

Top-cited articles of the last 30 years (1985–2014) in otolaryngology – head and neck surgery

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Abstract

Background: The frequency with which a scientific article is cited by other studies is one way to measure its academic influence.

Methods: A comprehensive search was performed to identify journal articles in the otorhinolaryngology subject category of the 2013 Journal Citation Report Science Edition over the last 30 years (1985–2014). The 100 most cited articles were reviewed and basic information including the publication year, country of origin, source journal, article type and research field was collected.

Results: The 100 most cited articles were published in 15 of the 44 otorhinolaryngology journals. The number of citations per article ranged between 208 and 1559. The leading research field was otology and neurotology ($n = 50$), followed by rhinology ($n = 23$) and head and neck surgery ($n = 11$). Most papers originated in the USA ($n = 64$).

Conclusion: The possibility of an article being cited is influenced by the publication language, country of origin and source journal.

Key words: Bibliometrics; Journal Impact Factor; Otolaryngology; Publications; Review

Introduction

The frequency with which a scientific article is cited by other studies is one way to measure its academic influence. Although the academic influence of an article does not exactly correspond to its quality, it does reflect how that particular study has generated discussion, controversy and further research in its field. Moreover, citation analysis has become a common evaluation method for scientific journals, articles and authors.

Recently, several medical specialties have ranked articles within their fields by citation frequency.^{1–6} An analysis of citation classics (defined as articles that received at least 100 citations⁷) in the field of otorhinolaryngology revealed a dramatic increase in the number of publications over the last few decades.^{8,9} This may be due to significant advancements in information technology and communication that allow studies and experiments to be rapidly performed, written, reviewed, published, and cited.

This study aimed to identify the 100 most cited articles in the field of otolaryngology – head and neck surgery, and to analyse the characteristics that made them important to the ENT community. This could help future research have higher relevance to the scientific community.

Materials and methods

A total of 44 journals are included in the ‘otorhinolaryngology’ subject category of the 2013 Journal Citation Reports Science Edition (Thompson Reuters, New York, New York, USA). Using all databases in the Web of Science (Thompson Reuters), a comprehensive search for articles published in the journals in the otorhinolaryngology subject category of the 2013 Journal Citation Report Science Edition over the last 30 years (1985–2014) was performed in May 2015.

The Thompson Reuters search engine provides information on the number of times a particular article has been cited by other articles. The 100 most cited articles were selected and data was collected for each article on the journal title, impact factor (in the Journal Citation Report 2013) and five-year impact factor, author names, country of origin of the authors (if there was more than one country of origin, then the country of origin of the first author was considered), publication year, research type (basic science or clinical research), article subtype (original study, review article, case report, expert opinion) and the research field (otology and neurotology, rhinology and/or endoscopic skull base surgery, head and neck surgery, laryngology, sleep disordered breathing, and general ENT surgery).

Pearson's correlation analysis of the impact factor of the journal of publication and number of citations was performed. In addition, correlation between the publication year and number of citations of the top 100 articles was assessed. A p value of less than 0.05 was considered statistically significant. Data were collected and analysed using Microsoft Office Excel 2007 (Microsoft, Redmond, Washington, USA).

Results

From 1985 to 2014 a total of 238 125 articles were published in the 44 journals in the otorhinolaryngology subject category of the 2013 Journal Citation Report Science Edition.

The article title, author names, publication year, title of the journal in which the article was published, country of origin, number of citations and citation density for the 100 most cited articles in the field of otorhinolaryngology are listed in Table I. All were published in 15 of the 44 journals in this category (Table II); all were published in English. Ninety-nine of the papers were published between 1985 and 2007; the other was published in 2012. The year with the highest number of top 100 publications was 1986, with 10 publications (Figure 1). The number of citations ranged between 208 and 1559 (mean 327.7), and the citation density ranged between 6.7 and 89.2 (mean 17.2).

Most papers in the list were clinical articles ($n = 77$); the other 23 were basic science articles. The leading research field was otology and neurotology ($n = 50$),

followed by rhinology ($n = 23$) and head and neck surgery ($n = 11$; shown in Table III). The country of origin of these articles was mainly the USA, followed by European countries (Table IV).

The effect of the journal impact factor on ranking was evaluated by correlation analysis; no correlation was found between the journal impact factor for 2013 ($r = 0.027$, $p = 0.787$) or the five-year impact factor ($r = 0.021$, $p = 0.834$) and the number of citations. In addition, there was no correlation between publication year and the number of citations ($r = -0.130$, $p = 0.196$).

