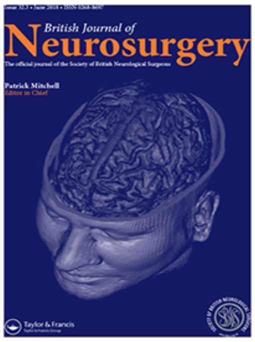

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ORIGINAL ARTICLE

Trends in the quality of work presented at the society of british neurological surgeons meetings: 1975 to 2010

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ABSTRACT

Background: The quality of scientific publications in clinical journals is well studied but the quality of work presented at medical conferences less so.

Aims: To describe trends in the quality of presentations at the Society of British Neurological Surgeons [SBNS] conference between 1975 and 2010 and the factors associated with higher quality work in order to consider what might improve publication rates.

Methods: Analysis was conducted in 5-year time periods (i.e. 1975–1979, 1985–1989, 1995–1999, 2005–2009). Published abstracts were used to identify conference presentations. Quality metrics included level of evidence of the presentation and eventual publication within 5 years. Publication 5-year citation count and destination journal impact factor were further used to assess publication quality. Statistical analysis was carried out using SPSS.

Results: Of the 1711 presentations in total, 479 (28%) were published. The British Journal of Neurosurgery (93, 19%) was the favoured destination. Although the total number of publications has increased, given the increase in the number of presentations, the proportion of work published has decreased (80/179; 45% in the 1970s to 113/721; 16% in the 2000s). The growth in the impact factor of published work was better than that found in leading neurosurgical journals, but lower than for leading medical journals. In a multivariate model, presentations using a higher level of evidence increased the likelihood of publication (AOR 6.7 95% CI 3.7, 12.1), whilst presenting at conferences after the 1970s reduced the likelihood of publication; 1985–1989 (AOR 0.3, 95% CI 0.2, 0.4), 1995–1999 (0.4, 95% CI 0.3, 0.7) and 2005–2009 (0.1, 95% CI 0.1, 0.2).

Conclusion: SBNS conferences today contain more presentations and yield more publications than ever before. However, the increased volume may dilute the quality of work presented.

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Meeting presentations; levels of evidence; neurosurgery; citation count; publication rate

Introduction

A variety of metrics exist to assess the quality of published studies. Common measures include the Oxford Evidence Based Medicine Levels of Evidence classification and journal impact factor.[1,2] The levels of evidence are a 5 stage, hierarchical taxonomy largely informed by the study design, ranging from level 1 evidence (Meta – analyses of RCTs, and/or high quality RCTs) to level 5 evidence (case reports and mechanistic based reasoning). Journal impact factor is a measure of current citation of articles published in the preceding 2 years. As a metric for comparison it has been criticised, as for example a research field with a greater number of academics or with a larger number of participants will often, through greater research output and referencing, generate higher impact factors which may not necessarily indicate research quality. Additionally, overall citation numbers have increased with time and therefore naturally impact factors. However, impact factor is still widely used and can provide a good idea of a journal's importance and may be an indirect measure of an article's significance.[3,4]

Whilst not without limitations, these metrics have been used extensively to analyse medical journals, where the quality of published research has increased over the last 30 years.[2,5–8] Many journals now provide a level of evidence rating for articles which they publish.[1,9] The academic output of practitioners is also closely analysed. Even within Neurosurgery, recent papers have assessed the productivity of both British trainees and consultants.[10,11]

Conference presentations are another important platform, particularly for continuing professional development (CPD).[12] Whilst journal articles are recognised to have improved in the levels of evidence of studies over the years, changes to the presentations in medical and surgical conferences are relatively unknown. The quality of medical conferences is disputed by some; Ioannidis[13] questions the usefulness of encouraging mass production of abstracts, especially as they undergo a comparatively less stringent peer-review process before their acceptance for presentation at conferences. He argues that the subsequent lack of published material is a sign of their diluted quality.

The Society of British Neurological Surgeons (SBNS) conference has been a regular event ever since 1926. We set out to describe trends in the quality of presentations at the SBNS conferences between 1975 and 2010, and to consider the factors associated with publication.

