 1989, 1999, and 2009 was not determined. However, an independent validation of the accuracy of data collection for 30 randomly selected articles from each journal in each year revealed no discrepancies. Fourth, our study did not assess research quality, primarily because we know of no objective way to do so. Although the impact factor for all 3 journals has increased, this parameter does not necessarily reflect quality. Finally, our study was subject to all forms of bias common to a retrospective review. We attempted to minimize this bias by adopting widely accepted definitions, using a standardized spreadsheet for data collection, holding meetings among data abstractors to facilitate the classification of problematic articles, and verifying the accuracy of data collection in a random subset of articles.

As mentioned, the proliferation of authorship may be viewed as positive because collaboration between researchers could result in a superior product. However, if the trend of an increasing number of authors per article continues unabated, the inherent value of authorship could

be diminished. Inappropriate assignment of authorship is also a concern, and authors should take personal responsibility to be aware of and adhere to the ICMJE criteria. This will help to prevent inappropriate proliferation of authorship in the future. Finally, additional investigation is warranted to further explore the causes for the increasing number of authors per article in the pharmacy literature.

To prevent inappropriate author-number inflation and to preserve authorship's meaning and value, authors should adhere to the criteria for authorship from the International Committee of Medical Journal Editors.

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**Conflict of interest:** Authors reported none

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## Autoría y Características de los Artículos en Revistas Farmacéuticas: Cambios en un Intervalo de 20 Años

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### EXTRACTO

**INTRODUCCIÓN:** No existen estudios que evalúen las pautas de autoría y las características de los artículos publicados en revistas farmacéuticas.

**OBJETIVO:** Investigar los cambios producidos a lo largo del tiempo en la autoría y las características de los artículos publicados en revistas farmacéuticas.

**MÉTODOS:** Se revisaron todos los artículos publicado en *American Journal of Health-System Pharmacy*, *Annals of Pharmacotherapy*, y *Pharmacotherapy* en 1989, 1999, y 2009. De cada artículo se recopilaron los siguientes datos: tipo de artículo, número de autores, número de autores médicos, si algún autor tenía conexión con una empresa farmacéutica y fuentes de financiación.

**RESULTADOS:** El número de artículos incluido fue 574 en 1989, 659 en 1999 y 589 en 2009. El número medio de autores por artículo aumentó de 2.5 en 1989, a 2.8 en 1999, y a 3.6 en 2009 ( $p < 0.0001$ ). A la inversa, el porcentaje de artículos con un solo autor disminuyó del 35% en 1989, al 23% en 1999 y al 11% en 2009 ( $p < 0.0003$ ), mientras que el porcentaje de artículos con multi-autoría (> 6 autores) aumentó del 2% en 1989, al 3% en 1999, y al 9% en 2009 ( $p < 0.0003$ ). En 1989 hubo un autor médico en el 25% de los artículos, aumentando al 38% en 1999 y al 41% en 2009 ( $p < 0.0001$ ). Entre los artículos de investigación que declararon recibir financiación de la industria, a lo largo del tiempo aumentó el número de autores que manifestaron tener conexión con un patrocinador de la industria (10% de los artículos en 1989, 17% en 1999, y 66% en 2009;  $p < 0.0001$ ).

**CONCLUSIONES:** Entre 1989 y 2009 se han observado cambios significativos en las pautas de autoría y características de los artículos publicados en revistas farmacéuticas. Encontramos un aumento en el

número de autores por artículo a lo largo del tiempo, con menos artículos de un solo autor publicados actualmente. También se observó un aumento del porcentaje de publicaciones con un autor médico y en los artículos de investigación con autores relacionados con patrocinadores de la industria.

Traducido por Juan del Arco

Caractéristiques et Auteurs des Articles Publiés dans des Journaux Pharmaceutiques: Changement au Cours d'une Période de 20 Ans

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#### RÉSUMÉ

**OBJECTIF:** Évaluer les changements au cours des années les auteurs et les caractéristiques des articles publiés dans les journaux de pharmacie.

**MÉTHODES:** Tous les articles publiés dans les journaux American Journal of Health-System Pharmacy, Annals of Pharmacotherapy, et Pharmacotherapy au cours des années 1989, 1999 et 2009 ont été revus. Les données collectées pour chacun des articles incluait le type de l'article, le nombre d'auteurs, le nombre de médecins comme premier auteur, si les auteurs étaient en relation avec une société pharmaceutique, et la source de financement.

**RÉSULTATS:** Le nombre d'articles inclus dans l'étude était de 574 en 1989, 659 en 1999, et de 589 en 2009. Le nombre moyen d'auteurs par article a augmenté de 2,5 en 1989, à 2,8 en 1999, à 3,6 en 2009 ( $p < 0.0001$ ). Inversement, la proportion d'articles avec un seul auteur a diminué de 35% en 1989, à 23% en 1999, à 11% en 2009 ( $p < 0.0003$ ), tandis que la proportion d'articles avec plusieurs auteurs ( $> 6$  auteurs) a augmenté de 2% en 1989, à 3% en 1999, à 9% en 2009 ( $p < 0.0003$ ). Un médecin était listé pour 25% des publications en 1989, avec une augmentation de 38% en 1999 et 41% en 2009 ( $p < 0.0001$ ). Parmi les articles de recherche avec une déclaration de financement par une société pharmaceutique, il y avait une augmentation dans le nombre d'affiliation des auteurs ayant reçu un financement de l'industrie pharmaceutique (10% des articles en 1989, 17% en 1999, et 66% en 2009;  $p < 0.0001$ ).

**CONCLUSIONS:** Des changements importants dans les caractéristiques des auteurs et des articles ont été observés entre 1989 et 2009 pour les journaux pharmaceutiques. Les auteurs ont trouvé une augmentation du nombre d'auteurs par article ainsi qu'une augmentation de la proportion d'articles avec un médecin comme premier auteur. Pour les articles en recherche, on note une augmentation d'un financement de l'industrie pharmaceutique.

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