Common Topics of Publication and Levels of Evidence in the Current Hand Surgery Literature

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Abstract

Background Scientific publications are the primary vehicle for the distribution of scientific findings, but there has been limited research on literature topic surveillance. We sought to identify and characterize the most commonly published topic domains in the hand surgery literature.

Methods We performed a 6-month hypothesis testing phase to identify the most frequently published topics in three hand surgery journals: *Hand*, *The Journal of Hand Surgery* (American), and *The Journal of Hand Surgery* (European). We reviewed all of the published articles in these journals from June 2010 to May 2015 to identify and characterize publications related to the three most common topic domains.

Results A total of 2,146 articles were published during the 5-year study period. The three most frequent topics domains included distal radius (DR) (11% of all articles), flexor tendon (FT) (9%), and carpal tunnel (CT) (7.5%). These subjects accounted for a total of 584 articles (27% of all publications) and 3,014 published pages during the study period. FT, CT, and DR publications were cited on average 2.3 times per year (2.5, 2.4, and 2.0, respectively).

Conclusion A small subset of topic domains makes up a significant proportion of scientific publications in hand surgery.

Keywords

- publication frequency
- level of evidence
- publication bias
- citation analysis

Introduction

Scientific publication is a primary means by which physicians obtain information and learn about medical advancements.¹ However, the quantity of published material can be overwhelming. For primary care journals, it is estimated that a physician would need more than 600 hours each month to review newly published literature.² Meanwhile, surveys indicate that most physicians spend less than 4 hours reviewing articles weekly.^{2–4}

Within every specialty, certain topics are of greater interest to readers and journal editors for a variety of reasons. The publication frequency of certain subjects may reflect the relative merit or clinical importance of these subjects within the clinical and research landscape. From an editor's perspective, certain subjects may have a higher likelihood of being referenced, which can favorably increase the journal's impact factor. Finally, and perhaps most importantly, topic domains that are commonly evaluated and managed by the readers (e.g., carpal tunnel [CT] surgery for hand surgeons) may have

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broad appeal than less common subjects, biasing publication toward these more common domains to sustain journal readership.

Unnecessary reiteration of overrepresented subject domains may dilute a journal's contents. Similarly, large publication volume makes it difficult for physicians to keep pace with new findings and practice evidenced-based medicine (EBM). Given the limited time, physicians have to read medical literature, unnecessary reiteration of previously researched topics makes it challenging for readers to identify novel research that addresses knowledge gaps in the field. Most studies to date concerning the content of journals have focused on the peer review process, but not on literature topic surveillance.^{5–10} This study investigates and analyzes the most common published topic domains, and the levels of evidence (LOE) of such research, in the hand surgery literature during a 5-year period.

Methods

Study Design

During the hypothesis testing phase, we identified the most frequently published topic domains from a 6-month pilot period (May 2015–December 2015) in three journals focused on hand surgery: *Hand*, *The Journal of Hand Surgery* (American), and *The Journal of Hand Surgery* (European).¹¹ The top three most frequent topic domains identified in the 6-month pilot period included distal radius (DR) fracture or repair, flexor tendon (FT) injury or repair, or CT syndrome or release.

We then reviewed all the published articles in these journals from June 2010 to May 2015 to identify manuscripts related to the three most common topic domains. The primary inclusion criterion was an original article discussing the following topics: DR fracture or repair, FT injury or repair, or CT syndrome or release. For articles that met this criterion, we collected the following information: publication date, publication type, study category, length, number of times cited since publication date, and LOE. Publication types were categorized into seven groups: scientific articles,

case reports, case series, reviews, commentaries, techniques, and letters. Scientific articles included randomized control trials, cohort studies, case-control studies, cross-sectional studies, and meta-analyses. LOE for each article was determined using the guidelines established by the *Oxford Centre for Evidence-Based Medicine*.¹² Studies of animals, cadavers, basic science articles, review articles, and conference abstracts were excluded when determining the LOE for each publication.