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Methods

Presented work at SBNS was identified from the published abstracts, initially in the Journal of Neurology Neurosurgery and Psychiatry [JNNP] (1975–1979, 1985–1989, 1995- April 1996) and later in the British Journal of Neurosurgery [BJN] (Sept 1996 to present). Abstracts from the joint meeting with German and Dutch Neurosurgical Societies in May 1978 were also published in Acta Neurochirurgica.

To compensate for fluctuations in data, analysis was conducted over 5-year time periods during, 1975–1979; 1985–1989; 1995–1999 and 2005–2009. The title, names of authors and year of presentation were all recorded. Potential factors associated with publication were taken from previous articles. This included the type of presentation (oral or poster), study design and whether there was a negative or positive result. If not otherwise specified, abstracts were considered oral presentations. A positive result was defined as a result which demonstrated a statistically significant difference between experimental and control arms. Based on the levels of evidence criteria, set out by the Oxford Centre for Evidence based Medicine, randomised controlled trials, meta-analyses and systematic reviews were considered higher level evidence than case reports and case series.[2] For the purpose of this paper, this assessment will be referred to as 'level of evidence'. Basic science studies were considered a separate, single group.

Whether the study was published within 5 years, and if so its destination journal impact factor and article's 5-year citation count was also recorded. In order to identify a subsequent publication, a stepwise and systematic search was carried out using Pubmed (MEDLINE) and Google Scholar®. Key terms from abstract titles' were used as search terms initially, if nothing was found lead authors were identified, and their publication history reviewed for relevant time periods.

Impact factor is the number of times a journal's citable articles from the previous 2 years were cited in the current year of interest. Since 1975 journal impact factors have been recorded annually in the Journal Citation Report (Thomas Reuters, New York). For 1985 onwards, this data was retrievable. Unfortunately, we were unable to obtain reports for 1975–1979, therefore Web of Science (Thomas Reuters, New York) was used to manually calculate a journal's impact factor. It was also used to identify an article's 5-year citation count, searching all databases. Web of Science citation analysis is limited to journals listed in its database only. If an article was not identified in Web of Science, Google Scholar was used. Citation analysis of book chapters was performed using Bookmetrix® (Springer, Berlin). Impact factors could not be calculated for books, and therefore these were not included in impact factor averages.

The proportions of levels of evidence published were compared for each time period to identify trends. The proportion of published presentations, average impact factor and 5-year citation count were compared to assess for changes in the quality of presented work. To control for the increase in medical citation, and therefore journal impact factors, these metrics were compared to leading general neurosurgical journals [BJN, Neurosurgery, Journal of Neurosurgery and Acta Neurochirurgia] and also leading medical journals [Lancet, Journal of the American Medical Association, British Medical journal and New England Journal of Medicine]. The BJN was first published in 1987 and Neurosurgery in 1977. In this study their impact factors were therefore only included from 1995 and 1979 onwards.

Statistical analysis was performed using SPSS (Chicago, IL) and significance set at $p < .05$. Non-parametric data was assessed using the Chi-Squared test. Parametric data was assessed using the one-way analysis of variance [ANOVA]. Multivariate analysis was performed using Binary Logistic Regression. Correlations were assessed using Pearson's Rho.

Results

Conferences were biannual with the exception of 1975, 1979 and 2007 where there were just single meetings. Joint conferences were intermittently held with other national and international bodies. Typically, these were held in the UK and invited organisations were sister neurosurgical societies. Exceptions were the Neuroanaesthetist Traveling Club (Spring 1988), Society of British Neuroradiologists (Winter 1988), Association of British Neurologists (Spring 1995) and Netherlands Society of Neurology (Spring 2005).

Number of presentations

In total, 1711 presentations were given at SBNS conferences during the selected study intervals. Poster presentations were only mentioned in the published conference proceedings for Spring 1995 and Autumn 2006 onwards. In 2009 posters were published by title only and so level of evidence and positive or negative findings could not be recorded.

