

Surgical Education's 100 Most Cited Articles: A Bibliometric Analysis



Alexander H. Matthews, BMBS,* Tarig Abdelrahman, BM,* Arfon G.M.T. Powell, MB, CHB, MSc,[†] and Wyn G. Lewis, MD, DSc, FRCS*

*Department of Surgery, University Hospital of Wales, Cardiff, United Kingdom; and [†]Division of Cancer Genetics, Cardiff University, Cardiff, United Kingdom

BACKGROUND: Bibliometric analysis highlights the key topics and publications, which have shaped surgical education. Here, the 100 most cited articles in the arena of surgical education were analyzed.

METHODS: Thomson Reuters Web of Science was interrogated using the keyword search terms “surgery” and (“learning” or “skills” or “competence” or “assessment” or “training” or “procedure-based assessments” or “performance” or “technical skills” or “curriculum” or “education” or “mentoring”] to identify all English language full articles, and the 100 most cited articles were analyzed by topic, journal, author, year, institution, and country of origin.

RESULTS: A total of 403,733 eligible articles were returned and the median citation number was 164 (range: 107–1018). The most cited article (by Seymour, Yale University School of Medicine, *Annals of Surgery*, 1018 citations) focused on the use of virtual reality surgical simulation training. *Annals of Surgery* published the highest number of articles and received the most citations ($n = 16$, 3715 citations). The countries with the greatest number of publications were the USA ($n = 45$), Canada ($n = 19$), and the UK ($n = 18$). The commonest topics included simulation ($n = 45$) and assessment of clinical competence ($n = 40$).

CONCLUSION: Surgical skill acquisition and assessment was the area of focus of 85% of the most cited contemporary articles, and this study provides the most cited references, serving as a guide as to what makes a citable published work in the field of surgical education. (*J Surg Ed* 73:919–929. © 2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgery, training, education, citations, bibliometric analysis

Correspondence: Inquiries to Wyn G. Lewis, MD, DSc, FRCS, Department of Surgery, University Hospital of Wales, Heath Park, Cardiff CF14 4XW, United Kingdom; fax: (292) 074-4553; e-mail: wyn.lewis4@wales.nhs.uk, alexmatthews@doctors.org.uk

INTRODUCTION

The development of surgical education and published works has a long and distinguished history, originating from Galen of Pergamon (AD 131–201), a prominent Greek physician, surgeon, and philosopher in the Roman Empire, and arguably the most accomplished of all medical researchers of antiquity. His theories dominated western medical science for more than 1500 years and his anatomical reports were a mainstay of medieval physicians' university curricula, with medical students continuing to study his writings well into the 19th century.¹

The western world's most senior surgical college, in 1505, the surgeons and barbers of Edinburgh, now known as Royal College of Surgeons of Edinburgh, UK, was formally incorporated as a Craft of the Burgh,² when a seal of cause (charter of privileges) was granted by the town council of Edinburgh, conferring certain privileges and imposing certain crucial duties, the most important of these being that every master surgeon should have full knowledge of anatomy and surgical procedures; that all apprentices be literate; and that this knowledge be thoroughly tested at the apprenticeship end. All clauses remain relevant to contemporary surgical practice, and with the development of formal training programs, the development of published research works has become allied with successful training progression and more recently associated with assessment of competence progression.

The standard of published works can be rated by means of citation analysis (ranking and evaluating an article or journal related to the number of citations received), thereby establishing a citation rank list, a surrogate marker of quality, which identifies the most influential publications.³ Several reports have used citation rank analysis to identify the most influential articles in specialist fields, including trauma and orthopedic surgery,⁴ plastic surgery,⁵ general surgery,⁶ urology,⁷ and oncology.^{8,9} Yet at the time of writing, only 1 report exists regarding the most influential articles in surgical education by Wohlauer, describing the 20 most cited publications between 2002 and 2012.¹⁰

The aim of this study was to amplify the above and determine the topics and specifically the studies that had been most cited in the arena of surgical education by means of a bibliometric analysis of the 100 most cited articles over the past 100 years.