Data Collection and Analysis

Journals were accessed online from their publishers. Each article's abstract was reviewed by two authors to ensure that the publication's content met the inclusion criteria. Average number of citations per year for each article was determined by dividing the number of total citations (determined using *Google Scholar*) by the number of years since publication. Normality of data was determined using D'Agostino & Pearson, Shapiro-Wilk, and KS normality tests. If the data distribution was normal, a Pearson regression was performed, and if the data distribution did not pass the normality test, a Spearman regression was performed. Significance between groups for nonparametric data was assessed using a Kruskal-Wallis test with a post-hoc Dunn's multiple comparisons test.

Results

A total of 2,146 articles were published in the reference journals during the 5-year study period. DR fracture was the most common topic domain, accounting for 11% of all publications (6.6% of total pages). This was followed by FT publications, which accounted for 9% (5.3% of pages) and finally CT at 7.5% (4.0% of pages). These subjects accounted for a total of 584 articles (27%) and 3,014 pages during the 5-year study period (► **Table 1**).

Scientific articles, including randomized control trials, cohort studies, case-control studies, cross-sectional studies, and meta-analyses, were the most frequent article type, representing more than 50% of the total articles published on each topic domain (► **Table 2**).

Table 1 Bibliometric analysis of the most frequently published topics

Topic	Total pages	% Total pages	Average citations/year	Total articles	Average LOE	Correlation of citations/year and LOE
FT	989	5.3	2.5	187	4	−0.45
DR	1,253	6.6	2.4	237	3	−0.39
CT	772	4.0	2.0	160	3	−0.38

Abbreviations: CT, carpal tunnel; DR, distal radius; FT, flexor tendon; LOE, level of evidence.

Table 2 Publication types

Topic	Scientific articles ^a	Case reports	Case series	Reviews	Commentaries	Technique	Letters
DR (<i>n</i> = 237)	139 (59%)	22 (9%)	45 (19%)	8 (3%)	9 (4%)	8 (3%)	6 (3%)
FT (<i>n</i> = 182)	100 (55%)	26 (14%)	18 (10%)	14 (8%)	3 (2%)	4 (2%)	17 (9%)
CT (<i>n</i> = 163)	90 (55%)	23 (14%)	23 (14%)	5 (3%)	16 (10%)	1 (0.6%)	5 (3%)

Abbreviations: CT, carpal tunnel; DR, distal radius; FT, flexor tendon.

^aScientific articles refer to original manuscripts containing clinical or basic science research and do not include case reports or case series.

Although there was no statistically significant difference among the three topic domains for average citations per year, there was a significant difference in the articles' LOE ($p < 0.01$) (►Fig. 1). FT articles had lower-quality LOE (Level 4) than DR and CT (Level 3) ($p < 0.01$). For individual articles, there was a strong correlation between the LOE and the citation frequency ($p < 0.01$), a relationship that held true across all three topic domains (►Table 1). Therapeutic studies were the most common clinical study type for FT and DR studies (54% and 53%, respectively), followed by prognostic studies (46% and 28%, respectively). For CT literature, therapeutic and prognostic studies were equally common (44%) (►Table 3).

Discussion

With the increasing volume of scientific publications, it is difficult for physicians to identify high-impact research and to stay up to date on the latest findings in the literature. Therefore, it is a necessity that published research aims to address knowledge gaps in the field and contains high-quality evidence.^{2,11,13} In this study we identified the three most commonly published topic domains in a 5-year study period. These three topics—DR, FT, and CT—represented 27% of all the published articles with more than 3,000 published pages.

This high publication frequency might be justified by the clinical relevance of these topic domains. More than 500,000 CT releases are performed annually in the United States, and

DR fracture is the most common orthopedic injury. Yet, FT injury and repair is much less common, accounting for only 1% of all hand injuries, and it is not listed among the 10 most common hand surgery procedures.^{14–18}

Beyond clinical frequency, the relevance of these subject domains may be examined using citation analysis, which is widely used to evaluate the relative importance of a published article.^{11,19} We found that FT, CT, and DR publications were cited on average 2.3 times per year (2.5, 2.4, and 2.0, respectively). Of note, this citation frequency is higher than the impact factor for each of the journals included in the study, indicating that these articles contribute positively to the impact factor of the analyzed journals.