The number of presentations given has increased over time from an average of 22.4 per conference in the 1975–1979 period, to 80.1 in the 2005–2009 time period (ANOVA, $p < .0005$; Figure 1). The inclusion of posters in published proceedings contributes to this (i.e. 0 during the 1970s, 16.9 per conference during the 2005–2009), but even with their exclusion oral presentations have increased (ANOVA, $p < .0005$) (Figure 1).

Levels of evidence of presentations

Case series were the most popular study type presented ($N = 1091$, 64%). Other study types included case reports ($N = 48$, 3%), randomised control trials (RCT) ($N = 47$, 3%) and meta-analysis/systematic reviews ($N = 13$, 1%). Overall 124 (7%) of presentations were primarily considered basic science studies.

Although the actual number of higher-level studies has increased over time, owing to an increase in the number of presentations, the proportion of higher-level studies such as meta-analyses, RCTs and systematic reviews has decreased (Chi Squared, $p = .01$), although the prevalence of RCTs remains the same (Chi Squared, $p = .8$). Basic science studies have also decreased over time (Chi Squared, $p < .005$) (Figure 2(A)). Lower quality studies such as Case Series and Case Reports increased in number over time and although their prevalence at conferences differed between eras (Chi Squared, $p < .005$), they remain the most prevalent study design (Figure 2(B)).

Publication rates of presentations

Of the 1711 presentations given, 479 (28%) were published as full articles including 24 (5%) as book chapters (Table 1). The majority were published in neuroscience-themed journals (383, 80%), of which 242 (51%) were neurosurgery-only journals. The favoured destination was the British Journal of Neurosurgery ($N = 93$, 19%).

Of the 179 presentations from 1975 to 1979, 80 (45%) were published as full articles or book chapters, as were 75 (28%) of

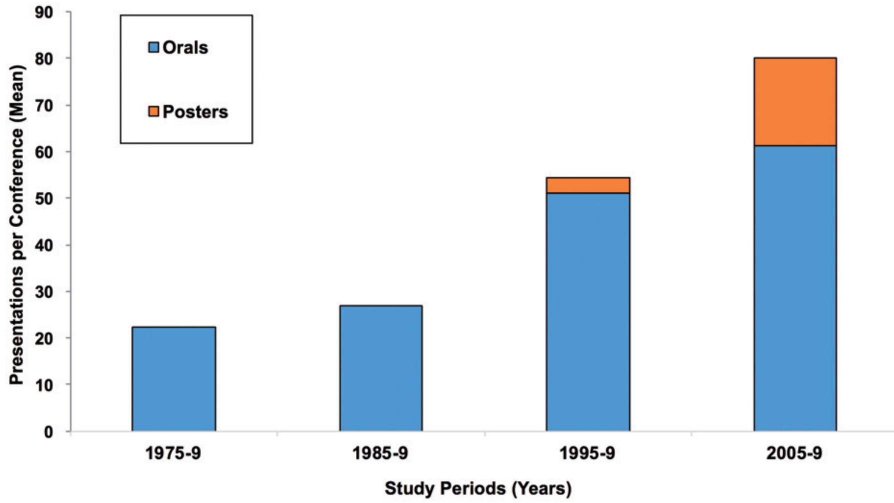

Figure 1. Trends in the number of presentations. Bar chart of the mean number of presentations per conference, including where applicable the mean number of poster presentations compared to oral presentations. Regardless of presentation format, the number of presentations given has increased over time.