Discussion

The importance and the influence of an article in the medical literature can be estimated by the number of citations. The number of citations indicates the number of times the article has been cited in subsequent publications. It depends on both the article topic and the influence it has on the work of other authors (who cite it in their own publications). However, the number of citations and the impact factor of the journal of publication do not always indicate the quality of the original article. Indeed, both the author name(s) and journal of publication may significantly influence the number of citations. This study aimed to determine which articles published in otorhinolaryngological journals have had the most influence by ranking the 100 most cited works. In addition, the characteristics of these articles were analysed to determine which qualities make an ENT article important to other researchers working in the specialty.

TABLE I
LIST OF TOP 100 CITED OTOLARYNGOLOGIC ARTICLES

Rank	Publication	Country of origin	Citations (n)	Citation density
1	House JW, Brackmann DE. Facial nerve grading system. <i>Otolaryngol Head Neck Surg</i> 1985; 93 :146–7	USA	1559	50.3
2	Glasberg BR, Moore BCJ. Derivation of auditory filter shapes from notched-noise data. <i>Hear Res</i> 1990; 47 :103–38	UK	1186	45.6
3	Koufman JA. The otorhinolaryngologic manifestation of gastroesophageal reflux disease (GERD): a clinical investigation of 225 patients using ambulatory 24-hour pH monitoring and experimental investigation of the role of acid and pepsin in the development of laryngeal injury. <i>Laryngoscope</i> 1991; 101 :1–78	USA	694	27.8
4	Luce PA, Pisoni DB. Recognizing spoken words: the neighborhood activation model. <i>Ear Hear</i> 1998; 19 :1–36	USA	602	33.4
5	Jacobson GP, Newman CW. The development of the Dizziness Handicap Inventory. <i>Arch Otolaryngol Head Neck Surg</i> 1998; 116 :424–7	USA	519	20.0
6	Spiro RH. Salivary neoplasms: overview of a 35-year experience with 2807 patients. <i>Head Neck Surg</i> 1986; 8 :177–84	USA	516	17.2
8	Benninger MS. Adult chronic rhinosinusitis: definitions, diagnosis, epidemiology, and pathophysiology. <i>Otolaryngol Head Neck Surg</i> 2003; 129 :S1–32	USA	464	35.7
7	Epley JM. The canalith repositioning procedure: for treatment of benign paroxysmal positional vertigo. <i>Otolaryngol Head Neck Surg</i> 1992; 107 :399–404	USA	504	21.0
9	Hadad G, Bassagasteguy L, Carrau RL, Mataza JC, Kassam A, Snyderman CH <i>et al.</i> A novel reconstructive technique after endoscopic expanded endonasal approaches: vascular pedicle nasoseptal flap. <i>Laryngoscope</i> 2006; 116 :1882–6	Argentina	456	45.6
10	Kennedy DW, Zinreich SJ, Rosenbaum AE, Johns ME. Functional endoscopic sinus surgery: theory and diagnostic evaluation. <i>Arch Otolaryngol Head Neck Surg</i> 1985; 111 :576–82	USA	444	14.3
11	Rosenbek JC, Robbins JA, Roecker EB, Coyle JL, Wood JL. A penetration aspiration scale. <i>Dysphagia</i> 1996; 11 :93–8	USA	434	21.7

