The American Journal of Surgery 218 (2019) 813–817

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Academic inertia: Examining changes of scholarly output over time among academic minimally invasive surgeons

Christopher G. Yheulon [a, *], Fadi M. Balla [b], Justin J. Ernat [c], Edward Lin [a], S. Scott Davis Jr. [a]

[a] Division of General and GI Surgery, Emory University Hospital, Atlanta, GA, USA
[b] Department of Surgery, Kaiser Westside Medical Center, Hillsboro, OR, USA
[c] Department of Orthopedic Surgery, Blanchfield Army Community Hospital, Fort Campbell, KY, USA

ARTICLE INFO

Article history:
Received 5 February 2019
Received in revised form
12 March 2019
Accepted 13 March 2019

Keywords:
h-index
Self-citation
Minimally invasive surgery
General surgery
Fellowship

ABSTRACT

Introduction: The purpose of this study is to assess how the Hirsch Index (*h*-index) and other academic metrics change over time for academic minimally invasive surgeons (MIS).
Methods: Through the Fellowship Council's website, MIS program-directors and associate program-directors were identified in 2017 and again in 2018. Using the Scopus database, the number of publications, citations, self-citations, and *h*-indices were calculated.
Results: A total of 222 surgeons were included. The median increase of publications, citations, and *h*-index were 4, 134, and 1, respectively. 75% of surgeons (166/222) saw their *h*-index increase. In 2017, 26% of surgeons (57/222) had an increase of their *h*-index due to self-citation. One-year later, 35% of those surgeons (20/57) no longer demonstrated that change.
Conclusion: Self-citation remains infrequent within MIS. The *h*-index of most surgeons will increase over one-year. Many surgeons demonstrating an increase in *h*-index due to self-citation will see that change eliminated over time.

Published by Elsevier Inc.

Introduction

The Hirsch Index (*h*-index) is a common metric within academia, measuring the effect of an author's scholarly work. Hirsch developed the metric in 2005 to address the shortcomings of other bibliometric indicators.[1] The *h*-index measures both the quantity and quality of scholarly activity in a simplistic manner defined as "the number of papers with citation number > or = *h*."

Since its inception nearly 15 years ago, there has been great interest in the *h*-index including the field of meta-research (i.e. research about research).[2] However, there appears to be a blind spot with regard to the relationship of this metric with time. Though papers exist defining and explaining this relationship, they do so through mathematical models, theorems, and proofs.[3–7] To date, there is no paper outlining how the *h*-index changes over time when applied to specific populations – in medicine or any other discipline. Such an analysis at the granular and applied level is critical, especially if these metrics are "a foundation for conferring academic awards, hierarchal promotions, tenures, fellowships, salary increments, recruitments and leadership positions" as described by Saleem in 2011.[8]

Given these immense incentives tied to scholarly productivity, establishing benchmarks is important for both institutions and individuals. Such benchmarks should be established for individual academic communities, as publication patterns are not uniform across disciplines.[9] Furthermore, production of scholarly output should be defined at the author's point in their career as there is little insight gained in comparing a junior faculty member against an accomplished senior faculty member in their same specialty. The purpose of this study is to define how scholarly output and its associated metrics change over time for academic minimally invasive surgeons (MIS).

Methods and materials

Inclusion of programs and surgeons

The Fellowship Council was created to organize fellowship programs teaching MIS. Their website (https://fellowshipcouncil.org) lists MIS programs along with their respective program

* Corresponding author. Division of General and GI Surgery, Emory University Hospital, 1364 Clifton Road, NE, Atlanta, GA, 30322, USA.
E-mail address: cyheulo@emory.edu (C.G. Yheulon).

https://doi.org/10.1016/j.amjsurg.2019.03.014
0002-9610/Published by Elsevier Inc.

directors and associate program directors. The Fellowship Council website was accessed in October 2017 and again one year later in 2018. Surgeons were excluded if they were no longer listed as a program director or associate program director. Surgeons were also excluded if they demonstrated a negative change in the number of publications, number of citations, or *h*-index. These metrics should not decrease over time, though such a change can be reflected by Scopus due to its "Author Identifier" feature.[10] This feature helps "to differentiate authors with common last names," though metrics can vary both positively or negatively over time periods when accounts and/or publications are merged or unmerged. The Scopus website details that such issues can arise for the following reasons: "multiple profiles for a single author; articles need to be added/removed from an author's profile, the spelling of a name is incorrect; the affiliation is out of date or incorrect".