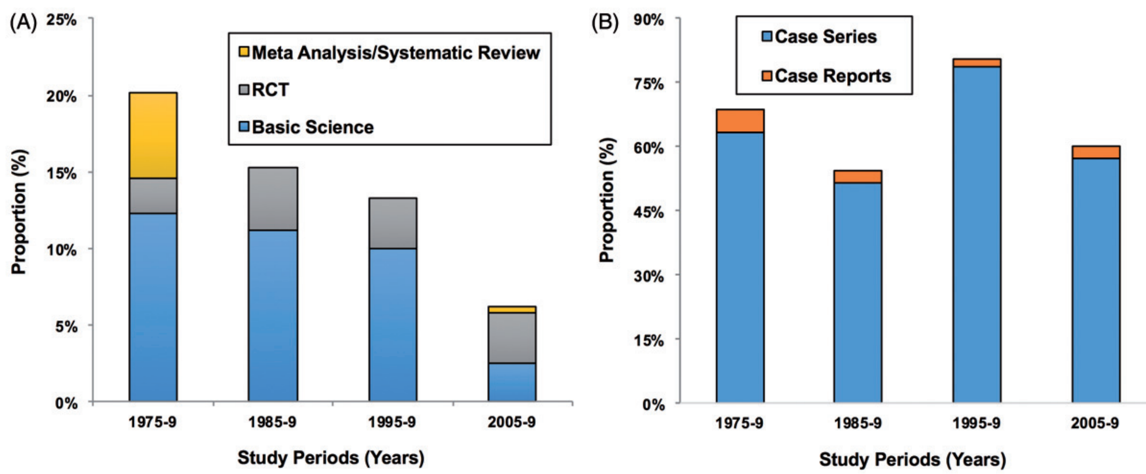

Figure 2. Trends in the level of evidence. Bar charts of the percentages of higher level (A; meta-analysis, systemic review, RCT and basic science studies) and lower level evidence (B; case series and case studies) per study period. The contribution of lower level evidence remains a relatively stable, and significant proportion of presented work. The contribution of basic science, meta-analysis and systematic review studies have decreased, whereas RCTs have remained similar.

the 268 presentations given during 1985–1989; 211 (39%) of the 543 presentations given during 1995–1999 and 113 (16%) of the 721 presentations given during 2005–2009.

The absolute number of publications per conference has increased in line with the increase in the number of presentations per conference, but the proportion of work published has decreased (Figure 3 and Table 1). The average time to publication was 1.5 years (SD ±1.2 years) after presentation, ranging from −2.2 years to +5 years. Only 44 articles were published prior to presentation.

Impact factor analysis

Publications without an impact factor, i.e. book chapters ($N=24$) and articles published in initial journal editions ($N=22$), were excluded from impact factor analysis. The average impact factor of destination journals was found to have increased from 1.4 (±1.0) in the 1970s to 3.3 (±1.7) in the 2000s (Figure 4(A)). This correlated with both the performance of general neurosurgical journals (Pearson Correlation, 0.83 $p < .0005$) and lead medical journals (Pearson Correlation, 0.64 $p < .0005$). Average growth in impact factors for general medical journals was 71.5% per study period, compared to 37.3% for SBNS published articles and 21.4% for general neurosurgical journals. Growth of impact factor for SBNS publications was therefore better than general neurosurgical journals but lower than for leading general medical journals (Figure 4(A)).

Table 1. Factors associated with subsequent journal publication.

	Totals	Published (%)	Not published (%)	Sig
	1711	479 (28)	1232 (72)	
Study period				<0.005
1975–1979	179	*80 (45)*	*99 (55)*	
1985–1989	268	*75 (28)*	*193 (72)*	
1995–1999	543	*211 (39)*	*332 (61)*	
2005–2009	721	*113 (16)*	*608 (84)*	
RCT/MA/SR	60	41 (9)	19 (2)	<0.005
Basic science	124	48 (10)	76 (6)	0.006
Poster	200	39 (8)	161 (13)	0.004
Mixed conference	238	88 (18)	150 (12)	0.003
Positive findings	1285	353 (74)	932 (76)	0.40

For study period, percentages are expressed per published and non-published category per study period or dichotomised variable.