Continued

Table I *Continued*

Rank	Publication	Country of origin	Citations (n)	Citation density
12	Robbins KT, Medina JE, Wolfe GT, Levine PA, Sessions RB, Pruet CW. Standardizing neck dissection terminology: official report of the Academy's Committee for Head and Neck Surgery and Oncology. <i>Arch Otolaryngol Head Neck Surg</i> 1991; 117 :601–5	USA	430	17.2
13	Lanza DC, Kennedy DW. Adult rhinosinusitis defined. <i>Otolaryngol Head Neck Surg</i> 1997; 117 :S1–7	USA	419	22.0
14	Kemp DT, Ryan S, Bray P. A guide to the effective use of otoacoustic emissions. <i>Ear Hear</i> 1990; 11 :93–8	UK	404	15.5
15	Alho K. Cerebral generators of mismatch negativity (MMN) and its magnetic counterpart (MMNM) elicited by sound changes. <i>Ear Hear</i> 1995; 16 :38–51	Finland	403	19.2
16	Zheng QY, Johnson KR, Erway LC. Assessment of hearing in 80 inbred strains of mice by ABR threshold analyses. <i>Hear Res</i> 1999; 130 :94–107	USA	399	23.5
17	Gardner G, Robertson JH. Hearing preservation in unilateral acoustic neuroma surgery. <i>Ann Otol Rhinol Laryngol</i> 1988; 97 :55–66	USA	396	14.1
18	Kobal G, Klimek L, Wolfensberger M, Gudziol H, Temmel A, Owen CM <i>et al.</i> Multicenter investigation of 1036 subjects using a standardized method for the assessment of olfactory function combining tests of odor identification, odor discrimination, and olfactory thresholds. <i>Eur Arch Otorhinolaryngol</i> 2000; 257 :205–11	Germany	389	24.3
19	Kennedy DW. Functional endoscopic sinus surgery: technique. <i>Arch Otolaryngol Head Neck Surg</i> 1985; 111 :643–9	USA	388	12.5
20	Stammberger H. Endoscopic endonasal surgery: concepts in treatment of recurring rhinosinusitis. 1. Anatomic and pathophysiologic considerations. <i>Otolaryngol Head Neck Surg</i> 1986; 94 :143–7	Austria	374	12.5
21	Deems DA, Doty RL, Settle G, Mooregillon V, Shaman P, Mester AF <i>et al.</i> Smell and taste disorders, a study of 750 patients from the University of Pennsylvania Smell and Taste Center. <i>Arch Otolaryngol Head Neck Surg</i> 1991; 117 :519–28	USA	369	14.8
22	Rosenfeld RM, Andes D, Bhattacharyya N, Cheung D, Eisenberg S, Ganiats TG <i>et al.</i> Clinical practice guideline: adult sinusitis. <i>Otolaryngol Head Neck Surg</i> 2007; 137 :S1–31	USA	366	40.7
23	Byrne D, Dillon H. The national acoustic laboratories' (NAL) new procedure for selecting the gain and frequency-response of a hearing-aid. <i>Ear Hear</i> 1986; 7 :257–65	Australia	366	12.2
24	Picton TW, Alain C, Otten L, Ritter W, Achim A. Mismatch negativity: different water in the same river. <i>Audiol Neurotol</i> 2000; 5 :111–39	Canada	359	22.5
25	Minor LB, Solomon D, Zinreich JS, Zee DS. Sound- and/or pressure-induced vertigo due to bone dehiscence of the superior semicircular canal. <i>Arch Otolaryngol Head Neck Surg</i> 1998; 124 :249–58	USA	359	19.9
26	Fokkens WJ, Lund VJ, Mullol J, Bachert C, Alobid I, Baroody F <i>et al.</i> European position paper on rhinosinusitis and nasal polyps 2012. <i>Rhinology</i> 2012; 50 :1–298	The Netherlands	357	89.2
27	Bolger WE, Butzin CA, Parsons DS. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analyses for endoscopic sinus surgery. <i>Laryngoscope</i> 1991; 101 :56–64	USA	356	14.2
28	Bernier J, Cooper JS, Pajak TF, van Glabbeke M, Bourhis J, Forastiere A <i>et al.</i> Defining risk levels in locally advanced head and neck cancers: a comparative analysis of concurrent postoperative radiation plus chemotherapy trials of the EORTC (#22931) and RTOG (#9501). <i>Head Neck</i> 2005; 27 :843–50	Switzerland	352	32.0
29	Escera C, Alho K, Schroger E, Winkler I. Involuntary attention and distractibility as evaluated with event-related brain potentials. <i>Audiol Neurotol</i> 2000; 5 :151–66	Spain	349	21.8
30	Brownell WE. Outer hair cell electromotility and otoacoustic emissions. <i>Ear Hear</i> 1990; 11 :82–92	USA	346	13.3
31	Newman CW, Jacobson GP, Spitzer JB. Development of the tinnitus handicap inventory. <i>Arch Otolaryngol Head Neck Surg</i> 1996; 122 :143–8	USA	341	17.0
32	Robbins KT, Clayman G, Levine PA, Medina J, Sessions R, Shaha A <i>et al.</i> Neck dissection classification update – revisions proposed by the American Head and Neck Society and the American Academy of Otolaryngology – Head and Neck Surgery. <i>Arch Otolaryngol Head Neck Surg</i> 2002; 128 :751–8	USA	334	23.9
33	Forge A, Schacht J. Aminoglycoside antibiotics. <i>Audiol Neurotol</i> 2000; 5 :3–22	UK	334	20.9
34	Palmer AR, Russel IJ. Phase-locking in the cochlear nerve of the guinea pig and its relation to the reception potential of inner hair-cells. <i>Hear Res</i> 1986; 24 :1–15	UK	334	11.1
35	Hummel T, Kobal G, Gudziol H, Mackay-Sim A. Normative data for the Sniffin' Sticks including tests of odor identification, odor discrimination, and olfactory thresholds: an upgrade based on a group of more than 3000 subjects. <i>Eur Arch Otorhinolaryngol</i> 2007; 264 :237–43	Germany	333	37.0
36	Piccirillo JF, Merritt MG, Richards ML. Psychometric and clinimetric validity of the 20-Item Sino-Nasal Outcome Test (SNOT-20). <i>Otolaryngol Head Neck Surg</i> 2002; 126 :41–7	USA	324	23.1
37	Hassan SJ, Weymuller EA. Assessing quality of life in head and neck cancer patients. <i>Head Neck</i> 1993; 15 :485–96	USA	318	13.8
38	Parnes LS, Sun AH, Freeman DJ. Corticosteroid pharmacokinetics in the inner ear fluids: an animal study followed by clinical application. <i>Laryngoscope</i> 1999; 109 :1–17	USA	315	18.5
40	Toriumi DM, Kotler HS, Luxenberg DP, Holtrop ME, Wang EA. Mandibular reconstruction with a recombinant bone-inducing factor: functional, histologic and biomechanical evaluation. <i>Arch Otolaryngol Head Neck Surg</i> 1991; 117 :1101–12	USA	307	12.3