The Scopus database was used to extract the number of publications, total number of citations, and *h*-index for each respective surgeon. Author name and academic affiliation were entered into the "author search" page and metrics were available within the "view citation overview" page as previously described by Rad et al.[11] The total number of citations and *h*-index were recorded before and after excluding self-citations.

Institutional Review Board approval was not necessary as both the Fellowship Council's list of program directors and the Scopus database are publicly available.

Statistical analysis

The change of academic metrics over the course of a year was examined in the entire cohort. To reflect surgeons at different points in their academic careers, the group was divided into tertiles based on 2017 *h*-index for subgroup analysis. In addition, a separate subgroup analysis was performed on surgeons who had an increase in their *h*-index in 2017 due to self-citation. Qualitative variables were analyzed with a Chi-Square test and continuous variables were analyzed with a Student's T-test. Data were extracted and analyzed using Microsoft Excel (Microsoft Corporation, Redmond, Washington).

Results

In October 2017, The Fellowship Council website was accessed, identifying 274 unique academic MIS surgeons.[12] The Fellowship Council website was accessed one year later in 2018. Forty-five surgeons were excluded as they were no longer listed as a program director or associate program director. Seven additional surgeons were excluded as they demonstrated a negative change in the number of publications, number of citations, or *h*-index from 2017 to 2018. Overall, 222 surgeons were included for analysis.

For the entire cohort in 2017, the mean *h*-index, number of publications, and number of citations were 16.0, 62.2, and 1646, respectively (Table 1). One year later, those numbers increased by a mean *h*-index of 1.6, 6.7 publications, and 281 citations. There was no difference in the self-citation rate among new citations (3.57% vs. 3.61%, $p = 0.6203$) or the proportion of surgeons who had an increase in *h*-index due to self-citation (25.7% vs. 28.4%, $p = 0.521$). The median increase in *h*-index was one and 75% of surgeons (166/222) saw their *h*-index increase by at least one integer.

All tertiles of surgeons saw significant increases from 2017 to 2018 in the *h*-index, number of publications, and total number of citations (Table 2). In 2017, the mean *h*-index for each respective tertile was 3.2, 13.0, and 31.8. There was a significant increase in the rate of new self-citations among the middle tertile from 2017 to 2018 (2.41% vs. 3.71%, $p < 0.0001$).

For those surgeons whose *h*-index increased due to self-citation in 2017, there was a significant decrease in the rate of new self-citations (4.63% vs. 4.36%, $p = 0.0275$) (Table 3). This significantly lower self-citation rate for the subgroup was still significantly higher when compared to the rest of the cohort (4.36% vs. 2.68%, $p < 0.0001$). However, over a third of this subgroup's surgeons saw the increase of h-index due to self-citation in 2017 eliminated in 2018 (100% vs. 64.9%, $p < 0.0001$).

That same subgroup was compared to the remainder of the highest tertile, excluding overlapping members (Table 4). All academic metrics across both time periods were nearly identical between the two groups, except for self-citation rates. Nearly 40% of the remainder of the highest tertile saw their *h*-index increase in 2018 due to self-citation. However, this was at a significantly lower rate than the subgroup of surgeons who also experienced that increase in 2017 (64.9% vs. 39.5%, $p = 0.0147$).

Table 1
Change in academic metrics from 2017 to 2018.