Publication 5-year citation count

Fifteen articles were published within the last 5 years and excluded from 5-year citation analysis, but of the remaining

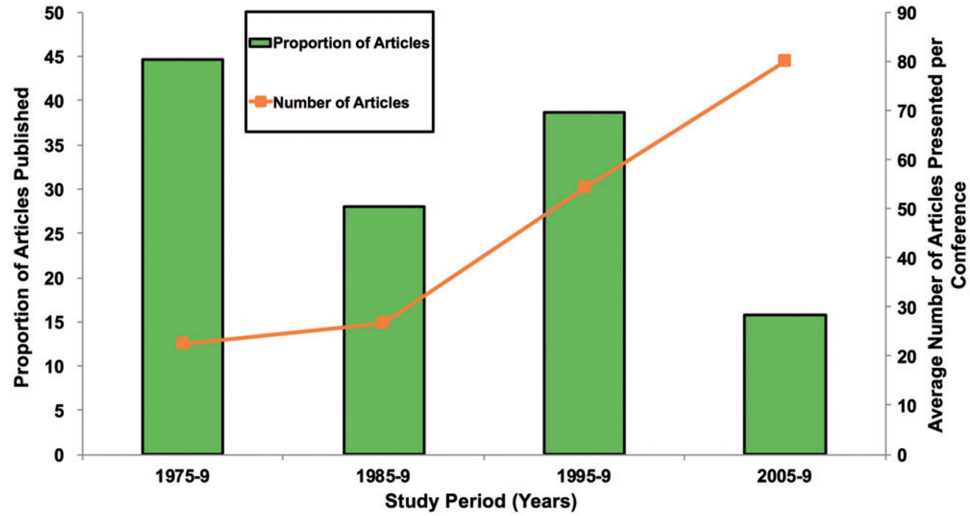

Figure 3. Trends in the number of published presentations. Bar chart of the proportion of presentations subsequently published and line graph of the average number of presentations given per conference. The overall number of presentations published has increased, but due to increasing numbers of presentations, the proportion of presentations published has decreased.

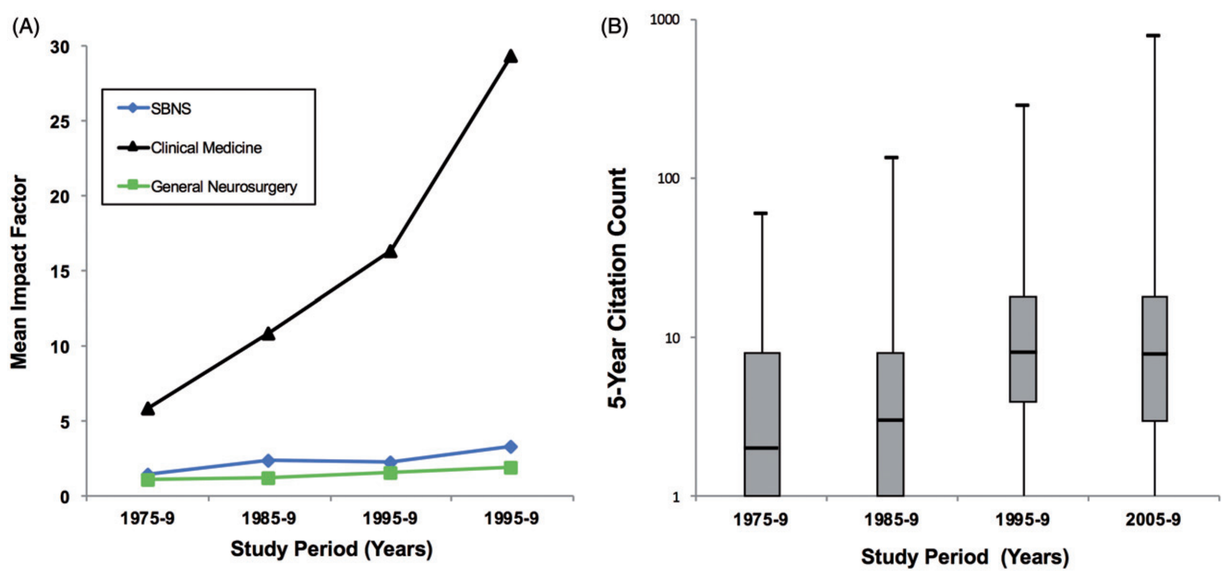

Figure 4. Trends in the performance of published presentations. Line graph of the mean impact factor for published presentations (A) of published presentations at SBNS meetings compared to, General Neurosurgical and General medical journals. (B) Box-and-whisker plots of the 5-year citation counts for published presentations. Box plots depict the median (horizontal black line), interquartile range (box) and the maximum/minimum values (tails). The performance of published SBNS presentations out performs lead neurosurgical but not clinical medical journals, even controlling for baseline impact. Growth in 5-year citation rates has plateaued.