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Table I Continued

Rank	Publication	Country of origin	Citations (n)	Citation density
39	Jackler RK, Luxford WM, Hous WF. Congenital malformations of the inner ear: a classification based on embryogenesis. <i>Laryngoscope</i> 1987; 97 :2–14	USA	311	10.7
41	Belafsky PC, Postma GN, Koufman JA. The validity and reliability of the reflux finding score (RFS). <i>Laryngoscope</i> 2001; 111 :1313–17	USA	306	20.4
42	Naatanen R. The mismatch negativity: a powerful tool for cognitive neuroscience. <i>Ear Hear</i> 1995; 16 :6–18	Finland	305	14.5
43	Langner G. Periodicity coding in the auditory system. <i>Hear Res</i> 1992; 60 :115–42	Germany	304	12.7
44	Riley RW, Powell NB, Guilleminault C. Obstructive sleep apnea syndrome: a review of 306 consecutively treated surgical patients. <i>Otolaryngol Head Neck Surg</i> 1993; 108 :117–25	USA	303	13.2
45	Schuknecht HF, Gacek MR. Cochlear pathology in presbycusis. <i>Ann Otol Rhinol Laryngol</i> 1993; 102 :1–16	USA	301	13.1
46	Belafsky PC, Postma GN, Koufman JA. Validity and reliability of the reflux symptom index (RSI). <i>J Voice</i> 2002; 16 :274–7	USA	300	21.5
47	Byers RM, Wolf PF, Ballantyne AJ. Rationale for elective modified neck dissection. <i>Head Neck</i> 1988; 10 :160–7	USA	297	10.6
48	Liberman MC, Brown MC. Physiology and anatomy of single olivocochlear neurons in the cat. <i>Hear Res</i> 1986; 24 :17–36	USA	295	9.8
49	Dejonckere PH, Bradley P, Clemente P, Cornut G, Crevier-Buchman L, Friedrich G <i>et al.</i> A basic protocol for functional assessment of voice pathology, especially for investigating the efficacy of (phonosurgical) treatments and evaluating new assessment techniques – Guideline elaborated by the Committee on Phoniatrics of the European Laryngological Society (ELS). <i>Eur Arch Otorhinolaryngol</i> 2001; 258 :77–82	The Netherlands	288	19.2
50	Cotanche DA. Regeneration of hair cell stereociliary bundles in the chick cochlea following severe acoustic trauma. <i>Hear Res</i> 1987; 30 :181–95	USA	286	9.9
51	Cox RM, Alexander GC. The abbreviated profile of hearing-aid benefit. <i>Ear Hear</i> 1995; 16 :176–86	USA	285	13.6
52	Hogikyan ND, Sethuraman G. Validation of an instrument to measure voice-related quality of life (V-RQOL). <i>J Voice</i> 1999; 13 :557–69	USA	282	16.6
53	Stammberger H. Endoscopic endonasal surgery: concepts in treatment of recurring rhinosinusitis. 2.Surgical technique. <i>Otolaryngol Head Neck Surg</i> 1986; 94 :147–56	Austria	280	9.3
54	Picton TW, John MS, Dimitrijevic A, Purcell D. Human auditory steady-state responses. <i>Int J Audiol</i> 2003; 42 :177–219	Canada	279	21.5
55	Fokkens W, Lund V, Mullol J. European position paper on rhinosinusitis and nasal polyps. <i>Rhinol Suppl</i> 2007; 20 :1–36	The Netherlands	278	30.9