	MIS Surgeons	p value
n	222	
2017 Mean *h*-index ± SD (median)	16.0 ± 14.0 (12.5)	
2018 Mean *h*-index ± SD (median)	17.7 ± 14.6 (14)	
Mean Change in *h*-index ± SD (median)	1.6 ± 1.7 (1)	**<0.0001**
2017 Mean Publications ± SD (median)	62.2 ± 75.2 (35.5)	
2018 Mean Publications ± SD (median)	68.9 ± 80.2 (43)	
Mean Change in Publications ± SD (median)	6.7 ± 8.9 (4)	**<0.0001**
2017 Mean Citations ± SD (median)	1646 ± 3033 (671)	
2018 Mean Citations ± SD (median)	1927 ± 3479 (796)	
Mean Change in Citations ± SD (median)	281 ± 500 (134)	**<0.0001**
2017 Self Citation Rate	3.58%	
2018 Self Citation Rate	3.61%	
Change in Self Citation Rate	0.03%	0.6203
2017 *h*-index Changed from Self-Citation (*n*)	25.7% (57)	
2018 *h*-index Changed from Self-Citation (*n*)	28.4% (63)	
Difference (*n*)	2.7% (6)	0.5214
h-index Increased by at Least one Integer (*n*)	74.8% (166)	

Abbreviations: MIS, Minimally Invasive Surgery; SD, Standard Deviation.

Discussion

Scholarly benchmarks

Though we present averages in the form of means for statistical analysis, perhaps the medians of the groups and subgroups are more telling. For example, the median increase in *h*-index, publications, and citations for the entire group was 1, 4, and 134. As in, over one year, the median surgeon within the group authored or co-authored four new publications, had 134 new citations, and *h*-index increased by one (Table 1). These numbers certainly seem more attainable and sustainable, especially for more junior surgeons. In addition, we can see that the median number of publications increases along the tertiles, with 1 in the low tertile, 3 in the middle tertile, and 9 in the high tertile (Table 2). This is important information for both authors and supervisors/institutions as we can "track" an author's academic progress compared to their peers.

Change in self-citation rates over time

There was no change in the overall self-citation rate of new citations with the exception of the middle tertile group. These researchers may be at a point in their careers when they are

Table 2
Change in academic metrics by tertile.

	1st Tertile	p value	2nd Tertile	p value	3rd Tertile	p value
n	73		75		74	
2017 Mean *h*-index ± SD (median)	3.2 ± 2.5 (3)		13.0 ± 3.4 (12)		31.8 ± 12.2 (28.5)	
2018 Mean *h*-index ± SD (median)	4.6 ± 2.7 (4)		14.2 ± 3.8 (14)		34.0 ± 12.8 (31)	
Mean Change in *h*-index ± SD (median)	1.4 ± 2.1 (1)	**<0.0001**	1.2 ± 1.0 (1)	**<0.0001**	2.3 ± 1.7 (2)	**<0.0001**
2017 Mean Publications ± SD (median)	8.1 ± 8.0 (6)		40.5 ± 21.2 (35)		137.6 ± 86 (122)	
2018 Mean Publications ± SD (median)	11.2 ± 11.0 (8)		45.4 ± 24.1 (39)		149.5 ± 91.1 (131)	
Mean Change in Publications ± SD (median)	3.1 ± 5.8 (1)	**<0.0001**	4.9 ± 5.0 (3)	**<0.0001**	12.0 ± 11.6 (9)	**<0.0001**
2017 Mean Citations ± SD (median)	107 ± 187 (55)		724 ± 384 (670)		4100 ± 4281 (3023)	
2018 Mean Citations ± SD (median)	161 ± 233 (95)		863 ± 447 (763)		4747 ± 4904 (3517)	
Mean Change in Citations ± SD (median)	54 ± 104 (20)	**<0.0001**	139 ± 101 (114)	**<0.0001**	647 ± 727 (467)	**<0.0001**
2017 Self Citation Rate	1.37%		2.41%		3.83%	
2018 Self Citation Rate	1.81%		3.71%		3.74%	
Change in Self Citation Rate	0.44%	0.4535	1.29%	**<0.0001**	−0.09%	0.3256
2017 *h*-index Changed from Self-Citation (*n*)	1.4% (1)		26.7% (20)		48.6% (36)	
2018 *h*-index Changed from Self-Citation (*n*)	4.1% (3)		22.7% (17)		58.1% (43)	
Difference (*n*)	2.7% (2)	0.3107	−4.0% (−3)	0.5699	9.46% (7)	0.2487
h-index Increased by at Least One Integer (*n*)	63% (46)	**0.0047**	72% (54)	0.4965	89% (66)	**0.0005**

