

Conflict of interest policies and disclosure requirements in neurosurgical journals

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OBJECTIVE An increasing amount of funding in neurosurgery research comes from industry, which may create a conflict of interest (COI) and the potential to bias results. The reporting and handling of COIs have become difficult, particularly as explicit policies themselves and definitions thereof continue to vary between medical journals. In this study, the authors sought to evaluate the prevalence and comprehensiveness of COI policies among leading neurosurgical journals.

METHODS The authors conducted a cross-sectional study of publicly available online disclosure policies in the 20 highest-ranking neurosurgical journals, as determined by Google Scholar Metrics, in July 2016.

RESULTS Overall, 89.5% of the highest-impact neurosurgical journals included COI policy statements. Ten (53%) journals requested declaration of nonfinancial conflicts, while 2 journals specifically set a time period for COIs. Sixteen journals required declaration from the corresponding author, 13 from all authors, 6 from reviewers, and 5 from editors. Four journals were included in the International Committee of Medical Journal Editors (ICMJE) list of publications that follow the Uniform Requirements for Manuscripts Submitted to Biomedical Journals (currently known as Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals). Five journal policies included COI declaration verification, management, or enforcement. The neurosurgery journals with more comprehensive COI policies were significantly more likely to have higher h5-indices ($p = 0.003$) and higher impact factors ($p = 0.01$).

CONCLUSIONS In 2016, the majority of, but not all, high-impact neurosurgical journals had publically available COI disclosure policies. Policy inclusiveness and comprehensiveness varied substantially across neurosurgical journals, but COI comprehensiveness was associated with other established markers of individual journals' favorability and influence, such as impact factor and h5-index.

<https://thejns.org/doi/abs/10.3171/2018.4.JNS172751>

KEYWORDS neurosurgery; ethics; conflicts of interest; disclosure; industry; journals

THE credibility of the scientific process is largely dependent on the upholding of ethical standards in research and publication.¹ Over the past decade, the number of industry-sponsored clinical trials has increased substantially,¹¹ while the number of government-funded trials, such as those by the National Institutes of Health, has decreased dramatically.¹¹ This shift toward industry-sponsored research has led to extensive financial connections between scientific investigators, academic institutions, and industry, and has a number of potential implications for the quality and integrity of published biomedical research.⁴

Thus, transparent and complete conflict of interest (COI) declarations and handling have become essential for ensuring public and professional trust in the scientific process, and maintaining academic research credibility.⁹

The International Committee of Medical Journal Editors (ICMJE) defines a COI as “exist[ing] when professional judgment concerning a primary interest (such as patients' welfare or the validity of research) may be influenced by a secondary interest (such as financial gain).”^{10,13}

As industry funding mechanisms have continued to evolve, the reporting of COIs has become increasingly dif-

ABBREVIATIONS COI = conflict of interest; COPE = Committee of Publication Ethics; ICMJE = International Committee of Medical Journal Editors.

SUBMITTED October 30, 2017. **ACCEPTED** April 2, 2018.

INCLUDE WHEN CITING Published online August 17, 2018; DOI: 10.3171/2018.4.JNS172751.

ficult, particularly as the definition and required scope of COI disclosure continues to vary between medical journals.⁵ For example, it is frequently left to individual authors to determine the relevance of a financial relationship to published research or an appropriate time period for disclosure.⁶ In addition, personal relationships, intellectual beliefs, and academic competition may provide powerful sources of conflict, and these are almost always left out of COI definitions.⁹

In 2006, a survey analyzing COI policies in high-impact biomedical journals found that the prevalence of these policies, and of published disclosures of financial conflict, had increased over the preceding decade.⁷ However, this survey focused on primary care specialties,⁷ and recent studies examining the presence and scope of COI policies among surgical specialties are limited. The potential for financial conflicts in neurosurgery research is significant. The Center for Medicare & Medicaid Services Open Payments Program (<https://www.cms.gov/openpayments/>) showed that neurosurgeons received the second highest amount of money from industry, in both absolute and per capita terms, in 2014 and 2015. In this study, we sought to evaluate the prevalence and comprehensiveness of COI policies among leading neurosurgical journals. Our analysis compares these policies to those of the ICMJE disclosure recommendations.