56	Lim DJ. Functional structure of the organ of Corti: a review. <i>Hear Res</i> 1986; 22 :117–46	USA	276	9.2
57	Henderson D, Bielefeld EC, Harris KC, Hu BH. The role of oxidative stress in noise-induced hearing loss. <i>Ear Hear</i> 2006; 27 :1–19	USA	274	27.4
58	Collet L, Kemp DT, Veuillet E, Duclaux R, Moulin A, Morgon A. Effect of contralateral auditory stimuli on active cochlear micromechanical properties in human subjects. <i>Hear Res</i> 1990; 43 :251–62	France	272	10.5
59	Langmore SE, Terpenning MS, Schork A, Chen YM, Murray JT, Lopatin D, Loesche WJ. Predictors of aspiration pneumonia: how important is dysphagia? <i>Dysphagia</i> 1998; 13 :69–81	USA	264	14.7
60	Santos-Sacchi J, Dilger JP. Whole cell currents and mechanical responses of isolated outer hair cells. <i>Hear Res</i> 1988; 35 :143–50	USA	261	9.4
61	Zenner HP, Zimmermann U, Schmitt U. Reversible contraction of isolated mammalian cochlear hair cells. <i>Hear Res</i> 1985; 18 :127–33	Germany	256	8.3
62	Bess FH, Dodd-Murphy J, Parker RA. Children with minimal sensorineural hearing loss: prevalence, educational performance, and functional status. <i>Ear Hear</i> 1998; 19 :339–54	USA	255	14.2
63	Friedman M, Tanyeri H, La Rosa M, Landsberg R, Vaidyanathan K, Pieri S <i>et al.</i> Clinical predictors of obstructive sleep apnea. <i>Laryngoscope</i> 1999; 109 :1901–7	USA	254	14.9
64	Zenner HP. Motile responses in outer hair cells. <i>Hear Res</i> 1986; 22 :83–90	Germany	253	8.4
65	Stammberger H, Posawetz W. Functional endoscopic sinus surgery: concept, indications and results of the Messerklinger technique. <i>Eur Arch Otorhinolaryngol</i> 1990; 247 :63–76	Austria	252	9.7
66	Steiner W. Results of curative laser microsurgery of laryngeal carcinomas. <i>Am J Otolaryngol</i> 1993; 14 :116–21	Germany	248	10.8
67	Senior BA, Kennedy DW, Tanabodee J, Kroger H, Hassab M, Lanza D. Long-term results of functional endoscopic sinus surgery. <i>Laryngoscope</i> 1998; 108 :151–7	USA	247	13.7
68	Suen JS, Arnold JE, Brooks LJ. Adenotonsillectomy for treatment of obstructive sleep apnea in children. <i>Arch Otolaryngol Head Neck Surg</i> 1995; 121 :525–30	USA	246	11.7
69	Gates GA, Cooper JC, Kannel WB, Miller NJ. Hearing in the elderly: the Framingham cohort, 1983–1985. 1. Basic audiometric test results. <i>Ear Hear</i> 1990; 11 :247–56	USA	246	9.5
70	Wangemann P. K+ cycling and the endocochlear potential. <i>Hearing Res</i> 2002; 165 :1–9	USA	243	17.4
71	Rance G, Beer DE, Cone-Wesson B, Shepherd RK, Dowell RC, King AM <i>et al.</i> Clinical findings for a group of infants and young children with auditory neuropathy. <i>Ear Hear</i> 1999; 20 :238–52	Australia	243	14.3
72	Doty RL, Marcus A, Lee WW. Development of the 12-item cross-cultural smell identification test (CC-SIT). <i>Laryngoscope</i> 1996; 106 :353–6	USA	242	12.1