published presentations the average 5-year citation count was found to be 15.1 (±44). Fifty-six articles were not cited in their first 5 years. "Deep brain stimulation plus best medical therapy versus best medical therapy alone for advanced Parkinson's Disease (PD SURG trial): a randomised, open-label trial", published in the Lancet, was the most cited article after 5 years in this series, having been cited 779 times.[14]

Our findings indicate that the mean citation count increased across the study period, from 5.9 in the 1970s, to 29.6 in the 2000s. However, this was distorted by high-impact publications such as the aforementioned article, and the median/interquartile range has been unchanged in more recent years (Figure 4(B)).

Factors associated with publication

Factors were compared between SBNS presentations that were published and those that were not. Between group differences are found in Table 1. Oral presentations, presentations at earlier meetings or mixed speciality meetings, concerning basic science or using a higher level of evidence were more likely to be published. In a multivariate model, presentations using a higher level of evidence increased the likelihood of publication (AOR 6.7 95% CI 3.7, 12.1) whilst presenting at conferences after the 1975–1979 reduced the likelihood of publication; 1985–1989 (AOR 0.3, 95% CI 0.2, 0.4), 1995–1999 (0.4, 95% CI 0.3, 0.7) and 2005–2009 (0.1, 95% CI 0.1, 0.2).

Factors associated with higher-impact publication

The impact factor of journals in which the SBNS presentations were later published was compared to the average general neurosurgical mean of their era and dichotomized to be of either a higher impact (if it was greater than this value) or of lower impact (if it was lower than this value). Of the 432 presentations

Table 2. Factors associated with higher impact factor publications.

	Total	Higher IF	Lower IF	Sig
Total	432	234 (54)	198 (46)	
Mean impact factor (± SD)		3.8 ± 4	0.6 ± 3.3	<0.005
Mean 5-year citation		25 ± 62	6.4 ± 0.1	<0.005
Study period (%)				0.22
1975–1979	60	35 (58)	25 (42)	
1985–1989	53	35 (66)	18 (34)	
1995–1999	207	106 (51)	101 (49)	
2005–2009	112	58 (52)	54 (48)	
Time to publication (Years, ± SD)		0.6 ± 1.8	0.6 ± 1.3	0.6
RCT/MA/SR (%)	40	32 (14)	8 (1)	<0.001
Basic science (%)	42	35 (15)	7 (4)	<0.001
Poster (%)	38	21 (9)	17 (9)	0.89
Mixed conference (%)	81	59 (25)	22 (11)	<0.001
Positive findings (%)	334	184 (78)	150 (76)	0.48

The impact factor of journals in which the SBNS presentations were later published was compared to the average general neurosurgical mean of their era and dichotomized to be of either a higher impact (if it was greater than this value) or of lower impact (if it was lower than this value). percentages are expressed per high or low impact category.

published as journal articles with an impact factor, 234 (54%) were published in 'higher-impact' journals (Table 2). In a multivariate model, presentations at mixed specialty meetings (AOR 5.1, 95% CI 2.2, 12.0), using a higher level of evidence (AOR 3.9, 95% CI 1.7, 8.8) or concerning basic science (AOR 2.3, 95% CI 1.3, 4.0) had almost 5, 4 and 3-fold benefits respectively on attaining higher-impact publication.

Discussion

There is much to be lauded when analyzing the trends of work presented at the SBNS conference. Since the 1970s there has been an increase in both the absolute number of presentations given and number of presentations published. The average impact factor of destination journals has increased beyond that of the general neurosurgical field, and average citation counts have also increased.

