Impact of Fellowship Training on Research Productivity in Academic Otolaryngology

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Objectives/Hypothesis: Assessment of scholarly productivity as measured by research output is a key component of decisions regarding appointment and advancement in academic otolaryngology. An increasing number of graduating residents are pursuing postresidency fellowships, and evaluation of research productivity among these subspecialists is important in determining their role in academic otolaryngology departments. The $h$-index is a reliable indicator of research productivity, as it takes into account both quantity and relevance of research contributions. Our objective was to evaluate and compare trends in research productivity among the various otolaryngology subspecialties.

Study Design: Analysis of research productivity trends among otolaryngology subspecialties using the $h$-index.

Methods: Faculty members from 92 academic otolaryngology departments were organized by subspecialty and academic rank, and their research productivity, as measured by the $h$-index, was calculated using the Scopus database.

Results: Fellowship-trained otolaryngologists in academic programs had higher $h$-indices than non-fellowship-trained otolaryngologists. Head and neck surgeons and otologists had significantly higher research productivity than their peers in other otolaryngology subspecialties. Analysis of the subspecialties of chairpersons indicated that 62% were either head and neck surgeons or otologists.

Conclusions: Fellowship-trained otolaryngologists had higher $h$-indices, and faculty members trained in the subspecialties with the highest research productivity were disproportionately represented in positions of leadership within academic otolaryngology, probably reflecting the importance of research contributions in the academic advancement process, although other factors, such as educational contributions and clinical performance, may also be important factors.

Key Words: $h$-index, otolaryngology fellowships, academic promotion, academic productivity, faculty productivity, surgical faculty productivity, academic physician scientific productivity, academic rank determination, academic rank in surgical specialties.


INTRODUCTION

The number of fellowships in subspecialties of otolaryngology has significantly increased within the past two decades. Proponents of this trend argue that this improves patient care, allows treatment of more complex and specific health problems, and has allowed for subsequent reorientation of the field toward more advanced and meaningful scholarship. Critics have cited potential fragmentation of the field as detrimental to clinical competencies and training experiences. A 2011 American Academy of Otolaryngology–Head and Neck Surgery Survey of Residents and Fellows indicated that only 30% did not plan to pursue postresidency fellowship training, and that the most popular fellowship choices were pediatrics (27.2%), facial plastics (18.5%), and head and neck surgery (15.8%). This survey also indicated that type of surgical cases was the most commonly cited consideration regarding fellowship choice, whereas lifestyle and financial considerations were listed as most important by less than 5% of residents.

Scholarly productivity in the form of research contributions is exceedingly important in determining appointment and promotion within academic medicine. Several metrics related to research productivity are commonly utilized in the evaluation process, including number of publications, number of significant publications, funding history, and number of times cited by others. None of these measures reliably relay the quality of scholarly productivity. Publication totals indicate little about relevance or the impact an author has had on a field. Sizeable funding awards do not necessarily indicate that the research product will be significant, whereas the number of times cited by others can be disproportionately affected by one or a handful of publications, of which an author may or may not have been the primary author and investigator.
The h-index, named for its founder Dr. J. E. Hirsch, was first described in 2005, in an effort to rectify the limitations of other bibliometric indicators. An author’s h is defined as the number of publications he or she has that have been cited at least h times. If an author has an h-index of 30, that means he/she has 30 publications that have been cited in the literature at least 30 times each. An author with 50 total publications and an h-index of 20 is valued higher than an author with 70 total publications but an h-index of 5 using this bibliometric. This measurement indicates that, although the latter author has more total publications, the author with an h-index of 20 has produced more meaningful and relevant research, having been cited in the literature by others more often. Furthermore, their research has been consistently more relevant and not disproportionately affected by one or a handful of heavily cited publications.