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Table I *Continued*

Rank	Publication	Country of origin	Citations (n)	Citation density
73	Schreiner CE, Urbas JV. Representation of amplitude modulation in the auditory cortex of the cat. 2. Comparison between cortical fields. <i>Hear Res</i> 1988; 32 :49–64	Germany	241	8.6
74	Ylikoski J, Pirvola U, Moshnyakov M, Palgi J, Arumae U, Saarna M. Expression patterns of neurotrophin and their receptor mRNAs in the rat inner ear. <i>Hear Res</i> 1993; 65 :69–78	Finland	240	10.4
75	Lund VJ, Kennedy DW. Staging for rhinosinusitis. <i>Otolaryngol Head Neck Surg</i> 1997; 117 :S35–40	UK	239	12.6
76	von Ilberg C, Kiefer J, Tillein J, Pfenningdorff T, Hartmann R, Sturzebecher E <i>et al.</i> Electric-acoustic stimulation of the auditory system: new technology for severe hearing loss. <i>ORL</i> 1999; 61 :334–40	Germany	237	13.9
77	Ohlemiller KK, Wright JS, Dugan LL. Early elevation of cochlear reactive oxygen species following noise exposure. <i>Audiol Neurotol</i> 1999; 4 :229–36	USA	235	13.8
78	Jankowski R, Auque J, Simon C, Marchal JC, Hepner H, Wayoff M. Endoscopic pituitary tumor surgery. <i>Laryngoscope</i> 1992; 102 :198–202	France	233	9.7
79	Cain WS, Gent JF, Goodspeed RB, Leonard G. Evaluation of olfactory dysfunction in the Connecticut Chemosensory Clinical Research Center. <i>Laryngoscope</i> 1988; 98 :83–8	USA	230	8.2
80	Rauschecker JP. Parallel processing in the auditory cortex of primates. <i>Audiol Neurotol</i> 1998; 3 :86–103	USA	229	12.7
81	Robinson K, Gatehouse S, Browning GG. Measuring patient benefit from otorhinolaryngological surgery and therapy. <i>Ann Otol Rhinol Laryngol</i> 1996; 105 :415–22	UK	228	11.4
82	Martin GK, Lonsbury-Martin BL, Probst R, Scheinin SA, Coats AC. Acoustic distortion products in rabbit ear canal. II. Sites of origin revealed by suppression contours and pure-tone exposures. <i>Hear Res</i> 1987; 28 :191–208	USA	227	7.8
83	Gatehouse S, Noble W. The speech, spatial and qualities of hearing scale (SSQ). <i>Int J Audiol</i> 2004; 43 :85–99	UK	226	18.8
84	Myer CM, O'Connor DM, Cotton RT. Proposed grading system for subglottic stenosis based on endotracheal tube sizes. <i>Ann Otol Rhinol Laryngol</i> 1994; 103 :319–23	USA	226	10.3
85	Urken ML, Weinberg H, Buchbinder D, Moscoso JF, Lawson W, Catalano PJ <i>et al.</i> Microvascular free flaps in head and neck reconstruction. Report of 200 cases and review of complications. <i>Arch Otolaryngol Head Neck Surg</i> 1994; 120 :633–40	USA	224	10.2
86	Murofushi T, Halmagyi GM, Yavor RA, Colebatch JG. Absent vestibular evoked myogenic potentials in vestibular neurolabyrinthitis: an indicator of inferior vestibular nerve involvement? <i>Arch Otolaryngol Head Neck Surg</i> 1996; 122 :845–8	Australia	223	11.2
87	Friedman CD, Costantino PD, Jones K, Chow LC, Pelzer HJ, Sisson GA Sr. Hydroxyapatite cement. II. Obliteration and reconstruction of the cat frontal sinus. <i>Arch Otolaryngol Head Neck Surg</i> 1991; 117 :385–9	USA	222	8.9
88	Spicer SS, Schulte BA. The fine structure of spiral ligament cells relates to ion return to the stria and varies with place-frequency. <i>Hear Res</i> 1996; 100 :80–100	USA	221	11.0
89	Kemp DT. Otoacoustic emissions, travelling waves and cochlear mechanisms. <i>Hear Res</i> 1986; 22 :95–104	UK	220	7.4
90	Frisina RD, Smith RL, Chamberlain SC. Encoding of amplitude modulation in the gerbil cochlear nucleus: I. A hierarchy of enhancement. <i>Hear Res</i> 1990; 44 :99–122	USA	217	8.4
91	Schuller DE, Metc B, Stein DW, Mattox D, McCracken JD. Preoperative chemotherapy in advanced resectable head and neck cancer: final report of the Southwest Oncology Group. <i>Laryngoscope</i> 1988; 98 :1205–11	USA	216	7.7
92	Nadol JB, Young YS, Glynn RJ. Survival of spiral ganglion cells in profound sensorineural hearing loss: implications for cochlear implantation. <i>Ann Otol Rhinol Laryngol</i> 1989; 98 :411–16	USA	215	8.0
93	Wilkes CH. Internal derangements of the temporomandibular joint. Pathological variations. <i>Arch Otolaryngol Head Neck Surg</i> 1989; 115 :469–77	USA	215	8.0
94	Moore BC, Glasberg BR. Formulae describing frequency selectivity as a function of frequency and level, and their use in calculating excitation patterns. <i>Hear Res</i> 1987; 28 :209–25	UK	215	7.4
95	Cruz RM, Lambert PR, Rubel EW. Light microscopic evidence of hair cell regeneration after gentamicin toxicity in chick cochlea. <i>Arch Otolaryngol Head Neck Surg</i> 1987; 113 :1058–62	USA	214	7.4
96	Hegazy HM, Carrau RL, Snyderman CH, Kassam A, Zweig J. Transnasal endoscopic repair of cerebrospinal fluid rhinorrhea: a meta-analysis. <i>Laryngoscope</i> 2000; 110 :1166–72	USA	213	13.3
97	Ruda JM, Hollenbeak CS, Stack BC. A systematic review of the diagnosis and treatment of primary hyperparathyroidism from 1995 to 2003. <i>Otolaryngol Head Neck Surg</i> 2005; 132 :359–72	USA	212	19.3
98	Sher AE, Thorpy MJ, Shprintzen RJ, Spielman AJ, Burack B, McGregor PA. Predictive value of Müller maneuver in selection of patients for uvulopalatopharyngoplasty. <i>Laryngoscope</i> 1985; 95 :1483–7	USA	209	6.7
99	Hoffman HT, Porter K, Karnell LH, Cooper JS, Weber RS, Langer CJ <i>et al.</i> Laryngeal cancer in the USA: changes in demographics, patterns of care, and survival. <i>Laryngoscope</i> 2006; 116 :1–13	USA	208	20.8
100	Koufman JA, Aviv JE, Casiano RR, Shaw JY. Laryngopharyngeal reflux: position statement of the committee on speech, voice, and swallowing disorders of the American Academy of Otolaryngology – Head and Neck Surgery. <i>Otolaryngol Head Neck Surg</i> 2002; 127 :32–5	USA	208	15.0