Abbreviations: SD, Standard Deviation.

facilitating longitudinal and compounding research projects that could lead to appropriate self-citation. This tertile may also be more likely to secure grant funding for research as the metrics of this particular group are approaching values consistent with NIH grant funding in other medical specialties.[13–15] In a 2018 study by Silvestre et al., NIH funding was associated with a significantly higher rate of self-citation and subsequent increase in *h*-index.[16] However, in this MIS subgroup, there was a paradoxical albeit non-significant decrease in the proportion of surgeons with an increase in *h*-index due to self-citation (26.7% vs. 22.7%, p = 0.5699).

Change in h-index due to self-citation

Of specific interest was the subgroup of surgeons who had an increase of *h*-index in 2017 due to self-citation. Though one could interpret such self-citation as nefarious and self-serving, John Ionnadis stated in a 2015 paper that "self-citation is not necessarily inappropriate by default. In fact, usually it is fully appropriate but often it is even necessary."[17] This sentiment is re-enforced by the data. Over 35% (20/57) of that subgroup saw their change in *h*-index due to self-citation eliminated a year later. Another 12% (7/57) of those surgeons saw their magnitude of *h*-index change decrease, albeit not eliminated. Furthermore, when compared to similarly prolific authors, almost an identical proportion of those surgeons saw a new increase in their *h*-index due to self-citation. Thus, an "inflation" of one's *h*-index due to self-citation is merely a snapshot in time. This effect can be viewed as a "revolving door" with each group as likely as the other to demonstrate a change at different time intervals.

Table 3
Subgroup Analysis: *h*-index Increased in 2017 due to Self-Citation.

	2017 h-index changed	p value
n	57	
2017 Mean *h*-index ± SD (median)	27.5 ± 16.3 (26)	
2018 Mean *h*-index ± SD (median)	29.6 ± 17.1 (28)	
Mean Change in *h*-index ± SD (median)	2.1 ± 1.8 (2)	**<0.0001**
2017 Mean Publications ± SD (median)	123.2 ± 100.2 (95)	
2018 Mean Publications ± SD (median)	133.9 ± 105.6 (103)	
Mean Change in Publications ± SD (median)	10.7 ± 9.1 (8)	**<0.0001**
2017 Mean Citations ± SD (median)	3577 ± 4983 (2226)	
2018 Mean Citations ± SD (median)	4184 ± 5710 (2597)	
Mean Change in Citations ± SD (median)	607 ± 824 (323)	**<0.0001**
2017 Self Citation Rate	4.63%	
2018 Self Citation Rate	4.36%	
Change in Self Citation Rate	−0.27%	**0.0275**
2017 *h*-index Changed from Self-Citation (*n*)	100% (57)	
2018 *h*-index Changed from Self-Citation (*n*)	64.9% (37)	
Difference (*n*)	−35.1% (20)	**<0.0001**
h-index Increased by at Least one Integer (*n*)	86.0% (49)	

Abbreviations: SD, Standard Deviation.

Table 4
Comparison of Surgeons with a Change in *h*-index in 2017 vs. Remaining 3rd Tertile.

