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The scientific divulgation in neurosurgery.

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Abstract

The communication of scientific findings in a young discipline in the evolution of knowledge about the human nervous system, has had a consistent and significant advance. This interdisciplinary and multidisciplinary vision has been a fundamental educational axis in the development of neurosurgery in terms of innovation, scientific progress, technological development and quality of patient care. It is therefore essential that scientific writing and communication channels continue to preserve these quality standards, to validate without bias and with certainty, the value and strength of the advances of neurosurgery as a science.

Visual Abstract

Keywords

Journal impact factor, Medical education, Medical ethics, Neurosurgery, Publication, Research methods.

The Scientific Divulgation in Neurosurgery

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Abstract

The communication of scientific findings in the evolution of knowledge in a young discipline about the human nervous system has had a consistent and significant advance. This inters and multidisciplinary vision has been a fundamental educational axis in the development of neurosurgery in terms of innovation, scientific progress, technological development, and quality of patient care. Therefore, scientific writing and communication channels must continue to preserve these quality standards, validate without bias, and with certainty the value and strength of neurosurgery advances as a discipline.

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The communication of scientific findings in the evolution of knowledge in a young discipline about the human nervous system has had a consistent and significant advance, especially in the last 120 years. As the functional role of the brain and its peripheral connections (the neuronal theory) were identified in terms of electrophysiological and biochemical implications, a series of questions and challenges were generated, which psychiatry initially addressed almost on the same scale as neurology. Later on, clinical neurology had to face the frontier of surgery as a challenge to advance, resulting in neurosurgery's birth as a field of knowledge.

The first formal schools for neurosurgical training emerged in Europe with a fully anatomical approach based on the clinical principles of neurological examination. In this way, the basic principles on which many surgical procedures are based were developed and still prevail in medical training and education.

The evolution in the American continent, both in the North and in the southern cone, was decisive to rethink the teaching models, which by that date already postulated a specific curriculum design involving basic sciences, clinical sciences, neuropathology, and of course, neurosurgical practice.

The multidisciplinary vision of other scientific branches enriched the surgical practice by expanding its range of possibilities. This vision is best exemplified by the collaboration of the mathematician Robert Henry Clarke with Sir Victor Horsley to define a prototype for stereotaxy, as well as that of Ivan Pavlov and Harvey Cushing to understand the behavioral implications of the human brain, and Santiago Ramon y Cajal and Charles Scott Sherrington to define neuronal theory and the implications on synapses, to point out some virtuous associations [1].

This inters and multidisciplinary vision has been a fundamental educational axis in the development of neurosurgery in terms of innovation, scientific progress, technological development, and quality of patient care.

In this scenario, scientific dissemination has always been present in different formats. While during the period of the Maecenas, it was a transfer of knowledge in a pragmatical and observational nature by direct experience, the scientific rigor proposed for neurosurgery demanded the highest standards in its discipline and training processes, as well as a progressive refinement in the way of communicating and disseminating scientific information. In this way, we gradually moved from descriptive anecdotal experiences to more structured methodological proposals that promoted the conversion of information into knowledge and supported the principles of scientific

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communication. The surgical observations and expert opinions helped to consolidate a key route for the development of neurosurgery.

After the First World War, on August 31st, 1931, the first International Neurological Congress was held in the municipal theatre of the city of Bern, Switzerland. Predominantly constituted by neurologists and psychiatrists, in this event appeared the first conferences of those formerly trained as neurosurgeons, as it was the case of Clovis Vincent (Paris, France), Percival Bayley (USA), Wilder Penfield (Canada), highlighting a particular interest in the presentation of Harvey Cushing with his lecture "two thousand brain tumors" [2−4].

The description of a methodology in presenting morbidity and mortality, aseptic guidelines, anesthetic strategies, and formal education in neurological surgery was vital to open the formative scenario of neurosurgery in the world.