Methods

The study included the top 20 neurosurgical journals, as defined by Google Scholar Metrics (https://scholar.google.ca/citations?view_op=top_venues&hl=en&vq=med_neurosurgery). These top 20 journals were ranked according to their 5-year h-index and h-median metrics, defined by Google as the largest number h such that h articles published in 2011–2015 have at least h citations each and the median number of citations for the articles that make up its h5-index, respectively (<https://scholar.google.ca/intl/en/scholar/metrics.html#metrics>). We excluded journals that, although having significant readership and contribution by neurosurgeons, were not specifically neurosurgical in their focus.

We obtained information regarding the 2014 and 2015 impact factors from data provided by Thompson Reuters Journal Citation Reports (<https://clarivate.com/products/journal-citation-reports/>). Impact factor is generally accepted as an indication of journal prestige and quality and is calculated as the number of citations in the current year divided by the number of citable articles published over the prior 2 years.¹³ Impact factor data were not available online for 3 journals (*Surgical Neurology International*, *Acta Neurochirurgica Supplement*, and *Journal of Neurological Surgery Part B: Skull Base*); therefore, these were excluded from our calculation of mean impact factor. For our analysis we chose to emphasize h5-index as a measure of journal ranking over impact factor because the h5-index is a free resource and is therefore more readily accessible to the general public.

A cross-sectional study of instructions for authors available in July 2016 was conducted on data that were publicly available at the time and entirely obtained on-

line from the respective journal websites. Documents regarding instructions for authors and manuscript submission forms were accessed during July 2016.

We restricted our review to instructions found within instructions to the author, instructions to the reviewer, authorship forms, or similarly labeled pages or documents found directly on a journal's website. In order to eliminate policy ambiguity, links or references to the Committee of Publication Ethics (COPE), the ICMJE, or a publisher's website that were not found directly within the COI section were not considered. Both COPE and the ICMJE groups deal with a number of ethics issues, and at times it was unclear to which standards the journal had adhered. In a number of cases, links were provided to the journal publisher's website, which all contained extensive COI policies, among other information; however, it was unclear whether the journal had adopted these policies based on their instructions to authors. If the COI definition differed between the author instruction forms and the submission form, we included the more comprehensive definition.

We surveyed online documents electronically for instances of the words "conflict," "interest," "financial," "form," and "disclosure." Criteria for analysis of journal COI policies were created based on work done by Rowan-Legg et al.,¹⁹ Alfonso et al.,¹ Cooper et al.,⁷ and Blum et al.⁵ We then examined the detail included in each COI policy. Comprehensive policies were defined as those that included a definition of COI and provided examples of types of potential COIs, such as patents, royalties, honoraria, consultation, grants, employment, management, investment, family involvement, personal belief, and personal relationships, for disclosure. Simple policies were defined as those that requested disclosure, but provided either a vague definition of COI or no definition at all. Some simple policies requested disclosure of financial support, agreement, interest, connection, or benefit but provided limited examples (≤ 1) of what constituted a financial conflict (Table 1). The types of COI disclosure requested or suggested by each journal are listed in Table 2.

The ICMJE list of publications that follow the ICMJE Uniform Requirements for Manuscripts Submitted to Biomedical Journals (currently known as Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals) was obtained online (<http://www.icmje.org/journals-following-the-icmje-recommendations>).

This study did not involve human subjects or data and used publically accessible information; therefore, approval from our local institutional review board was not considered necessary and not sought. We present the content of the respective COI policies descriptively using frequencies and proportions. We used the Student t-test to compare the binary variable of simple versus comprehensive COI policies (as defined above) to the continuous variables of each journal's h5-index and the 2015 impact factor. We also examined the association between the journal h5-index and impact factor (both 2014 and 2015) using Pearson correlation coefficients and report the p values. Microsoft Excel 2016 and Statistical Analysis Software (version 9.4, SAS Institute) were used for data analyses.

