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Society of Asian Academic Surgeons

How academically productive are endocrine surgeons in the United States?

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ABSTRACT

Background: Many surgical departments in the United States lack endocrine surgery faculty. Although endocrine surgeons can provide worthwhile clinical services, it is unclear how they contribute to the overall academic mission of the department. The present study aims to evaluate the academic productivity of endocrine surgeons, as defined by the American Association of Endocrine Surgeons (AAES) membership, when compared with other academic surgical faculty.

Materials and methods: An established database of 4081 surgical department faculty was used for this study. This database includes surgical faculty of the top 50 National Institutes of Health (NIH) funded universities and faculty from five outstanding hospital-based surgical departments. Academic metrics including publication, citations, H-index, and NIH funding were obtained using publically available data from websites. The AAES membership status was gathered from the online membership registry.

Results: A total of 110 AAES members were identified in this database, accounting for 2.7% of this population. Overall, the AAES members outperformed other academic surgical faculty with respect to publications (66 ± 94 *versus* 28 ± 91, $P < 0.001$), publication citations (1430 ± 3432 *versus* 495 ± 2955, $P < 0.001$), and H-index (19 ± 18 *versus* 10 ± 13, $P < 0.001$). In addition, the AAES members were more likely to have former/current NIH funding and hold divisional or departmental leadership positions than their non-AAES member colleagues.

Conclusions: Based on these data, the AAES members excelled with respect to publications, citations, and research funding compared with nonendocrine surgical faculty. These results demonstrate that endocrine surgeons can contribute enormously to the overall academic mission. Therefore, more surgical departments in the United States should consider establishing an endocrine surgery program.

Introduction

In addition to their clinical duties, academic surgeons have educational, administrative, and research obligations. Research productivity as measured by publications, citations, H-index, and extramural research funding can be an important factor in the promotion of academic clinicians.[1-3] These metrics have been shown to be valuable measures of

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individual academic success and have been used for purposes of hiring, promotion, tenure, grant funding, and entry into academic organizations.[4-10] Furthermore, these metrics allow for comparison of academic productivity between faculty across multiple institutions.[11] In addition to the number of an author's publications and citations, the H-index is a bibliometric statistic created by Jorge Hirsch in 2005 as a means of characterizing the scientific output of a researcher.[12,13] The H-index is defined as the number of publications, *h*, which has been cited at least *h* times.[12] For example, if an author has an H-index of 20, he or she has twenty publications that have been referenced at least 20 times. The H-index, therefore, accounts for the amount of citations per publication. Despite its limitations, the H-index is a well-established metric for defining the quantity and significance of an individual's academic contributions.[8]

Recently, there has been a desire to quantify the academic productivity within surgical specialties.[14-16] We know that certain surgical disciplines, such as transplant surgery and urology, contribute more to departmental academic productivity than others.[3,17] Endocrine surgery has evolved as a subspecialty of general surgery over the past several decades.[18] In 1980, the American Association of Endocrine Surgeons (AAES) was formed as the first surgical society dedicated specifically to endocrine surgery.[19] Recent studies have demonstrated that higher surgeon volume is associated with improved outcomes in many surgical specialties, including endocrine surgery.[20,21] Due to the increasing incidence of endocrine disorders and the shift toward high-volume surgeons, there appears to be a demand for the clinical contributions of endocrine surgeons.[22-24] While endocrine surgeons can provide worthwhile clinical services, it is unclear how they contribute to the overall academic mission of the department. The aim of the present study is to evaluate the academic productivity of endocrine surgeons, as defined by AAES membership, when compared with other academic surgical faculty.

Materials and methods

Institutions selected

An established database of 4081 surgical department faculty was used for this study.[3,6] The top 50 university-based programs based on the current NIH funding was determined using data from the Blue Ridge Institute for Medical Research.[25] An additional five hospital-based surgical departments not identified on the NIH funding rank list were also included based on their significant impact. These departments were identified by a Medline search and review of current meetings.[6] All data were collected from September 1, 2014 to October 21, 2015.

Faculty demographics and metrics

Demographic and metric data were collected using online sources. The department of surgery website for each institution was used to collect the following demographic variables: sex, academic degrees, career track (clinical versus research), academic rank, division, and specialty. The Scopus database (www.scopus.com), the NIH Research Portfolio Online Reporting Tools (RePORT; https://report.nih.gov), and the Grantome database (http://grantome.com) were used to collect bibliometric and funding data, including number of publications, number of citations, H-index, and type and number of NIH awards for each faculty.

AAES membership

In addition to the previously collected data, the American Association of Endocrine Surgeons (AAES) membership was determined using the membership roster (www.endocrinesurgery.org).

Statistical analysis

Descriptive statistics were performed to summarize data. Medians, standard deviations, and ranges were calculated for the continuous variables, including total number of publications, total career citations, 3-year citations, and H-indices. Group comparisons of these variables were performed across the categorical variables of AAES membership and academic rank. Two-sided Wilcoxon rank-sum tests were used for comparison between groups. Differences between categorical variables were determined using χ^2 tests. Statistical analysis was performed using IBM SPSS Statistics for Macintosh, version 24.0 (Armonk, NY: IBM Corp) to evaluate differences between groups. Statistical significance was defined as $P < 0.05$.