Despite the relatively favorable citation frequency, the included articles contained lower-quality evidence. On average, there was Level 3 evidence for DR and CT publications and Level 4 evidence for FT publications. This is not a new finding for hand surgery publications. A study by Sugrue et al¹¹ recently illustrated that despite the upward trend of evidence quality in hand surgery research over the past 20 years, the articles were still of low quality, as 82.5% were Levels 4 and 5 evidence. In our review of the literature, there were no Level 1 studies on FT injury/repair, and only 6% and 12% of the studies related to DR and CT were of Level 1 evidence. This indicates that most research in the 5-year study period was retrospective or lacked a control group. Such findings may be attributed to the overrepresentation of case reports and case studies in hand surgery literature.²⁰ Among the three topic domains in our analysis, when combined, case reports and case series represented 27% (157 articles) of all the publications included in this study.

In this study, we also show a statistically significant correlation ($p < 0.01$) between the LOE of an article and the number of times it is cited per year. Although longer follow-up times for well-designed studies are anticipated and can potentially cause the number of publications with high-grade evidence to be artificially low, there is reasonable concern that weaker studies are published due to the

Table 3 Study categories

Clinical study type	FT (n = 59)	DR (n = 151)	CT (n = 110)
Therapeutic	32 (54%)	80 (53%)	48 (44%)
Prognostic	27 (46%)	43 (28%)	48 (44%)
Diagnostic	0 (0%)	21 (14%)	10 (9%)
Economic	0 (0%)	7 (5%)	4 (3%)

Abbreviations: CT, carpal tunnel; DR, distal radius; FT, flexor tendon.

Fig. 1 Distribution of evidence levels among topic domains. Bar graph representing the number of publications that were assigned evidence levels of 1 to 5 for each respective topic domain. CT, carpal tunnel; DR, distal radius; FT, flexor tendon.

ease of design and a misguided emphasis on quantity of publications, rather than quality. Of particular interest is whether evidence levels influence a physician's application of research findings to their clinical practice. After examining two decades of outcomes research in hand surgery literature, Chung and colleagues²¹ showed that most hand surgery articles did not impact physician decision making and attributed this lack of impact to inadequate evidence levels.

Our analysis has several limitations. First, we determined the three most frequently published topic domains after a 6-month hypothesis-testing period. While a 6-month hypothesis-testing phase, which included 221 publications, was assumed to be an adequate time period to account for variation, it is possible that other topic domains were more predominant in years preceding 2010 or following the 6-month pilot period. Given the large discrepancy in publication frequency between publications related to FT, CT, and DR compared with all other topics, we are confident that our findings in the hypothesis-testing phase are representative of the 5-year study period. We chose to not include subjects beyond the top three topic domains as they were either too broad in scope (i.e., thumb pathology, nerve repair, etc.), or the frequency of publication was so minimal that any derived data would lack the power to draw evidenced-based conclusions. Furthermore, our choice of journals is not inclusive of all hand surgery publications. By restricting the articles that were included in this study to only three journals that primarily publish hand-related research, we have potentially missed hand surgery articles in different journals, which may be of higher impact. Finally, citation analysis alone may not be reliable when determining an article's impact, as authors may blindly cite original studies from secondary sources.

To improve scientific publications and encourage the practice of EBM, there should be increased efforts by authors to not reiterate previously studied topics, but rather focus on topics in which a disparity of knowledge still exists. Furthermore, there should be a focus on quality of research over quantity, with strong efforts to perform Levels 1 and 2 studies. Editors can aid in this process by requiring authors to declare a LOE upon submission and by limiting the amount of total publications accepted. Additionally, it is important for journal editors to be aware of the current research landscape and attempt to diversify the topics accepted for publication. Such selectiveness should increase the quality of evidence-based research, make it easier for surgeons to stay abreast with current research, and encourage investigation of under-researched topic domains.

Conclusion

This study characterized the three most commonly published topic domains in the hand surgery literature. We found that the hand surgery literature is dominated by research on the DR, FT, and CT. We confirmed the findings of previous studies, showing that the evidence levels in hand surgery are generally low, and we illustrated that low-grade evidence is correlated with decreased citation frequency.