TABLE 1. Policy comprehensiveness

Disclosure Policy	Journal
Comprehensive	<i>Journal of Neurosurgery</i>
	<i>Neurosurgery</i>
	<i>Journal of Neurosurgery: Spine</i>
	<i>Neurosurgical Focus</i>
	<i>World Neurosurgery</i>
	<i>Acta Neurochirurgica</i>
	<i>Journal of Neurosurgery: Pediatrics</i>
	<i>Neurosurgical Review</i>
Simple/no policy	<i>Surgical Neurology International</i>
	<i>British Journal of Neurosurgery</i>
	<i>Neurosurgery Clinics of North America</i>
	<i>Stereotactic and Functional Neurosurgery</i>
	<i>Journal of Korean Neurosurgical Society</i>
	<i>Journal of Neurological Surgery Part A: Central European Neurosurgery</i>
	<i>Journal of Neurosurgical Sciences</i>
	<i>Journal of Neurological Surgery Part B: Skull Base</i>
	<i>Progress in Neurological Surgery</i>

Results

Our sample included 19 neurosurgical journals. One journal, *Skull Base*, was excluded from our analysis, as this journal became the *Journal of Neurological Surgery Part B: Skull Base* in 2011, which was also listed in the top 20 journals as per Google Scholar metrics. Of the 19 remaining journals, 18 (95%) had links on their websites to instructions for authors, instructions for reviewers, manuscript submission forms, authorship forms, or similarly labeled documents. Within these links, 17 (89.5%) included COI policy statements (Table 3).

Nine (47%) of the journals could be grouped by their involvement in journal or publishing groups that shared Internet domains or similar formats for their instructions or forms. These journals were found within the following groupings: the Journal of Neurosurgery Publishing Group (4 journals), Springer (3 journals), and Thieme (2 journals). Although journals under the same publishing group have similar disclosure requirements, their h5-indices and impact factors are calculated independently. As such, we elected to consider each journal within the same publishing group independently. Five (26%) journals provided links to publisher policies. For the purpose of our study we chose to limit our assessment to those policies found directly on specific journal websites.

Four (21%) journals were included on the ICMJE list of publications that follow the ICMJE Uniform Requirements for Manuscripts Submitted to Biomedical Journals (Table 3). Of these 4 journals, none made reference to the ICMJE within their COI policies. Five (26%) journals made reference or provided a link to the ICMJE directly within their COI policy (Table 3), but were not found on the ICMJE list (Table 4). Of the other 14 journals, 11 (58%) referred to the ICMJE elsewhere in the instructions for author forms, outside of the COI policy section.

TABLE 2. The number of COI disclosure types requested by each journal

Journal	h5-index	2015 Impact Factor	No. of COI Types
<i>Journal of Neurosurgery</i>	60	3.443	9
<i>Neurosurgery</i>	57	3.78	6
<i>Journal of Neurosurgery: Spine</i>	46	2.126	9
<i>Neurosurgical Focus</i>	37	2.546	9
<i>World Neurosurgery</i>	37	2.685	8
<i>Acta Neurochirurgica</i>	33	1.617	15
<i>Journal of Neurosurgery: Pediatrics</i>	31	1.757	9
<i>Surgical Neurology International</i>	26	NA	4
<i>British Journal of Neurosurgery</i>	25	1.063	2
<i>Neurosurgical Review</i>	24	2.166	15
<i>Neurosurgery Clinics of North America</i>	23	1.624	2
<i>Acta Neurochirurgica Supplement</i>	23	NA	15
<i>Stereotactic and Functional Neurosurgery</i>	21	1.691	0
<i>Neurologia Medico-Chirurgica</i>	19	0.612	9
<i>Journal of Korean Neurosurgical Society</i>	18	0.599	0
<i>Journal of Neurological Surgery Part A: Central European Neurosurgery</i>	16	0.723	2
<i>Journal of Neurosurgical Sciences</i>	15	1.651	2
<i>Journal of Neurological Surgery Part B: Skull Base</i>	14	NA	2
<i>Progress in Neurological Surgery</i>	14	1.079	0

NA = not available.

