



Original Research

Publishing Trends in Two American Journals in Anesthesiology—Results of an 80-Year Geographical Survey[☆]

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ABSTRACT

Background: We examined publication trends in two major American journals devoted to anesthesia to understand the geographical distribution of authorship and attempt to decipher the factors that influence this distribution.

Methods: In addition to bibliometric information for all articles published in *Anesthesiology* between 1941 and 2010 and *Anesthesia & Analgesia* between 1931 and 2010, we also collected information about the country, continent, and medical school or institution from which the articles were submitted.

Results: The top five countries that published research in these journals were the United States, Japan, Germany, Canada, and France. More than 50% of the published articles were submitted from the United States. However, US publications have steadily and significantly declined over the decades. Contributions from Europe and Asia (especially China) have shown marked increases. US spending on research, especially biomedical research, has remained essentially unchanged and declined in some areas, whereas it has increased steadily in some of the other countries we discuss.

Conclusions: There is a significantly increased prominence in publishing from countries other than the United States. The reasons for this include the convenience of Web-based submission, an increased desire by researchers from around the world to publish in journals considered prestigious, English becoming the preferred language of communication amongst academicians in science, the advent of globalization, and a decrease in public research funding in the United States relative to other countries.

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Introduction

Prominent journals serve as important vehicles for announcements of notable discoveries through publicizing research, interesting cases, reviews, policies, and guidelines. The publications studied in this paper are the two oldest journals devoted to anesthesia in the United States. *Anesthesia & Analgesia* (A&A) began in 1922 as the official publication of the International Anesthesia Research Society. The International Anesthesia Research Society has a worldwide membership of more than 15,000, and A&A has now become the official publication of over half a dozen subspecialty societies and interest groups within the field of anesthesiology. *Anesthesiology* began in

1940 as the official publication of the American Society of Anesthesiologists, which has a membership exceeding 48,000.

Earlier investigations from the United States and Europe have reported a gradual decline in the dominance of the United States and the United Kingdom in research productivity as estimated by publication of articles in scientific journals related to anesthesiology,^{1–7} medicine,⁸ surgery,⁹ and subspecialties of anesthesiology.¹⁰ The period covered by these investigations ranged from 2² to 21¹⁰ years, whereas the number of journals ranged from 1¹⁰ to 551.⁴ Some studies included research reports only,^{1,3–5,7,8} whereas others also included reviews, editorials, and case reports.^{2,6,9,10} Lastly, some investigators examined every issue of the journals,^{1,2,6–10} whereas others selected articles based on electronic database searches (eg, Medline)^{3–5} or only selected specific years to study (eg, every fourth or fifth year).^{6,7}

The aim of our investigation was to determine the geographic distribution of all original articles published in A&A and *Anesthesiology* through 2010 and examine factors responsible for trends. This would allow us to study publication trends over a longer period and

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focus only on two US journals dedicated to anesthesiology. During the first few decades of publication, authors were required to submit typewritten copies and carry on all communication by mail. During the late 1990s, the Internet and electronic mail allowed journals to begin accepting submissions in electronic format. Ease of submission, the need to reach a wider readership, the desire by academicians to publish in journals with greater impact, and increased use of the English language have greatly changed the geographical distribution of authors of published articles.¹¹⁻¹³ We also examined the possible effects on research of changing funding expenditures in the United States and elsewhere.

Methods

Every original article published between 1931 and 2010 in *A&A* and *Anesthesiology* was included in our study (*Anesthesiology* was founded in 1940; data were obtained starting in 1941). Case reports, editorial commentary, and communications were not included in our study. Publication date, country and continent of origin, medical school or institution from which the article originated, anesthesia subspecialty, and brief abstract summary were obtained for each article. The country, continent, and institution of origin were assigned based on the corresponding author. A total of 26,344 articles were reviewed: 16,807 articles from *A&A* and 9537 articles from *Anesthesiology*. Data were entered into simple spreadsheet programs. Simple statistics were calculated by automated functions in spreadsheet programs or determined manually. A professional statistician was consulted for analysis. All raw data were entered into a data set, and SAS software (Cary, NC) was used to obtain descriptive as well as inferential statistics. Correlation coefficients were derived between national gross domestic product (GDP) and articles published each year.