Conflict of Interest

None.

References

- 1 Stross JK, Harlan WR. The dissemination of new medical information. *JAMA* 1979;241(24):2622–2624
- 2 Alper BS, Hand JA, Elliott SG, et al. How much effort is needed to keep up with the literature relevant for primary care? *J Med Libr Assoc* 2004;92(4):429–437
- 3 Haynes RB, McKibbon KA, Fitzgerald D, Guyatt GH, Walker CJ, Sackett DL. How to keep up with the medical literature: I. Why try to keep up and how to get started. *Ann Intern Med* 1986;105(1):149–153
- 4 Survey: How Doctors Read and What It Means to Patients /Business Wire 2014 Available at: <http://www.businesswire.com/news/home/20140722005535/en/Survey-Doctors-Read-Means-Patients>. Accessed October 2, 2017
- 5 Callaham M, Wears RL, Weber E. Journal prestige, publication bias, and other characteristics associated with citation of published studies in peer-reviewed journals. *JAMA* 2002;287(21):2847–2850
- 6 Ho RC, Mak KK, Tao R, Lu Y, Day JR, Pan F. Views on the peer review system of biomedical journals: an online survey of academics from high-ranking universities. *BMC Med Res Methodol* 2013;13:74
- 7 Resnik DB, Elmore SA. Ensuring the quality, fairness, and integrity of journal peer review: a possible role of editors. *Sci Eng Ethics* 2016;22(1):169–188
- 8 Stahel PF, Moore EE. Peer review for biomedical publications: we can improve the system. *BMC Med* 2014;12:179
- 9 Patel J. Why training and specialization is needed for peer review: a case study of peer review for randomized controlled trials. *BMC Med* 2014;12:128
- 10 van Lent M, Overbeke J, Out HJ. Role of editorial and peer review processes in publication bias: analysis of drug trials submitted to eight medical journals. *PLoS One* 2014;9(8):e104846
- 11 Sugrue CM, Joyce CW, Sugrue RM, Carroll SM. Trends in the level of evidence in clinical hand surgery research. *Hand (NY)* 2016;11(2):211–215
- 12 Howick J, Chalmers I, Glasziou P, et al The Oxford 2011 Levels of Evidence. Oxford Centre Evidence-Based Medicine Vol. 1; 2011. Available at: <http://www.cebm.net/index.aspx?o=1025>
- 13 Ahn CS, Li RJ, Ahn BS, Kuo P, Bryant J, Day CS. Hand and wrist research productivity in journals with high impact factors: a 20 year analysis. *J Hand Surg Eur Vol* 2012;37(3):275–283
- 14 Ootes D, Lambers KT, Ring DC. The epidemiology of upper extremity injuries presenting to the emergency department in the United States. *Hand (NY)* 2012;7(1):18–22
- 15 Wildin C, Dias JJ, Heras-Palou C, Bradley MJ, Burke FD. Trends in elective hand surgery referrals from primary care. *Ann R Coll Surg Engl* 2006;88(6):543–546
- 16 Thoma A, Veltri K, Haines T, Duku E. A meta-analysis of randomized controlled trials comparing endoscopic and open carpal tunnel decompression. *Plast Reconstr Surg* 2004;114(5):1137–1146
- 17 Chung KC, Spilson SV. The frequency and epidemiology of hand and forearm fractures in the United States. *J Hand Surg Am* 2001;26(5):908–915
- 18 Hill C, Riaz M, Mozzam A, Brennen MD. A regional audit of hand and wrist injuries. A study of 4873 injuries. *J Hand Surg [Br]* 1998;23(2):196–200
- 19 Eberlin KR, Labow BI, Upton J III, Taghinia AH. High-impact articles in hand surgery. *Hand (NY)* 2012;7(2):157–162
- 20 Rosales RS, Reboso-Morales L, Martin-Hidalgo Y, Diez de la Lastra-Bosch I. Level of evidence in hand surgery. *BMC Res Notes* 2012;5(1):665
- 21 Chung KC, Burns PB, Sears ED. Outcomes research in hand surgery: where have we been and where should we go? *J Hand Surg Am* 2006;31(8):1373–1379