We further examined the COI policies for specific details, definitions, or examples of potential conflicts, with our findings summarized in Table 3. Of the 19 neurosurgical journals, 10 (53%) specifically addressed potential COIs other than funding, such as consultation, honoraria, or patents. Ten (53%) journals requested declaration of nonfinancial conflicts, such as family connections, professional connections, or beliefs. Two (11%) journals specified limits on how recent or for how long the financial tie existed.

Simple Versus Comprehensive COI Policy

Journals were separated as to whether they had simple COI policies (n = 9) or comprehensive COI policies (n = 10) based on the qualitative definitions delineated in the *Methods* section (Table 1). Simple COI policy journals had a mean (\pm standard deviation) number of declaration types of 1.6 ± 1.3 with a range of 0 to 4 declaration types per journal. Comprehensive COI policy journals had a mean (\pm standard deviation) number of declaration types of 10.4 ± 3.3 with a range of 6 to 15 declaration types per journal. These results support the qualitative dichotomization between simple and comprehensive groups.

When we compared the simple versus comprehensive COI policy groups using the journal h5-index as the primary outcome, we found that journals with comprehensive policies were associated with significantly higher h5-

TABLE 3. Journal COI policy details

	No. of Journals (%)
Journal has a policy on the authors' COIs available in the instructions for authors or manuscript submission form	17 (89.5)
Journal provides a definition or examples of different COIs	10 (52.6)
Nonfinancial COIs are specified	10 (52.6)
Journal policy specifies time period for disclosure	2 (10.5)
Journal policy specifies that all authors declare COI	13 (68.4)
Journal policy includes reviewer's COI	6 (31.6)
Journal policy includes editor's COI	5 (26.3)
Manuscript form	
All authors sign	6 (31.6)
Only corresponding author signs	5 (26.3)
Form does not include COI statement	2 (10.5)
Journal is present on ICMJE list	4 (21.1)
Reference to ICMJE is made in journal COI policy	5 (26.3)
COI declaration location	
1st page	6 (31.6)
End of article	7 (36.8)
Not specified	6 (31.6)
Specific COI verification procedure	0 (0)
Specific policy regarding publication in face of a declared COI	1 (5.3)
Policy regarding publication rejection or retraction in face of inaccurate or incomplete COI declaration	5 (26.3)

index rankings (36.7 ± 13.9 vs 19.1 ± 4.8 , $p = 0.003$). Comprehensive COI policy journals had significantly higher impact factors in 2015 (2.3 ± 1.0 vs 1.2 ± 0.5 , $p = 0.01$) than simple COI policy journals. This trend was also significantly demonstrated when we examined 2014 impact factors ($p = 0.01$).

When we examined the relationship between h5-index and impact factor, we found a statistically significant correlation between h5-index and both 2014 ($p = 0.001$) and 2015 ($p = 0.001$) impact factors.

We assessed policies for inclusiveness and summarize our findings in Table 3; 16 (84%) journals required that the corresponding author declare all COIs, 13 (68%) required that all authors declare, 6 (32%) required that reviewers declare, and 5 (26%) provided clear policies for editor declaration. Five (26%) of the journals that did not provide specific policies for reviewers and/or editors provided links or made reference to the ICMJE and COPE at some point within their author instruction forms, both of which recommend reviewer and editor declaration. Eleven (58%) journals required that the COI declarations be signed on either a manuscript or authorship form, while 8 (42%) did not. Six of these specified that all authors should sign their declaration statements, while the remaining journals accepted a signature solely by the corresponding author.