Hirsch’s measure is an objective, reliable, and easily calculable approximation of research productivity that may be used in decisions regarding appointment and promotion in academic otolaryngology. Its use has been studied in a wide variety of disciplines, including several medical specialties, and has been generally found to increase with increasing academic rank. Hirsch did stress, however, that its use is most appropriate on comparison within fields rather than among different disciplines of science. Different fields have varying numbers of practitioners and peer-reviewed journals, and consequently variations among readers of these journals. For example, journals such as Science and Nature have far higher impact factors and reach a far larger audience than otolaryngology journals, meaning that basic scientists publishing in venues like Science and Nature are probably cited far more frequently than clinicians publishing exclusively in otolaryngology journals. Nonetheless, comparison of research output as measured by the h-index among otolaryngology subspecialties may provide valuable insights into the degrees of research emphasis among these closely related subfields. A considerable proportion of significant research is published in the main otolaryngology journals whose audience encompasses practitioners from all subspecialties, guaranteeing a broad audience throughout the field and allowing for comparison of the research productivity of these subspecialties.

The h-index can be calculated using several online databases, including those available from Google Scholar and Scopus. One recent analysis of h-indices among neurological surgeons found a high degree of correlation between the latter two databases. The primary objective of this analysis was to analyze whether there were research productivity differences, as measured by the h-index, of faculty members of academic otolaryngology departments based on fellowship training.

MATERIALS AND METHODS

The American Medical Association’s Fellowship and Residency Electronic Interactive Database was used to generate a list of otolaryngology residencies. Faculty listings on the individual Web sites of each of the 102 residencies listed were used to determine subspecialty and academic rank. Web sites from which individual faculty listings, academic rank, or subspecialty could not be determined were excluded, leaving faculty members from the remaining 92 academic departments. Individual faculty members for which any of this information could not be determined were also excluded from this analysis. Adjunct, voluntary, and nonphysician faculty members were excluded from this analysis.

The 1,001 faculty members included in this analysis were classified by academic rank into assistant professor, associate professor, and professor, and were grouped into the following categories based on fellowship training: head and neck surgery/oncology, otology/neurotology, rhinology, laryngology, facial plastics, pediatric otolaryngology, and non-fellowship trained. Faculty had to have completed a clinical fellowship or be board certified in a subspecialty to be included among one of the fellowship-trained groups. The h-index of each faculty member was calculated using the h-index calculator available from the Scopus database (www.scopus.com). All data were collected in June 2012 and July 2012. Statistical analyses were performed using one-way analysis of variance (ANOVA) and Student t test where appropriate, with thresholds for significance set at \( P < .05 \).

RESULTS

Out of the 1,001 academic otolaryngologists included in this analysis, 77% were trained in one of the six fellowships examined. These fellowship-trained otolaryngologists had higher research productivity, as measured by the h-index, than non–fellowship-trained otolaryngologists included in this analysis (t test, \( P < .0005 \)) (Fig. 1).

There was significant statistical variance among the subspecialties examined (one-way ANOVA, \( P < .0005 \)), with head and neck surgeons having higher h-index values than all other subspecialties (t tests, \( P < .05 \)) (Fig. 2). Otologists had statistically the second highest research productivity as measured by the h-index (t tests, \( P < .05 \)), although this trend did not reach statistical significance on comparison of otologists and laryngologists (t test, \( P > .05 \)). There was a consistent
increase in research productivity with academic rank in all specialties examined (Fig. 3).

Subspecialty information could not be determined reliably for five chairpersons out of 92 programs. An analysis of the subspecialties of remaining chairpersons indicated that out of the 87 departmental leaders included in this analysis, 62% were either head and neck surgeons or otologists (Fig. 4). These findings suggest that emphasis on research is likely stronger in these two subspecialties. The findings also confirm the important role scholarly research contributions play in academic advancement, because 62% of the departmental chairpersons included in this analysis were fellowship-trained in either of these two fields (Fig. 4). This finding may also be due to the longevity of head and neck surgery and otology/neurotology as subspecialties when compared to fields with newer fellowship opportunities such as laryngology and rhinology.