METHODS

A search of the Thompson Reuters Web of Science citation indexing database and research platform was completed using the search term “surgery” and also using the following

TABLE 1. The Top 100 Cited Articles in Surgical Education

Rank	Citations	Study	Rank	Citations	Study
1	1018	Seymour et al. ¹¹	51	163	Hyltander et al. ⁶¹
2	811	Martin et al. ¹²	52	161	Herrell and Smith ⁶²
3	517	Grantcharov ¹³	53	160	Aggarwal et al. ⁶³
4	475	Reznick and Macrae ¹⁴	54	160	Derossis et al. ⁶⁴
5	473	Reznick et al. ¹⁵	55	154	Norcini and Burch ⁶⁵
6	429	Martling et al. ¹⁶	56	151	Aggarwal et al. ⁶⁶
7	422	Edmondson et al. ¹⁷	57	151	Grantcharov et al. ⁶⁷
8	387	Issenberg et al. ¹⁸	58	150	Wishner et al. ⁶⁸
9	369	Scott et al. ¹⁹	59	149	Sroka et al. ⁶⁹
10	353	Bridges and Diamond ²⁰	60	149	Debas et al. ⁷⁰
11	351	Fried ²¹	61	149	Winckel et al. ⁷¹
12	336	Ahlering et al. ²²	62	148	Gallagher and Satava ⁷²
13	322	Derossis ²³	63	146	Matsumoto et al. ⁷³
14	312	Regehr et al. ²⁴	64	146	Rosser et al. ⁷⁴
15	310	Gallagher ²⁵	65	144	Gurusamy et al. ⁷⁵
16	263	Anastakis et al. ²⁶	66	143	Yule et al. ⁷⁶
17	259	Reznick ²⁷	67	141	Larsen et al. ⁷⁷
18	247	Moorthy et al. ²⁸	68	141	Fraser et al. ⁷⁸
19	244	Schlachta et al. ²⁹	69	140	Scott and Dunnington ⁷⁹
20	238	Peters et al. ³⁰	70	139	Hamilton et al. ⁸⁰
21	223	Schauer et al. ³¹	71	138	Okuda et al. ⁸¹
22	223	Rosser et al. ³²	72	138	Gallagher et al. ⁸²
23	220	Bennett et al. ³³	73	137	Link et al. ⁸³
24	219	Greenberg et al. ³⁴	74	136	Gallagher et al. ⁸⁴
25	219	Meyers and Bennett ³⁵	75	135	Torkington et al. ⁸⁵
26	214	Satava ³⁶	76	135	Fried et al. ⁸⁶
27	213	Cook et al. ³⁷	77	134	Andreatta et al. ⁸⁷
28	212	Cotin et al. ³⁸	78	134	Datta et al. ⁸⁸
29	208	Aggarwal et al. ³⁹	79	134	Dahl et al. ⁸⁹
30	206	Vickers et al. ⁴⁰	80	133	Older ⁹⁰
31	203	Ahlberg et al. ⁴¹	81	133	Eastridge et al. ⁹¹
32	202	Vassiliou et al. ⁴²	82	133	Gallagher et al. ⁹²
33	195	Yule et al. ⁴³	83	128	Schueneman et al. ⁹³
34	193	Rosser et al. ⁴⁴	84	122	Haluck and Krummel ⁹⁴
35	190	Sturm et al. ⁴⁵	85	122	Liem ⁹⁵
36	188	Korndorffer et al. ⁴⁶	86	122	Simons et al. ⁹⁶
37	188	Kneebone ⁴⁷	87	121	Sloan et al. ⁹⁷
38	188	Datta et al. ⁴⁸	88	120	Marescaux et al. ⁹⁸
39	188	Darzi et al. ⁴⁹	89	118	Kneebone et al. ⁹⁹
40	186	Patel et al. ⁵⁰	90	117	Basdogan et al. ¹⁰⁰
41	185	Watson et al. ⁵¹	91	116	Yule et al. ¹⁰¹
42	182	Moulton et al. ⁵²	92	115	Liu et al. ¹⁰²
43	180	Taffinder et al. ⁵³	93	114	Bell et al. ¹⁰³
44	178	Hutter et al. ⁵⁴	94	111	Marshall et al. ¹⁰⁴
45	176	Sutherland et al. ⁵⁵	95	109	Dincler et al. ¹⁰⁵
46	176	Grober et al. ⁵⁶	96	109	O'Toole et al. ¹⁰⁶
47	173	Pisano et al. ⁵⁷	97	108	Carter et al. ¹⁰⁷
48	171	Barden et al. ⁵⁸	98	108	Senagore et al. ¹⁰⁸
49	169	Faulkner et al. ⁵⁹	99	107	Gallagher and Cates ¹⁰⁹
50	165	Munz et al. ⁶⁰	100	107	Ahlberg et al. ¹¹⁰

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