When we examined policies for details regarding publication, 6 (32%) journals specified that the declaration would be published on the first page of the article, 7 (37%) specified that it would appear at the end of the article,

TABLE 4. Journals on the ICMJE list of publications that follow the Uniform Requirements for Manuscripts and whether they link to ICMJE requirements

Journal	On ICMJE List	Link to ICMJE Requirements
<i>Journal of Neurosurgery</i>	No	No
<i>Neurosurgery</i>	No	Yes
<i>Journal of Neurosurgery: Spine</i>	No	No
<i>Neurosurgical Focus</i>	No	No
<i>World Neurosurgery</i>	No	Yes
<i>Acta Neurochirurgica</i>	No	Yes
<i>Journal of Neurosurgery: Pediatrics</i>	Yes	No
<i>Surgical Neurology International</i>	No	No
<i>British Journal of Neurosurgery</i>	Yes	No
<i>Neurosurgical Review</i>	No	Yes
<i>Neurosurgery Clinics of North America</i>	No	No
<i>Acta Neurochirurgica Supplement</i>	No	Yes
<i>Stereotactic and Functional Neurosurgery</i>	No	No
<i>Neurologia Medico-Chirurgica</i>	No	No
<i>Journal of Korean Neurosurgical Society</i>	No	No
<i>Journal of Neurological Surgery Part A: Central European Neurosurgery</i>	Yes	No
<i>Journal of Neurosurgical Sciences</i>	No	No
<i>Journal of Neurological Surgery Part B: Skull Base</i>	Yes	No
<i>Progress in Neurological Surgery</i>	No	No

while 6 (32%) journals did not specify where the conflict statement would appear.

Five (26%) journals made mention of COI declaration verification, management, or enforcement. Four (21%) journals specified a penalty of article rejection or retraction for false or absent COI declarations. One (5%) journal policy included a description of how potential COIs would be managed and indicated that a conflict could potentially affect manuscript acceptance and subsequent publication. Five (26%) journals made reference outside of the COI policy to the procedures developed by COPE, a group that provides advice to editors and publishers on publication ethics, in particular the handling of research and publication misconduct.

Discussion

In neurosurgery, COIs may be encountered in research, clinical practice, and academia.⁸ These COIs are ubiquitous and inevitable, and they do not indicate unethical behavior if managed properly.¹⁷ One way to manage COIs is to declare them, making them known to editors, reviewers, and, perhaps most importantly, readers, thus allowing them to decide whether the COI potentially biases the study's results. Poorly managed conflicts have the potential to erode both the profession's and the public's trust in the integrity of scientific research.¹⁷ With the increase in industry-funded and concurrent decline in publicly funded research, funding from device manufacturers and phar-

maceutical companies is now increasingly responsible for advancements in medical knowledge.²¹ Therefore, over the past decade, academic and public scrutiny has increased substantially regarding industry-sponsored biomedical research.⁴

Within neurosurgery, an increasing amount of research funding, and payments to neurosurgeons outside the research context, is provided by device manufacturers.¹⁷ When a sponsor stands to benefit from a report, subtle biases in study design and interpretation may arise.²¹ Any company investigating its own product inherently has a vested financial interest in the trial outcome, and this may impact the capacity for complete objectivity during the conduction of research.¹¹ An individual or group of researchers may also have their objectivity influenced by financial relationships with industry. Bekelman et al.⁴ demonstrated that industry-funded trials have a significantly greater chance of resulting in positive results when compared with nonsponsored research. Thus, disclosing COIs is essential for readers to accurately appraise the associations made within a study and judge the relevance of those COIs themselves.²¹