	2017 *h*-index Changed	3rd Tertile	p value
n	57	38	
2017 Mean *h*-index ± SD (median)	27.5 ± 16.3 (26)	27.9 ± 7.5 (27)	0.8915
2018 Mean *h*-index ± SD (median)	29.6 ± 17.1 (28)	29.9 ± 8.1 (27)	0.9041
Mean Change in *h*-index ± SD (median)	2.1 ± 1.8 (2)	2.0 ± 1.4 (2)	0.9395
2017 Mean Publications ± SD (median)	123.2 ± 100.2 (95)	110.9 ± 56.5 (96)	0.4931
2018 Mean Publications ± SD (median)	133.9 ± 105.6 (103)	122 ± 61.0 (106)	0.5306
Mean Change in Publications ± SD (median)	10.7 ± 9.1 (8)	11.1 ± 13.3 (6.5)	0.8666
2017 Mean Citations ± SD (median)	3577 ± 4983 (2226)	3004 ± 1898 (2674)	0.5006
2018 Mean Citations ± SD (median)	4184 ± 5710 (2597)	3442 ± 2147 (3046)	0.4463
Mean Change in Citations ± SD (median)	607 ± 824 (323)	438 ± 332 (312)	0.2334
2017 Self Citation Rate	4.63%	2.45%	**<0.0001**
2018 Self Citation Rate	4.36%	2.75%	**<0.0001**
2017 *h*-index Changed from Self-Citation (*n*)	100% (57)	0% (38)	**0**
2018 *h*-index Changed from Self-Citation (*n*)	64.9% (37)	39.5% (15)	**0.0147**
h-index Increased by at Least one Integer (*n*)	86.0% (49)	84.2% (32)	0.8132

Abbreviations: SD, Standard Deviation.

Limitations

There are several limitations to this study. There is no clear definition as to what defines an MIS surgeon. An arguable definition of an MIS surgeon is one who practices advanced laparoscopic or endoscopic techniques. However, this statement in itself is somewhat vague and exposure to advanced laparoscopic techniques is mandatory in today's general surgical residencies. Although there is no board certification within the field of MIS, The Fellowship Council is sponsored by many surgical societies. The leading and largest of those societies, the Society for American Gastrointestinal and Endoscopic Surgeons, now offers a fellowship certificate overseen by their Resident and Fellow Training Review Committee that requires minimum case volumes among five defined categories.[18]

We also excluded 52 surgeons from our analysis. Though many of these individuals remain academic MIS surgeons, we could not be 100% certain unless they maintained their position as listed by the Fellowship Council. It is possible that those surgeons moved on to a non-academic practice or retired. Furthermore, if we included the seven surgeons with a negative change in academic metrics, this may have significantly skewed results. Even despite these exclusions, 81% (222/274) of surgeons were captured.

Another limitation is the decision to group surgeons by tertile based on 2017 *h*-index. This was performed to reflect surgeons at different points in their career. The *h*-index is well correlated with academic rank and has been previously studied in general surgery. The mean *h*-indices for the low, middle, and high tertiles were comparable with the ranks of assistant professor, associate professor, and professor/chairperson as described by Svider et al., in 2013.[19] It is unlikely – though still possible – to have a senior academic surgeon (full professor or chairperson) captured in the lowest tertile and a junior surgeon captured in the highest tertile. Adding academic rank upon initial analysis in 2017 would have strengthened this paper, though we cannot retrospectively discern what that rank was a year ago. All surgeons' academic ranks may not be publicly available and some authors – particularly those in a private practice centered fellowship – may not be affiliated with a medical school or hold any professorship.

Arguments can also be made challenging our use of the term "academic surgeon." The most traditional definition describes "a surgeon who is a member of a medical school department of surgery."[20] As we did not analyze academic rank, we cannot verify academic surgeons by this particular definition. Though David Soybel in his Association for Academic Surgery Presidential Address defined an academic surgeon as "anyone who contributes to the intellectual life of a department or the discipline of surgery in a serious, systematic way."[21] All program directors analyzed would meet this criterion given program requirements and accreditation by The Fellowship Council.

