An Analysis of Publication Productivity for 1,225 Academic Neurosurgeons and 99 Departments

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Introduction

Bibliometrics is defined as the study of statistical and mathematical methods used to quantitatively analyze scientific literature. There are numerous metrics available, each with its own strengths and weaknesses. Arguably the most famous is the Hirsch or h-index, defined as the number of papers ('h') with 'h' or more citations per paper (Fig. 1). Other metrics include the contemporary h-index (hc), m-quotient (h-index divided by number of years since first publication), g-index and e-index (recognizes highly cited papers), Google's i10 (number of papers with 10 or more citations), and more.
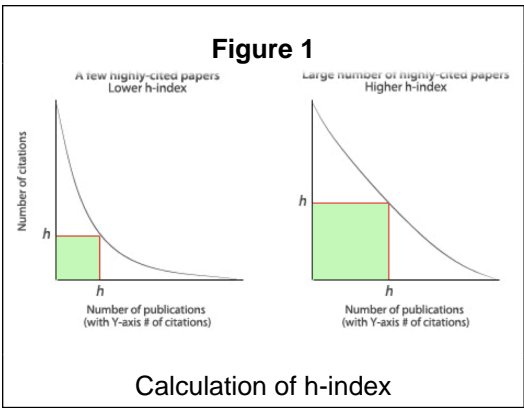
This study evaluates almost all of academic neurosurgery in order to benchmark the h-index, m-quotient, g-index and hc-index across academic ranks, sex, subspecialties and departments using all three currently available databases (Scopus, Google Scholar, and WOS).

Methods

A bibliometric profile comprised of the h-index, g-index, m-quotient, and contemporary (hc) h-index was created for 1,225 academic neurosurgeons in 99 (out of 101) programs listed by the ACGME for 2013 using the 3 currently available citation databases: Google Scholar (GS), Scopus, and Web of Science (WOS). Comparisons based on academic rank, gender and subspecialties were performed. Departments were ranked based on the summation of individual faculty h-index scores. Calculations were carried out from January-February of 2013.

Results

Table 1 shows the bibliometric measurements for the entire group of academic neurosurgeons. Table 2 depicts these measurements based on academic rank, sex and subspecialty. Although male (n=1,144) neurosurgeons had mean/median h-index, hc-index and g-index than thier female counterparts (n=81), there was no difference when corrected for academic rank. Functional/epilepsy, peripheral nerve, radiosurgery, neuro-oncology/skull base, and vascular neurosurgeons have the highest median h-indices whereas general, pediatric, and spine neurosurgeons have the lowest (Fig. 1). The top programs for publication productivity are shown in Table 3.

Table 1

Database	Citation Metric			
	h-index (Scopus*/GS/WOS)	m-quotient (Scopus*)	hc-index (GS)	g-index (GS)
Academic Rank				
Chairman	31/29/27 [29/22/26]	1.02 [1]	17 [16]	55 [50]
Professor	24/24/23 [22/17/23]	0.88 [0.84]	14 [13]	45 [42]
Associate	12/12/11 [11/10/11]	0.69 [0.60]	9 [8]	23 [21]
Assistant	8/7/7 [6/6/6]	0.57 [0.50]	6 [5]	14 [11]
Instructor	7/5/7 [4/4/3]	0.51 [0.45]	5 [2]	12 [4]
	(p<0.001)	(p<0.001)	(p<0.001)	p<0.001)
Sex				
Male	15/15/14 [11/11/10]	0.72 [0.62]	10 [8]	28 [21]
Female	10/9/8 [8/8/6]	0.64 [0.57]	7 [6]	17 [13]
	(p=0.111, p<0.291, p=0.423)	(p=0.211)	(p<0.167)	(p=0.380)
Subspecialty				
Vascular	17/16/15 [12/12/11]	0.87 [0.76]	11 [9]	31 [23]
Fxnal/epilepsy	16/15/15 [12/12/11]	0.75 [0.67]	10 [9]	29 [23]
Radiosurgery	18/19/16 [13/13/12]	0.82 [0.61]	13 [9]	35 [24]
Skull base	17/18/16 [14/14/12]	0.82 [0.77]	11 [10]	34 [28]
Pediatrics	13/13/12 [10/10/9]	0.64 [0.60]	8 [7]	23 [18]
Peripheral nerve	18/17/16 [16/16/12]	0.70 [0.65]	11 [10]	32 [34]
Spine	12/12/10 [8/9/7]	0.64 [0.50]	8 [6]	22 [15]
General	14/14/12 [9/9/9]	0.58 [0.50]	9 [6]	25 [16]
	(p<0.001)	(p=<0.001)	(p=<0.001)	(p<0.001)

Bibliometric Benchmarks for Groups of Individuals (mean and median values)

Table 2

Database	Citation Metric			
	h-index	m-quotient	hc-index	g-index
Scopus				
Manual	14.6 (11)	0.71 (0.62)	-	-
Automated	12.1 (9) (n=1180)	(n=1167)		
GS	14.1 (10) (n=1210)	-	9.3 (8) (n=1210)	26.5 (20) (n=1210)
WOS	13 (9) (n=1216)	-	-	-

Overall results across databases (meand and median values)

Figure 1

Bibliometrics across subspecialties

Table 3

Program	Rank	Mean h-index	# of Faculty	Σ h-index
University of California San Francisco (UCSF)	1	23.15	27	625
Barrow Neurological Institute (BNI)	2	20.52	25	513
Johns Hopkins	3	23.14	22	509
Pittsburgh (UPMC)	4	15.19	31	471
University of California Los Angeles (UCLA)	5	23.35	20	467
Columbia	6	25.63	16	410
Massachusetts General Hospital (MGH)	7	19.30	20	386

Departmental Rankings by Bibliometrics

Limitations

Not accounting for all individuals in programs analyzed and the assumption that citations, and the bibliometrics that arise from citation analysis, are surrogates for 'quality' in publishing

Hirsch, "…a single number can never give more than a rough approximation to an individual's multifaceted profile, and many other factors should be considered in combination in evaluating an individual".

Conclusions

This study represents the most detailed analysis of publication productivity amongst academic neurosurgeons and their programs to date. It is our hope that organized neurosurgery will adopt and continue to refine bibliometric profiling of individuals and departments.

Figure 1

A few highly-cited papers
Lower h-index

Large number of highly-cited papers
Higher h-index

Calculation of h-index