Two studies analyzing COI policies in high-impact journals, in 1997 and 2000, found that only a small proportion of journals had policies, and, of these, a minority contained published disclosures of financial conflict.^{15,20} Over the next decade, an increase in the prevalence of COI disclosures occurred, and a survey conducted in 2006 by Cooper et al.⁷ of high-impact biomedical journals found that 93% of journals had a COI policy, although only 57% of journals published all author disclosures. Similarly, in 2008, Blum et al. reported that 89% of medical journals had publically available COI policies;⁵ however, the study sample was limited to the highest-impact medical journals. The median impact factor for the lowest impact factor quartile in the study by Blum et al. was 2.66, while the median impact factor for the top 20 neurosurgical journals in our study was 1.67. We found that 84% of the highest-ranked neurosurgical journals had policies available online. Therefore, the prevalence of COI policies in our sample was below that of high-impact medical journals in general, despite reports of increased COI policy prevalence over the past decade.¹ This suggests that not only policy comprehensiveness, as demonstrated by our study, but also prevalence of COI policies tends to correlate with journal ranking.

Despite the relatively high rate of journals with disclosure policies within our review, we found that journals with more comprehensive COI policies, as defined by the number of COI examples or types suggested for disclosure, were associated with higher h5-index rankings. Our findings within neurosurgical journals were in keeping with those of Ancker and Flanagan,² who found that the frequency of policies correlated linearly with impact factor ranking. We selected the top-ranked neurosurgery journals by h5-index, rather than a random selection, in order to assess journals that stood to have the greatest impact on the neurosurgical literature. We chose to emphasize the h5-index instead of the impact factor because the h5-index is a more publically available form of journal ranking. In addition, we were able to demonstrate that a

journal's h5-index was a reliable proxy for impact factor, thus allowing us to compare our findings to previous studies that employed impact factor for their rankings. However, our use of both the h-index and impact factor may be seen as a study limitation, as both have been criticized for their accuracy in assessing journal merit.^{3,12} For example, both measurements have been shown to be susceptible to self-citation, one of a number of editorial polices that may manipulate the calculations.²

Impact factor is generally viewed as a proxy for journal quality and thus provides a potential source of conflict for journal editors. Lundh et al. demonstrated that the publication of industry-funded research was associated with an increase in article citations and therefore journal impact factor.¹⁶ This is accomplished through a combination of strategies, including media promotion, reprints, and reviews.¹⁶ For this reason, we feel that it is just as important for editors, reviewers, and journals to disclose financial conflicts as it is for authors; however, only 47% of the neurosurgical journals in our study had COI policies that included disclosure by editors and reviewers.

In the interest of soliciting further industry-funded advertisement and submissions, an editor may also be inclined to less thoroughly investigate an author's COI declaration. Therefore, editors' COIs are important to assess their potential for editorial bias, such as whether income from advertising could affect editorial decisions.¹⁶ One (5%) of 19 journals in our study requested that journal editors declare their COIs. For this journal, the policy regarding editor COI declaration was not found on the journal's own website, but on that of the publisher. As such, it remains unclear if this policy truly applied to the journal in question.

Editorial policies regarding the decision to reveal a COI currently vary among journals.⁵ In many cases the editor has the discretion to decide which COIs are disclosed, while other journals have adopted a method of systemic disclosure.⁵ Kesselheim et al.¹⁴ examined physicians' interpretations of medical research in light of disclosure and found that physician skepticism was greatest concerning industry-funded research, regardless of methodological quality of the study. Therefore, the value of total disclosure remains controversial, as this may lead to a perception of bias when it is not truly present.¹⁴ This must be balanced with the potential for bias overlook when COIs are underreported, particularly in light of recent reports of industry-funded articles that were ghostwritten or published for marketing purposes.¹⁸ No journals in our review indicated systemic disclosure. In fact, it was quite difficult to ascertain to what degree an author's COI would be evaluated, and, if so, which information would be considered relevant.

Our finding that very few journals had a formal COI verification policy was in keeping with previous surveys that examined policy enforcement. In 2006 Cooper et al.⁷ reported that 11% of high-impact biomedical journals restricted author submissions based on COI. In our review, 2 journals indicated the possibility of refusing to publish based on conflict declaration; however, one of these statements was found on the publisher's, rather than the journal's, website. Therefore, further examination into the

COI verification, management, and enforcement process in neurosurgical journals is warranted.