There are also inherent limitations of the Scopus database itself. The database does not easily differentiate author position leaving us unable to weight first or last authorships without reviewing each individual publication for every author. In addition, a search query returns an author's publication metrics as a cumulative snapshot in time. This limits the ability to retrospectively examine authors over longer durations (i.e 5–10 years). Though it would be possible to capture total and self-citations in this manner, it would be near impossible to calculate an author's retrospective *h*-index five years in the past. Such an examination would further be limited as many surgeons may still be in the early stages of their careers and their data would not be representative as an "academic" staff surgeon. Though this represents a limitation for this study, it does leave the opportunity for us to re-examine these trends in a prospective-retrospective manner at different time intervals in the future (3, 5, 10 years, etc.)

Scopus search queries can also return various results ranging from a single corresponding author (more common with uncommon names), or dozens of authors (more common with common names). When numerous authors are returned in a search, a manual inspection of the author's name including middle initial, institution, and type of publication was conducted to optimize complete author inclusion. This creates the possibility human error, even in the process of a database query. Such occurrences were infrequent and we believe this leads to minimal impact on the study results. Lastly, Scopus is not a "gold standard" for author metrics and previous studies have demonstrated poor agreement between Scopus and other databases.[22]

Lastly, the *h*-index is highly dependent on discipline (medicine), specialty (general surgery), and sub-specialty (general surgery related fellowships). For example, recent studies have demonstrated mean *h*-indices for academic physicians as a whole ranging

from 5.6 to 10.3, general surgery as a whole as 14.9, and surgical oncology as 18.4.[23,24] Acknowledging such facts lead us to recommend that the results of this study be applied only to the community examined, academic MIS surgeons.

Conclusion

The average academic MIS surgeon continues to produce scholarly content at a steady and sustainable pace. Self-citation continues to be infrequent with minimal impact on the publication profiles of academic MIS surgeons. Occasionally, academic MIS surgeons will experience an increase in *h*-index due to self-citation. When such changes occur, they are typically small in magnitude, from prolific authors, and those changes are often transient.

Support

The authors received no funding or other support for the creation of this manuscript to include the following organizations: National Institutes of Health; Wellcome Trust; Howard Hughes Medical Institute; and other(s).

Disclosures

Drs. Yheulon, Balla, Ernat, Lin, and Davis have no conflicts of interest or any relevant financial ties to disclose.