The h-index is an objective and dependable indicator of research productivity, and is reliably predictive of academic rank. By removing subjectivity from assessment of research relevance, this bibliometric allows for an impartial valuation of the influence an individual’s research contributions have on the discourse within a field and may be used as a valuable adjunct in decisions regarding appointment and advancement in academic otolaryngology.

There are, however, several limitations of this measure. Critics of the h-index allege that a propensity for
self-citation may artificially inflate this statistic. Authors who repeatedly cite their own work could theoretically raise their h-index, although this would require repeated and sustained self-citation. This would be most effective at raising an h-index at very low levels; it would be very tedious and unlikely to maintain self-citation to raise an h-index at a higher level. For example, if an author has an h-index of 7, to raise their h-index to 12 would require that they make sure an additional five articles not accounted for in their h of 7 are cited 12 times each, plus the citation of their original seven articles each to a total of 12 citations. Therefore, the only situations an author can realistically self-cite their way to a higher h-index are at very low h levels, or when they have several papers cited less than h instances at or near their h threshold.

A potential weakness of the h-index is its insensitivity to the type of research that an individual performs. For example, an otolaryngologist with an interest in basic science who participates in more laboratory-oriented projects may be involved in more time-intensive tasks than a faculty member producing influential publications on clinical research that requires access only to clinical records. These differences in the type of research may explain why average h-index totals may be different among scientific disciplines that are far different, although this may introduce a degree of variability within a field as well.

Another potential weakness of the h-index regards an accounting for the total quantity of publications in specific situations. It is clear that the h-index is a powerful measure of research relevance and significance rather than simply quantity, but an author with an h of 5 with 10 total publications is regarded as equivalent to an author with an h of 5 with 20 total publications. Although academic researchers aim for excellence and influence in research, a correction factor taking into account the absolute quantity of scholarship may need to be introduced to take into account these specific situations.

A limitation of this analysis was that the Scopus database does not take into account citations made before 1995. This likely has an effect on h-index values of more senior faculty members, but a significant increase in research productivity with senior academic rank was still detected (Fig. 3). Additionally, h-index values from the Scopus database have been shown to have a high correlation with those calculated from at least one other major database, Google Scholar, suggesting that this limitation likely had a minimal effect on the results in this analysis.

Scholarly productivity, as measured by research contributions, continues to play a major role in evaluation of academic otolaryngologists. It would be remiss not to mention, however, the importance of clinical performance, educational contributions, and administrative duties in academic medicine. Contributions in these capacities can be difficult to measure. Having high-quality non–fellowship-trained generalist faculty is absolutely essential for providing and maintaining the broad educational experience necessary for competence in both office-based and operative management of a wide variety of otolaryngologic conditions. The contributions of academic generalists are crucial for providing adequate training, and the time dedicated to these roles may be responsible for a shift in focus away from research and toward clinical service and education of residents and medical students. This analysis is designed to measure research productivity, and not intended as an attempt to minimize the other contributions that play a vital role in the development of academic departments.

With regard to measuring contributions toward medical student and residency education in particular, academic physicians in other specialties have attempted to address this situation through the use of educator portfolios, which organize contributions into a standardized format similar to a curriculum vitae. Regardless, a faculty member’s research productivity is just one facet of their profile that may be considered when examining their academic contributions.

As fellowship-trained otolaryngologists continue to play increasingly important roles in academic medicine, identifying objective measures to facilitate academic hiring and advancement processes in a more equitable manner should be a priority. The h-index can serve as a useful metric, as it measures scholarly relevance and contributions within a field in an objective manner.

CONCLUSION

The h-index is an accurate measure of research productivity and takes into account both quantity and relevance of research contributions. Fellowship-trained otolaryngologists have higher research productivity than non–fellowship-trained otolaryngologists, with head and neck surgeons, and otologists having the highest h-index values. These two subspecialties were also disproportionately represented among chairpersons, suggesting that research contributions are an important measure used in determining advancement opportunities. Although measurement of research productivity plays an important part in decisions regarding appointment and
promotion, other factors such as educational contributions and clinical performance may be difficult to quantify.

BIBLIOGRAPHY