Although the methodological approach is now one of the primary subjects in education, greater formality and better understanding is required to consolidate an academic society that disseminates science with the support of different computer tools for design, statistics, reference management, and scientific rigidity.

It is, therefore, essential that scientific writing and communication channels continue to preserve these quality standards, to validate with certainty free of bias the value and strength of the advances of neurosurgery as a discipline [5].

A fundamental principle for scientific communication is "having something important to say"; not only for innovation but for the significance in improving decision-making on a particular topic or technique for state of the art. Therefore, it is essential to identify compliance with the minimum information required under a specific methodological argument making simple questions such as what, how, where, when, and why.

Due to the lack of an appropriate methodological design, there are significant findings that lose interest for the scientific community and are destined to remain in the hidden drawer of "anecdotes" as a personal casuistry; however, their level of scientific evidence is limited.

This level of substantive evidence is one of the results of efficient communication in any branch of science. The most accurate methodological designs are those derived from comparative studies, with controls, blinded, randomized, multicenter, evaluated anonymously by expert peers, and without conflict of interest. From these strategies emanate the "gold-standards," which can contrast with clinical guidelines, recommendations, or personal experiences that have lower evidence quality for decision making, therefore exist various systems to grade evidence to discriminate faster between the best evidence among the different study types, nevertheless, these grading systems should always be used with caution and proper interpretation [6−8] (Table 1).

Abbreviations

RCT Randomized controlled trial

A good article or review paper can benefit both the author and those interested in their particular area. Within these benefits, three aspects stand out: 1) literature review, writing, and creating an article commits the author to make a thorough examination of the published literature, contributing to the knowledge, experience, and mastery in the topics of interest; 2) pedagogy and teaching, depending on the style of each author, there may be a combination of topics or strategies to facilitate or express the main ideas, which, in many occasions may not be familiar to the reader, seeking to condense complex information effectively. 3) Fomenting the habit of writing, which has become a necessity in neurosurgery in different academic and clinical positions, contributing to the writer's professional development [9,10] (Table 2).

Currently, there are search systems to identify the best option to publish, according to the disciplinary content of the topic, its methodological design or level of evidence, significance, and novelty in the scientific literature. Generally, the summary of the article is presented, and the search system can display the options of viable journals, considering the impact, the rejection rate, and the possibilities of acceptance according to their editorial ranks.

These tools have been incorporated to make publishing efficient and timely, given that getting updated is expeditiously is fundamental.

However, it is always advisable to review carefully and follow the author's instructions of a particular journal, avoiding rejections due to format errors provided that information is already online through specific editorial platforms.

Therefore, methodological designs must be robust to completely expose the actual scientific value of relevant findings in basic science, clinical data, neurosurgical technique, or translational research in neurosciences. In addition, this strategy will be helpful to prevent any bias by developing blinded and randomized studies.

Table 1. Levels of Evidence in differents studies [7,8].

	Prevalence Studies	Screening Studies	Diagnostic Studies	Prognostic Studies	Treatment Benefit Studies	Treatment Harms Studies
Level I	Local and current surveys or censuses	Systematic review of randomized trials	Systematic review of cross sectional studies	Systematic review of cohort studies	Systematic review of randomized trials or N-of-1 trials	Systematic review of randomized trials or case-control N-of-1 trial
Level II	Systematic Reviews (matching with local circumstances)	Randomized trial	Individual cross sectional studies	Inception cohort studies	Randomized trial Observational study with dramatic effect	Individual randomized trial
Level III	Local non-random sample	Non -randomized controlled cohort Follow-up study	Non-consecutive studies. Studies without consistently applied standards	Cohort study Control arm of randomized trial	Non-randomized controlled cohort Follow-up study	Non-randomized controlled cohort Follow-up study Post-marketing surveillance
Level IV	Case-series	Case-series Case-control Historically controlled studies	Case-control	Case-series Case-control Poor quality prognostic cohort	Case-series Case-control Historically controlled studies	Case-series Case-control Historically controlled studies
Level V	N/A	Mechanism-based Reasoning[a]	Mechanism-based Reasoning	N/A	Mechanism-based reasoning	Mechanism-based reasoning

[a] Such reasoning will involve an inferential chain linking the intervention (expert opinion, based on physiology, animal or laboratory studies).