References

1. Hirsch JE. An index to quantify an individual's scientific research output. *Proc Natl Acad Sci U S A*. 2005 Nov 15;102(46):16569–16572. PubMed PMID: 16275915. Pubmed Central PMCID: PMC1283832. Epub 2005/11/09. eng.
2. Bornmann L, Mutz R, Hug SE, Daniel HD. A multilevel meta-analysis of studies reporting correlations between the h index and 37 different h index variants. *J Inf*. 2011;5(3):346–359.
3. Egghe L. Dynamic h-index: the hirsch index in function of time. *J Am Soc Inf Sci Technol*. 2007;58(3):452–454.
4. Guns R, Rousseau R. Simulating growth of the h-index. *J Am Soc Inf Sci Technol*. 2009;60(2):410–417.
5. Mannella R, Rossi P. On the time dependence of the h-index. *J Inf*. 2013;7(1):176–182.
6. Tarasevich YY, Shinyaeva TS. Temporal dynamics of hirsch index. *Bull South Ural State Univ Series Math Model Program Comput Softw*. 2016;9(1):32–45.
7. Wu J, Lozano S, Helbing D. Empirical study of the growth dynamics in real career h-index sequences. *J Inf*. 2011;5(4):489–497.
8. Saleem T. The Hirsch index - a play on numbers or a true appraisal of academic output? *Int Arch Med*. 2011;4(1).
9. Radicchi F, Fortunato S, Castellano C. Universality of citation distributions: toward an objective measure of scientific impact. *Proc Natl Acad Sci U S A*. 2008;105(45):17268–17272.
10. Aghaei Chadegani A, Salehi H, Md Yunus MM, et al. A comparison between two main academic literature collections: web of science and scopus databases. *Asian Soc Sci*. 2013;9(5):18–26.
11. Rad AE, Shahgholi L, Kallmes D. Impact of self-citation on the H index in the field of academic radiology. *Acad Radiol*. 2012 Apr;19(4):455–457. PubMed PMID: 22285543. Epub 2012/01/31. eng.
12. Yheulon CG, Balla FM, Patel AD, et al. Publication patterns and the impact of self-citation among minimally invasive surgery fellowships. *American journal of surgery*. 2019 Feb;217(2), 346–9. PubMed PMID: 30257788. Epub 2018/09/28. eng.
13. Eloy JA, Svider PF, Kovalerchik O, et al. Gender differences in successful NIH grant funding in otolaryngology. *Otolaryngol Head Neck Surg Off J Am Acad Otolaryngol Head Neck Surg*. 2013 Jul;149(1):77–83. PubMed PMID: 23585148. Epub 2013/04/16. eng.
14. Rezek I, McDonald RJ, Kallmes DF. Is the h-index predictive of greater NIH funding success among academic radiologists? *Acad Radiol*. 2011 Nov;18(11):1337–1340. PubMed PMID: 21873082. Epub 2011/08/30. eng.
15. Svider PF, D'Aguillo CM, White PE, et al. Gender differences in successful National Institutes of Health funding in ophthalmology. *J Surg Educ*. 2014 Sep-Oct;71(5):680–688. PubMed PMID: 24776863. Epub 2014/04/30. eng.
16. Silvestre J, Kamath AF. Prevalence and impact of self-citation in academic orthopedic surgery. *Am J Orthoped*. 2018 Mar;47(3). PubMed PMID: 29611850. Epub 2018/04/04. eng.
17. Ioannidis JP. A generalized view of self-citation: direct, co-author, collaborative, and coercive induced self-citation. *J Psychosom Res*. 2015 Jan;78(1):7–11. PubMed PMID: 25466321. Epub 2014/12/04. eng.
18. Weis JJ, Goldblatt M, Pryor A, et al. SAGES's advanced GI/MIS fellowship curriculum pilot project. *Surg Endosc*. 2018;32(6):2613–2619.
19. Svider PF, Pashkova AA, Choudhry Z, et al. Comparison of scholarly impact among surgical specialties: an examination of 2429 academic surgeons. *Laryngoscope*. 2013 Apr;123(4):884–889. PubMed PMID: 23417821. Epub 2013/02/19. eng.
20. Rosengart TK, Mason MC, LeMaire SA, et al. The seven attributes of the academic surgeon: critical aspects of the archetype and contributions to the surgical community. *Am J Surg*. 2017 Aug;214(2):165–179. PubMed PMID: 28284432. Epub 2017/03/13. eng.
21. Soybel DI. The education of an academic surgeon. *J Surg Res*. 2001 May 1;97(1):1–8. PubMed PMID: 11319872. Epub 2001/04/26. eng.
22. Walker B, Alavifard S, Roberts S, et al. Inter-rater reliability of h-index scores calculated by Web of Science and Scopus for clinical epidemiology scientists. *Health Inf Libr J*. 2016 Jun;33(2):140–149. PubMed PMID: 27168256. Epub 2016/05/12. eng.
23. Ashfaq A, Kalagara R, Wasif N. H-index and academic rank in general surgery and surgical specialties in the United States. *J Surg Res*. 2018 Sep;229:108–113. PubMed PMID: 29936976. Epub 2018/06/26. eng.
24. Eloy JA, Svider PF, Cherla DV, et al. Gender disparities in research productivity among 9952 academic physicians. *Laryngoscope*. 2013 Aug;123(8):1865–1875. PubMed PMID: 23568709. Epub 2013/04/10. eng.