To work toward alleviating inconsistencies within COI reporting practices, the ICMJE developed an electronic Uniform Disclosure form in October 2009, and encouraged biomedical journals internationally to adopt the form.⁹ The form serves to simplify and standardize the reporting of conflicts of interest.² When reviewing online policies, we found that many neurosurgical journals made reference to the ICMJE guidelines. However, these journals were not necessarily the same journals that were found on the ICMJE list of publications that follow the ICMJE Uniform Requirements for Manuscripts Submitted to Biomedical Journals. The finding that some journals listed by the ICMJE did not appear to follow the Uniform Requirements was in accordance with findings of Blum et al.⁵ While only 5 (26%) of the journals in our study made reference to the ICMJE in their COI section of the author instructions, 11 (58%) requested a signed statement that included COI declaration and 6 (32%) specified that all authors should sign the form. It is important that all authors sign the COI form; otherwise, the corresponding author may be the only author to review the COI policy in the journal's instructions for authors.⁵ By requiring all authors to sign the COI form and review the policy, each author becomes directly responsible for his or her role in the study and for any COIs that may have arisen from their involvement.

Despite the introduction of the ICMJE recommendations and form, a study by Chimonas et al.⁶ comparing voluntary disclosure with company payment data demonstrated that only 50% of orthopedic surgery authors disclosed payments. This inadequate degree of disclosure within orthopedic surgery reinforces the finding that surgeons may be less concerned with disclosure practices than their medical colleagues.⁸ De Gara et al.⁸ provided evidence that surgeons are more likely to accept simple disclosures than internists or medical learners. Simple COI disclosures state a relationship with industry without including the amount of money involved.¹⁷ However, information regarding monetary value is important because many journal reviewers and readers would find payments of a certain magnitude relevant, regardless of whether or not a company's product was directly addressed in the research.⁶ This has implications for further research that could examine the prevalence and accuracy of payment disclosures by surgeons in publications.

This study's dependence on COI policies that were available online is a potential study limitation, as it is possible that policies existed in-house, therefore leading us to underestimate the true comprehensiveness and prevalence of these policies. However, given the importance of reporting COIs, this information should be easily and directly accessible at the author's port of entry into the publication process, which in this day and age is the submission website itself. In a number of journals, information regarding the COI policy differed between the information for authors document, the manuscript form, the publisher's website, and links to the ICMJE or COPE websites. In some cases, these forms could only be found on the separate submission website or after making a submission account.

This difficulty in obtaining the forms and the discrepancy within online policies may have also impacted our evaluation of policy prevalence and quality. However, we maintain that in the interest of transparency, these policies should be easily available publically and accurately for review by authors and readers alike.

Conclusions

In 2016, the majority of highest-impact neurosurgical journals had publically available COI disclosure policies. However, the definitions of COI and policy inclusiveness varied substantially across neurosurgical journals. We found that journals with more comprehensive journal policies were significantly more likely to have a higher h5-index and higher impact factors. As technology continues to advance within the field of neurosurgery, the potential for industry relationships will likewise continue to grow, therefore requiring closer examination and handling of COIs.

Acknowledgments

Dr. McDonald is the Alcan Chair in Neurosciences at the University of British Columbia, the funding from which was used to support this research.

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Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author Contributions

Conception and design: McDonald, de Lotbiniere-Bassett. Acquisition of data: de Lotbiniere-Bassett. Analysis and interpretation of data: all authors. Drafting the article: McDonald, de Lotbiniere-Bassett. Critically revising the article: McDonald, Riva-Cambrin. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: McDonald. Statistical analysis: de Lotbiniere-Bassett, Riva-Cambrin. Administrative/technical/material support: McDonald. Study supervision: McDonald.

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