TABLE II NUMBER OF ARTICLES IN THE TOP 100 LIST BY SOURCE JOURNAL		
Journal name	Publications (n)	Journal impact factor (2013)
Hearing Research	19	2.848
Laryngoscope	15	2.032
Archives of Otolaryngology – Head and Neck Surgery	15	1.748
Otolaryngology – Head and Neck Surgery	12	1.721
Ear and Hearing	11	2.833
Audiology and Neurotology	5	1.852
Annals of Otolology, Rhinology and Laryngology	5	1.054
Head and Neck	4	3.006
European Archives of Otorhinolaryngology	4	1.608
Rhinology	2	2.779
Disphagia	2	1.602
International Journal of Audiology	2	1.427
Journal of Voice	2	0.944
American Journal of Otolaryngology	1	1.078
ORL	1	0.667

Some problems are associated with the use of this method alone to evaluate the importance of an article, an author's publication record or the overall performance of a journal. Firstly, this type of citation analysis does not account for self-citation, citation in textbook and lectures, and the possibility that authors will cite articles published in a journal in which they seek to publish their own work.^{10–12} Secondly, the time lag inherent in citation analysis places the most recently published articles at a disadvantage.^{13–15} Indeed,

despite the evolving focus on improving research quality and the importance of evidence-based practice, most of the top 100 cited papers were published before 2007 and the year with the highest number of publications cited ($n = 10$) was 1986. Thirdly, this study was limited by the categorisation of journals in the Web of Science. By design, this study considered only journals in the otorhinolaryngology subject category of the 2013 Journal Citation Report Science Edition. Although this represents a complete list of the high-impact journals in the otorhinolaryngology field, it means that articles published in the general medical and basic science literature and those published in journals covering related disciplines (e.g. neurosurgery and maxillofacial surgery) were not considered. Therefore, some articles that have influenced ENT specialists have probably been left out. Fourthly, there was an obvious bias toward articles published in English language journals. Finally, authors are more likely to cite articles because they were previously cited rather than for their content or quality, thus causing a 'snowball effect' on the number of citations.

