Does Publication History Predict Future Publication Output in Orthopaedics?

Madison L. Goss 1, 3, Sarah McNutt 2, and Jesse E. Bible 1

1. Orthopaedics and Rehabilitation, Penn State Health Milton S. Hershey Medical Center, Hershey, USA. 2. Neurosurgery, Penn State Health Milton S. Hershey Medical Center, Hershey, USA.

Corresponding author: Jesse E. Bible, jesse.e.bible@gmail.com

Abstract

Background

The number of publications is widely used as a measure of academic productivity in the field of orthopaedics. How “productive” a physician is has a great influence on considerations for employment, compensation, and promotions. Predictors of potential high-output researchers would be of value to the orthopaedic department and university leadership for new faculty evaluation.

Methods

The study population included orthopaedic faculty from the top 10 orthopaedic institutions in the United States. Their names and the number of publications at each point in their training (medical school, residency, and fellowship) and early career (first five and 10 years following fellowship) along with a total number of publications in date were collected by using PubMed.

Results

Strong correlations were seen between publications during total training and publications output in the first five years following fellowship (r=0.717, P<0.0001). However, no significant correlations were found comparing publications during each stage of training and the first 10 years following fellowship. A moderate positive correlation was found when comparing publications during medical school and residency output (r=0.401, P<0.0001).

Conclusions

The data presented here may be utilized by department chairs during the evaluation of faculty and candidates to not interpret the number of publications during training and early career as a gauge of research interest and potential for future publications. Program directors may also use the only moderate correlation between publications in medical school and residency when evaluating applications as support of a more holistic review of applicants to determine research interest.

Materials And Methods

The top 10 academic institutions in the United States for orthopaedics were identified using the US News Health Report Rankings in 2018 [3]. The online directories were searched for each institution and the names of all orthopaedic surgeons were collected. Publicly available information from hospital websites and curricula vitae were used to obtain graduation years for medical school, residency, and any fellowship(s); the physician completed. PubMed was used to identify the number of peer-reviewed publications from each physician at each stage in their training (medical school, residency, fellowship), the number of publications in the five and 10 years following fellowship, and the total number of publications prior to and including the year 2018. When available, the date of acceptance of publication was used rather than the date of publication to attempt to account for delays in publication. 11-indeces for each physician were obtained from Scopus.

Physicians with incomplete data, such as missing graduation years during training, were omitted from data analysis. Spearman’s rank correlation coefficients (r,) and 5% significance levels were used to assess the relationships between the number of publications at different points in training and the early years in practice. Strength of the correlation was described using the following guide for the absolute value for r:

-0.50-0.19 “very weak”, 0.20-0.39 “weak”, 0.40-0.59 “moderate”, 0.60-0.79 “strong”, 0.80-1.0 “very strong”.

Results

Complete data were able to be obtained for 355 physicians employed by the top 10 academic institutions for orthopaedic surgery (Hospital for Special Surgery, Mayo Clinic, Cleveland Clinic, Beth Israel, Rush University, Massachusetts General, University of California San Francisco, New York University Langone, Cedars-Sinai Medical Center, and John Hopkins University). The sample included 527 (92%) males and 28 (8%) females.

The majority were listed as assistant professor (46%), followed by associate professor (32%), and professor (22%). Years in practice, the total number of publications, and H-indices all showed positive trends with increasing academic rank (Table 1).
Spearman rank coefficients showed statistically significant correlations between the number of publications in medical school, residency, fellowship, and the first five years in practice (Table 3). Strong correlations were seen between publications during total training and publications output in the first five years in practice ($r=0.717, P<0.0001$). However, no significant correlations were found between the number of publications at any stage in training and the number of publications produced in the first 10 years following fellowship. Furthermore, only a weak positive correlation was observed between the number of publications during the first five and first 10 years following fellowship ($r=0.274, P=0.0001$).

**TABLE 3: Correlations between publication history and future output.**

Spearman rank correlation coefficients with corresponding $p$-values for the number of publications between different stages in training and early career.

| Does publication history predict future publication output? | Residency | Fellowship | First 5 yrs in Practice | First 10 yrs in Practice |
|-----------------------------------------------------------|-----------|------------|-------------------------|--------------------------|
| Medical School (MS)                                       | 0.401 ($p<0.0001$) | 0.020 (0.901) | 0.258 ($p<0.0001$) | -0.033 (0.288) |
| Residence (R)                                             | --        | 0.706 ($p<0.0001$) | 0.668 ($p<0.0001$) | 0.006 (0.949) |
| Fellowship (F)                                            | --        | 0.022 (0.901) | 0.002 (0.318) | -- |
| Total Training (MS, R, and F)                             | 0.717 ($p<0.0001$) | 0.075 (0.199) | -- |
| First 5 yrs in Practice                                   | --        | 0.274 (0.0001) | -- |

A moderate positive correlation was found when comparing publications during medical school and residency output ($r=0.401, P<0.0001$) and a strong correlation was seen with publications during residency and publications during fellowship ($r=0.717, P<0.0001$).
Discussion

The output of peer-reviewed publications, commonly referred to as academic productivity, is viewed as an academic currency (along with research funding) by departmental and university leadership. Although an isolated publication number may not accurately represent academic output, it is used as a global assessment for promotion, dedicated academic time and funding, and institutional value come into question.

A strong significant correlation was found between publication output during training and productivity in the first five years following fellowship. This finding could suggest that having a previous foundation in research can help an attending be productive earlier in their career. This foundation could come in the form of training experience in efficient data collection, statistics, or manuscript preparation, along with already established academic collaborations.

However, no significant correlation was seen between productivity during training with productivity in the 10 years following fellowship. Furthermore, only a weak correlation was seen between publication output during the first five years and the first 10 years. These results can be important for orthopaedic leadership to take note of. A new attending may not have a strong prior research foundation or may hold other time consuming academic/clinical duties that could lead to lower publication output during their early career. However, this should not always be viewed as them not having an "interest" in research, seeing as they still have the potential to become a high-output researcher later in their career. A major component in consideration for promotion is current research productivity and the potential for future productivity, as measured by the number of peer-reviewed publications. This information may be used by department chairs when evaluating the portfolios of assistant and associate professors for under consideration for promotion.

Animal subjects:

Human subjects:

Disclosures

Additional Information

References