Results Total Articles and Country of Origin

Table 1 shows the combined number of articles published in *Anesthesiology* and *A&A* during 1931 to 2010, by country and decade. Between 1931 and 2000, there was a steady increase in the number of articles published in *Anesthesiology*, followed by a small decrease between 2000 and 2010. In *A&A*, there was an abrupt increase in publishing in 1970 as the journal started publishing issues monthly (as opposed to bimonthly), and there was a significant increase in the number of articles published per issue (Figure 1). Fifty-seven countries were represented in both journals, and Table 2 shows articles published by the top five countries (based on number of articles) for each journal (1931–2010). The top five countries in terms of number of articles were the same in both journals: the United States, Japan, and Germany were the top three; France was fourth and Canada fifth in *Anesthesiology*, whereas that order was reversed in *A&A*.

United States

In *A&A*, between 1931 and 1970, the percentage of articles from American authors ranged from 85% to 91%, as opposed to 40% between 1971 and 2010. The decreased contribution from the United States has been offset by significant increases in contributions from Japan, Germany, France, the Netherlands, South Korea, Australia, and China.

In *Anesthesiology*, US dominance has also decreased in recent decades. Between 1941 and 1970, US authors contributed more than 90% of articles, more than twice the current share of 42%.

Japan

In *A&A*, between 1971 and 2010, 7.3% of articles were from Japan, whereas Japan produced less than 1.3% of articles during the first four decades of *A&A*. Unlike other countries in the top five, Japan showed significant growth in representation in both journals during the 1990s. However, this trend was not sustained, and a slight decrease was seen in the number of Japanese publications in both journals between 2001 and 2010, although the decrease was less pronounced than that of the United States.

In the 1960s, 1.04% of the articles published in *Anesthesiology* came from Japan, compared to 3.18% of articles in the 1970s, representing an increase of 205%. In the 1990s, 8.98% of the articles came from Japan as compared to 4.01% of articles in the 1980s, representing an increase of 125%.

Germany

There was no significant increase in publishing in *A&A* after German reunification (October 3, 1990). German publications in *A&A* consistently ranged from 6.2% to 6.5% of published articles between 1981 and 2010. Before 1970, maximum activity was evident in the 1930s, perhaps reflecting increased research and development activity associated with war efforts. The growth in German publications in the 1970s was greater than that seen with Japan or the United States.

Unlike *A&A*, there was a significant increase in publishing in *Anesthesiology* after German reunification. During the 1980s, 2.4% of published articles were submitted from Germany, and this more than doubled to 5.4% in the 1990s. In the 2000s, Germany surpassed Japan to publish the second highest number of articles in these journals (about 7.8%). The number of articles published in *Anesthesiology* from Germany in the 2000s grew by almost 70% when compared to the previous decade. This contrasts with a lower rate of increase in France (21.8%) and decreases from the other countries in the top five countries. A similar disparity was not seen for articles published in *A&A*.

Canada

In *A&A*, the proportion of published articles from Canada consistently ranged from 3.9% to 5.3%, except during the 1960s (1.6%). Although the number of published articles from Canada in the early decades was smaller than the number from the United States (4%–5% vs 85%–90%), it was significantly larger than the contribution of other countries (approximately 0.5%–1% for other countries in the top five).

Although Canadian publication was consistent and significant in *Anesthesiology*, the growth in publications from other countries in the top five far outpaced that of Canada. Canadian publications accounted for a greater percentage (2.96%) during the first four decades of the journal compared to other countries in the top five (except the United States). Since the 2000s, the number of articles published from Canada has remained more or less constant.

France

Growth in the 1970s in *A&A* was far greater for France than for other countries in the top five. France has been a significant contributor since then, with about 5% of articles in every subsequent decade. More than 99% of French articles were published in the last four decades studied. Therefore, France made it into the top five of both journals as a result of the articles published since 1971.

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