Of the top 100 articles in the otorhinolaryngology specialty, the most cited article had 1559 citations and the least-cited article had 208 citations. Therefore, every article on the list can be considered a 'citation classic', because the arbitrary but frequently used benchmark is 100 citations.^{7,9}

Characteristics of the top 100 otorhinolaryngology articles were similar to those reported for other disciplines. Most articles originated in the USA, similar to the findings of reviews of anaesthesia, paediatrics, plastic surgery, emergency medicine, general surgery and orthopaedic surgery.^{1–5,11} This indicates that US authors may have an advantage when publishing

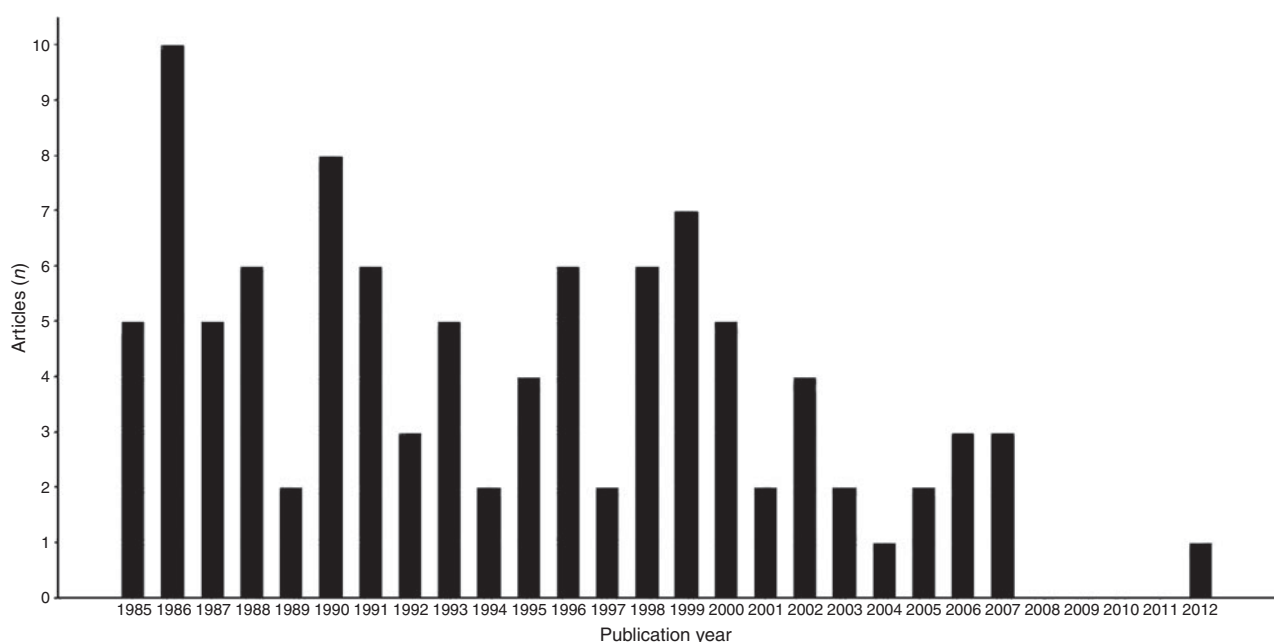


FIG. 1

Graph showing the number of articles in the top 100 cited articles by study year.

TABLE III
NUMBER OF ARTICLES IN THE TOP 100 LIST BY
SUBSPECIALTY

Subspecialty	Publications (n)
Otology and neurotology	50
Rhinology and/or endoscopic skull base surgery	23
Head and neck surgery	11
Laryngology	10
Sleep disordered breathing	4
General ENT	2

TABLE IV
TOP 100 PUBLICATIONS BY COUNTRY OF ORIGIN

Country of origin	Publications (n)	Publications per million people
North America		
– USA	64	0.20
– Canada	2	0.06
South America		
– Argentina	1	0.02
Europe		
– UK	9	0.14
– Germany	8	0.10
– Austria	3	0.35
– Finland	3	0.56
– The Netherlands	3	0.18
– France	2	0.03
– Spain	1	0.02
– Switzerland	1	0.12
Oceania		
– Australia	3	0.13

articles in international journals. If the publication number per million of population is considered, then some European countries do as well as or even better than the USA (Table IV). However, there are no publications from Asia or Africa in the top 100 list. The predominance of clinical articles was also noted in other reviews.^{2–5,11} When the most common ENT subspecialties are considered, otology and neurotology is best represented in the top 100 list (50 per cent of articles), followed by rhinology (23 per cent) and head and neck surgery (11 per cent).

Although the journal impact factor did not correlate with the number of citations, all articles in the top 100 list were published in only 15 of the total 44 journals in the otorhinolaryngology subject category of the 2013 Journal Citation Report Science Edition. Thus, the journal of publication is an important factor in determining the possibility that an article will be cited.

Conclusion

This review of the 100 most cited articles in otorhinolaryngology shows that the journal of publication and country of origin are the most important factors in determining the possibility of citation. Future bibliometric analyses could help confirm these observations or identify changes in the characteristics of the most influential publications.

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Dr R Lenzi takes responsibility for the integrity of the content of the paper

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