Table 2. Sections of a manuscript.

Title	The manuscript title implies the maximum role of notoriety and disclosure; it works as first-hand advertising to interested parties and potential readers. It must be specific and clear [8].
Author(s)	All authors who have contributed intellectually to the writing, those responsible for managing, obtaining, or interpreting the data and conclusions, should be considered. Author status is reserved for a contributor who deserves credit and can take responsibility for the work [9].
Key Words	It is an expansion outside the title that helps to delimit or extend the scope and direction of the writing, increasing the possibility of being found by interested parties with similar searches. The descriptive words of the main ideas of the writing should be used.
Abstract	The abstract involves the function and opportunity to describe the content of the writing; usually, in a maximum of 150–200 words, it must accurately represent the content of the writing, representing a quick reference to your article, especially for busy researchers.
Material and Methods	The primary objective of this section is to facilitate and explain in detail clearly the processes and ways in which the problem or research developed; the actions taken by the authors should be narrated in a sequential, logical, and detailed process to replicate the methods used and assess whether the methods justify the conclusions [8].
Manuscript	It is the bulk of the information presented by the author in variable length. It should start with a short introduction, offering relevant context and background, including any previous results that you seek to question or support; As supporting material, graphic summaries, illustrations, figures, and electronic art are valuable tools for providing visual content of the main ideas, concepts, or results presented.
Results	The results are a global and general description of the major results of the study; it should be a clear and concise section, base the sequence of the results with tables, figures, and graphs, clearly emphasize any significant finding. Remember not to interpret the results in this section and reserve it for discussion and conclusion.
Discussion/Conclusions	The discussion selectively recapitulates the content of the writing and presents a perspective of the general message of the article, offering meaning to the results, especially in the context of the existing evidence on the topic. It is important to contrast the exposed results and deductions with the bibliographic material cited, to highlight how the exposed findings and conclusions contribute to the knowledge and understanding of the subject in particular, including an "open invitation" to the scientific community to work on the points not demonstrated in the exposed work [8,11].

The new schemes of data generation in a "Society of knowledge" context are linked to broader terminal objectives than the traditional vision of publishing an original scientific text only. The line of translational knowledge is linked to aspects of innovation and technological development, patenting models, entrepreneurship, and the economy of knowledge.

Because of the enormous offer of scientific exchange worldwide, one of the recent critical subjects is the so-called reproducibility crisis, even in those serious (non-predatory) scientific journals, which are strictly peer-reviewed; in other words, the accuracy of the results shown cannot be reproduced by other groups of researchers when they apply the same methodology described. These origin and systematic failures have eventually led to the retraction of such publications because they are considered fraudulent [11–13].

Finally, it is pertinent to note the relevance of intellectual honesty and the timely application of ethical criteria in scientific communication. Methodological rigor must be compatible with universal criteria and values of respect for the parties' fundamental rights. The veracity of data, avoidance of redundancies and duplication of information, confidentiality, informed consent, declaration of conflicts of interest, funding, and responsibility in co-authorships are some of the daily items that also reflect the integrity of a scientific article [14].

Validation by institutional committees in bioethics and research are now part of the fundamental requirements for the acceptance of viable manuscripts for publication, and these considerations need to be considered.

1. Conclusion

The divulgation of knowledge in neurosurgery is a critical factor for the evolution of science and transcends in the scenario of data generation, as in the educational disciplinary aspects in the formation of human talent. Methodological strengthening is vital to highlight the true innovative sense in scientific reports overall its modalities, according to universal standards, with a critical vision, useful for decision making ethically.

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Conflicts of interest

The authors declare no conflict of interest.

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