Institutional Review Board exemption

We only used publically available data gathered online as described previously. This study was submitted to the Institutional Review Board at the University of Alabama-Birmingham, and qualified as exempt from review.

Results

Faculty characteristics of AAES members and nonmembers

A total of 4081 surgical department faculty were evaluated. A total of 110 AAES members were identified (2.7%). Table 1 summarizes the faculty characteristics. Overall, 21.8% of faculty members were women. The AAES members were more likely to be female (30%) than non-AAES members (21.6%) ($P = 0.036$). There were 11.7% instructors, 32.0% assistant, 23.6% associate, and 32.6% full professors.

We also evaluated the distribution of degrees held by AAES members and nonmembers; 93.6% of AAES members held the degree of MD compared with 89.0% of nonmembers, 4.5% of members held the degree of MD/PhD compared with 5.0%, and 1.8% of members held PhDs alone compared with 6.0% of nonmembers. There was no statistical difference in the distribution of degrees between members and nonmembers.

The AAES members were more likely to be more advanced in their careers. Differences in the distribution of academic ranks were noted between AAES members and non-AAES

members. AAES members held the rank of professor (50.5%), associate professor (19.3%), assistant professor (26.6%), and instructor/assistant (4.2%), whereas non-AAES members held the rank of professor (32.1%), associate professor (24.3%), assistant professor (32.1%), and instructor/assistant (11.5%). AAES members were also more likely to hold departmental or division leadership positions than non-AAES members with 23.1% of members holding leadership positions compared with 11.5% of nonmembers ($P < 0.001$).

Publications, citations, and H-index

AAES members outperformed other academic surgical faculty with respect to total number of publications (66 ± 94 *versus* 28 ± 91, $P < 0.001$). AAES members also had more 3-year citations (323 ± 791 *versus* 150 ± 758, $P < 0.001$) and total citations than nonmembers (1430 ± 3432 *versus* 459 ± 2955, $P < 0.001$). Furthermore, the median H-index of AAES members was higher than nonmembers, 19 *versus* 10 ($P < 0.001$).

Academic output by academic rank

Table 2 summarizes the academic output of AAES members and nonmembers by academic rank. There was no difference in any of the academic metrics at the lower faculty ranks, but there was a significant difference in output at the rank of professor. AAES members at the rank of professor had a median number of 126 publications and 723 3-year citations compared with non-AAES members who had a median of 88 publications and 459 3-year citations ($P <0.001$ and $P = 0.01$, respectively). AAES members at the professor rank also had a significantly higher median H-index than non-AAES members at the same rank (29 ± 17 *versus* 22 ± 15; $P = 0.001$). While AAES members did outperform non-AAES members at the assistant and associate faculty ranks, these differences were not significant.

AAES members have more NIH funding than non-AAES members

Regarding funding status, 30.9% of the AAES members had former/current NIH funding, compared with 17.7% of other surgical faculty ($P = 0.002$) (Table 3). In addition, AAES members were more likely to have RO1/U01/P01 grants than non-AAES members (17.3% *versus* 9.8%; $P = 0.004$).

Discussion

In addition to their clinical performance, academic surgeons are evaluated based on their administrative, educational, and scholarly activities.[2] Academic productivity may be characterized by the number of publications, citations, and extramural research funding.[1,4,5] Although not a perfect system, these metrics are often used in hiring, promotion, and tenure of faculty members.[1,4] Previous studies have demonstrated that certain divisions within a surgical department may contribute disproportionately to the overall academic productivity.[3] In this study, we evaluated the academic productivity of endocrine surgeons, as defined by AAES membership, in the United States.

We compared the academic metrics of 110 AAES members in the database of 4081 academic surgical faculty. Overall, AAES members had more total publications, total citations, and 3-year citations than non-AAES members. The AAES members also had a higher H-index than nonmembers (21 *versus* 14; $P < 0.001$). As previously discussed, research productivity and extramural funding are often used as criteria for academic appointment and promotion.[1,2,4] The academic performance of the AAES members likely contributes to them attaining higher academic ranks and holding leadership positions. AAES members were more likely to hold the rank of full professor than non-AAES members, 50.5% *versus* 32.1%. In

Table 1 – Faculty characteristics by AAES membership status.