There was a slight increase in the number of RCTs over the study period, but a decrease in the number of higher level studies presented at conferences. There has also been a reduction in the number of presentations containing work on basic science. The rate of publications for SBNS conference presentations has decreased from 45% for the period 1975–09 to 16% for the period 2005–09. This is a marked decrease even from the average reported publication rate of 36.6% for the period 2000–05.[10] In addition, the growth in impact factor of published work falls well below that of leading general medical journals, and the growth in citation may have plateaued over the last decade. As such, one view point is that the quality of work presented at the conference is being diluted and not keeping pace with global medical research.

It has recently been proposed to use publication rates as a quality indicator for medical conferences.[15] When comparing to a handful of similar studies in other medical and surgical sub-specialities, the SBNS presentations seems to be outperforming conferences organised by the American Academy of Optometry (21% in 2006), the Italian Society of Hygiene and Public health (23.5% for 2005-07) and the American Society of Anaesthesia (22% in 2009).[16–19] However, it would appear to be performing at a lower level than conferences convened by the American Society for Hand Surgery (46% in 2000–2005), Canadian congress of neurologic surgeons (50.8% for 2005), Vascular Society of Great Britain and Ireland (59.4% in 2001–2002) and the Dutch Surgical Society (68.6% 2007–2012), or international conferences such as those convened by the Cervical Spine Research Society Europe (42% for 2007–2012).[6,15,16,20] Additionally, in a systematic review of such articles searching up to 2001, the average 5 year publication rate was 46%.[23]

Within the SBNS meetings, presentation to publication conversion appears to be a topic of interest; the leading poster in Newcastle 2016 demonstrated[21] that the SBNS published less presentations than their American equivalent, whilst at Oxford 2017 a group from King's College has demonstrated that clinical throughput is related to publication output.[22] This latter finding would correlate with our finding the most commonly presented study design was a case series.

Our results are also of interest considering the recent move from Association of Surgeons in Training (ASiT) in concert with the British Neurosurgical Trainees Association (BNTA), to promote greater academic engagement amongst neurosurgical trainees. Our findings show that increased conference presentation rates do not result in greater quality of research or greater publication rates. A clear distinction needs to be made in terms of increasing participation and improving quality of work.

However, it is important to also ask whether these findings present a problem at all. The SBNS continues to be well attended and the amount of publications resulting from its conferences continues to increase. It clearly out-performs many other national conferences. Additionally, it continues to greatly support research and has raised the profile of many collaborative multi-centre studies, as evident from the increasing number of neurosurgical RCTs currently recruiting. The SBNS conference also provides an opportunity for networking, informal discussion and dissemination of ideas as well as fulfilling essential training and educational functions. In this respect, another consideration is the fact that accepted abstracts guarantee attendance, a continually problematic area for event organisers, and increased attendance adds to the success of a conference and benefits its wider functions.

Limitations

It is possible that not all associated publications from SBNS presentations would have been identified, despite our systematic method. Additionally, study design was assessed from the published abstract, and therefore given the limited information, often required interpretation. However, given the large number of presentations and publications identified, and use of both level of evidence and publication measures as quality metrics, we do not believe this will have affected the overall trends in data.

In this study, the impact factor was chosen as a measure of publication significance and offered a means of comparing output with other medical specialties. Impact factor is based upon citation counts, and therefore will be very different in larger compared to small medical field. Whilst therefore, the impact factor of leading neurosurgical journals would be expected to be comparable, when considering leading medical journals there will be a disparity. We have therefore chosen to use impact factor growth as a standardized alternative, but this is novel and should be considered accordingly.

Conclusion

SBNS conferences today contain more academic work and publish more articles than ever before. However, the increased volume is diluting the quality of the work presented overall, and this compares poorly against other national meetings. The significance of this finding is unclear as there are wider considerations when assessing the function of a conference.

Disclosure statement

No potential conflict of interest was reported by the authors.

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