Variable	All faculty	AAES	Non-AAES	P-value
Sex				
Men	3190 (78.2%)	77 (70.0%)	3113 (78.4%)	0.036
Women	891 (21.8%)	33 (30.0%)	858 (21.6%)	
Academic rank				
Instructor/assistant	454 (11.1%)	4 (4.2%)	450 (11.5%)	<0.001
Assistant professor	1281 (31.4%)	29 (26.6%)	1252 (32.1%)	
Associate professor	967 (23.7%)	21 (19.3%)	946 (24.3%)	
Professor	1308 (32.1%)	55 (50.5%)	1253 (32.1%)	
Degree				
MD	3642 (89.2%)	103 (93.6%)	3539 (89.1%)	0.181
MD/PhD	200 (4.9%)	5 (2.5%)	195 (4.9%)	
PhD	239 (5.9%)	2 (0.8%)	221 (6.0%)	
Divisional leadership				
Yes	444 (11.9%)	25 (23.1%)	419 (11.5%)	<0.001
No	3300 (88.1%)	83 (76.9%)	3217 (88.5%)	

Table 2 – Academic output by AAES members and nonmembers by academic rank.

Variable	Rank	AAES	Non-AAES	P-value
Publications	Instructor/assistant	8 ± 16	8 ± 37	0.997
	Assistant professor	15 ± 24	13 ± 40	0.927
	Associate professor	51 ± 35	35 ± 48	0.169
	Professor	126 ± 96	88 ± 126	<0.001
	All faculty	66 ± 94	28 ± 91	<0.001
Citations (total)	Instructor/assistant	154 ± 315	95 ± 952	0.672
	Assistant professor	216 ± 658	138 ± 985	0.768
	Associate professor	808 ± 850	553 ± 1697	0.173
	Professor	3517 ± 3997	2081 ± 4235	0.003
	All faculty	1430 ± 3432	459 ± 2955	<0.001
Citations (3 years)	Instructor/assistant	58 ± 315	57 ± 227	0.706
	Assistant professor	86 ± 176	53 ± 293	0.498
	Associate professor	326 ± 253	188 ± 559	0.06
	Professor	723 ± 962	459 ± 1096	0.01
	All faculty	323 ± 791	150 ± 758	<0.001
H-index	Instructor/assistant	6 ± 6	6 ± 8	0.855
	Assistant professor	6 ± 7	5 ± 7	0.941
	Associate professor	18 ± 16	12 ± 9	0.79
	Professor	29 ± 17	22 ± 15	0.001
	All faculty	19 ± 18	10 ± 13	<0.001

addition, AAES members were also more likely to hold positions of divisional or departmental leadership, 23.1% *versus* 11.5%. Finally, the AAES members were more likely not only to have former/current NIH funding than non-AAES members (30.9% *versus* 17.7%) but also to have been awarded a R01, P01, or U01 grants.

When we evaluated the academic output by academic rank, we did not see a difference in our outcome variables at lower ranks (i.e., assistant professor and associate professor), but there was a significant difference in all output variables at the level of professor. At the rank of professor, AAES members were more likely to have more total publications, more total citations, more 3-year citations, and a higher H-index than non-AAES members. In addition, we noted a higher academic output when looking at all academic ranks. This is likely secondary to the fact that endocrine surgeons were more likely to attain the rank of professor.

There are several potential reasons for these differences in academic productivity. First, academic societies may provide a venue that promotes networking and collaboration among surgical peers. Previous studies have demonstrated that membership into certain academic surgical societies, such as the Association for Academic Surgeons or the Society of University Surgeons, is correlated with greater academic performance.[6,7] In addition, we know that certain specialties and departments have varying degrees of academic output.[3,17] Other authors have proposed that this is secondary to increased research emphasis within certain surgical specialties.[17] Endocrine surgery may be one of these surgical specialties that contributes significantly to the overall academic mission of a department.

The study has several limitations. While attempts to verify the accuracy of the data in the database were made, errors in data collection may have occurred. In addition, the data were collected over a period of months. Additional publications, citations, or NIH funding may have occurred over the time frame the data was collected, and therefore, missed in this data set. This study also only evaluated at a few academic metrics as our outcome variables, including the number of total publications, number of total citations, number of 3-year citations, H-index, and NIH funding. These characteristics may not completely account for all the components of

Table 3 – NIH funding by AAES membership status.

Variable	All faculty	AAES member	AAES nonmember	P-value
No current or former NIH funding	3348 (82.1%)	76 (69.1%)	3272 (82.5%)	0.004
NIH funding	738 (18.1%)	34 (30.9%)	704 (17.7%)	
NIH RO1, P01, and U01 grants	407 (10%)	19 (17.3%)	388 (9.8%)	
Non-RO1 funding	322 (7.9%)	15 (13.6%)	307 (7.7%)	

academic productivity. For instance, we did not account for clinical productivity as a confounder. Also, the variables studied, including H-index, do not account for the order of an author listed in the manuscript.[8] Despite these limitations, this study gives an excellent overview of the academic production of this surgical specialty.

Conclusions

This study compared the academic productivity of the AAES members to other surgical department faculty at the top 55 NIH-funded department of surgery. The AAES members excelled with respect to publications, citations, and research funding compared with non-AAES surgical faculty. The AAES members were also more likely to attain higher academic rank and hold divisional and departmental leadership positions. In addition to providing important clinical services, these results demonstrate that endocrine surgeons can contribute enormously to the overall academic mission of a surgical department.

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Disclosures

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