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Article

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Authorship, authorship order and author contribution: a literature review

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Introduction: Literature review regarding author concepts, author contribution, authorship order and author position in the article byline. Objective: Identify patterns in the literature regarding the attribution of authorship, as well as the different roles of authors. Methodology: The methodological procedure involved a bibliographic review in the PubMed database, covering a period from 1895 to 2021. Results: It discusses guidelines for attribution of authorship, presenting the functions of the first author, main author and corresponding author, according to patterns identified in the literature. It reports the criteria established to regulate the correct and complete identification of authors in papers, according to the following documents: Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals, proposed by the International Committee of Medical Journal Editors (ICMJE); CSE Recommendations for Group-Author Articles in Scientific Journals and Bibliometric Databases, published by the Council of Science Editors (CSE); and the Contributor Roles Taxonomy (CrediT) – proposed by the Consortia Advancing Standards in Research Administration (CASRAI) and the National Information Standards Organization (NISO). Conclusion: Among the final considerations, it suggests the wide discussion of such documents among the Brazilian scientific community and their adoption by national journals.

KEYWORDS
Authors. Author contribution. Authorship order. Corresponding author. Medical writers.

Autoria, ordem de autoria e contribuição de autor: uma revisão de literatura

RESUMO
Introdução: Revisão de literatura acerca dos conceitos de autor, contribuição de autor, ordem de autoria e posição no *byline* do artigo. Objetivo: Identificar na literatura padrões relativos à atribuição de autoria, bem como os diversos papeis dos autores. Metodologia: O procedimento metodológico envolveu revisão bibliográfica na base de dados PubMed, abrangendo um período de 1895 até 2021. Resultados: Discute diretrizes para atribuição de autoria, apresentando as funções do primeiro autor, autor principal e autor correspondente, conforme padrões identificados na literatura. Relata os critérios estabelecidos para regulamentar a correta e completa identificação dos autores nos

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artigos científicos, conforme os seguintes documentos: Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals, proposta pelo International Committee of Medical Journal Editors (ICMJE); CSE Recommendations for Group-Author Articles in Scientific Journals and Bibliometric Databases, publicadas pelo Council of Science Editors (CSE); e a taxonomia Contributor Roles Taxonomy (CrediT) – proposta pelo Consortia Advancing Standards in Research Administration (CASRAI) e National Information Standards Organization (NISO). Conclusão: Entre as considerações finais, sugere a ampla discussão de tais documentos entre a comunidade científica brasileira e adoção dos mesmos pelas revistas nacionais.

PALAVRAS-CHAVE

Autoria. Autoria coletiva. Ordem de autoria. Autor correspondente. Escritores médicos.

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INTRODUCTION

Throughout history, the process of generating scientific knowledge has undergone transformations, as well as the ways of communicating and disseminating this knowledge. While in the early days, orality dominated the transmission of knowledge, the written language was gradually chosen for this communication process. From this point on, information started to be recorded in several supports, such as clay, parchment, papyrus, and paper. These records also began to be organized in order to be disseminated and consulted by scholars of each time, resulting from these actions the libraries, as well as other institutions of organization, storage, and memory of information (BURKE, 2003, 2012).

The development of science brought with it the professionalization of scientists. The practices of the scientific community have also changed over the years, as a natural consequence of the advent of technologies that allowed the exchange of information even at a long geographical distance. One of the most striking changes concerns authorships. In the beginning, thinkers presented their ideas alone. The first records of co-authorship date back to 1665, in a paper published by Hone, Oldenburg, Cassini and Boyle (BEAVER; ROSEN, 1978). Since then, scientific collaboration has become one of the precepts of modern science. Zhigang et al. (2020) reveal that collaboration among individuals has been growing, with averages from 2.2 authors per article in 1980 to 7.0 in 2019 in articles indexed in Web of Science.

Moreover, it is assumed that complex scientific problems demand large research networks and scientific collaboration. In this context, the phenomenon of coauthor ship has brought up the discussion about methods of credit assignment. Even in the 1980s it was perceived that not all authors contribute equally (SOLLA PRICE, 1976). It has therefore become a great challenge to establish the correct and clear identification of authorship and co-authorship, generated by the increase in the number of authors responsible for the content of articles published in scientific journals.

The exact order of appearance of the authors' names in the byline of the article gained importance in the context of the hyper authorship that characterized Big Science after World War II, dominating areas such as High Energy Physics and Biomedicine, gathering hundreds and sometimes thousands of authors in one publication (CRONIN, 2001). Two alternatives are possible in coauthored articles: alphabetical or non-alphabetical order, based on criteria that usually indicate the degree of contribution of the authors. Some disciplines place a high value on the position of first author and do not use alphabetical ordering of the byline (FRANDSEN; NICOLAISEN, 2010). The first author is the most visible and generally considered the most prestigious. However, alphabetical ordering representing equal contributions is still a common practice in mathematics and computer science (XIAOJUN, 2009), economics, and high-energy physics (FRANDSEN; NICOLAISEN, 2010). In biomedical sciences it is common to observe a note that the first two or three authors have equal contributions (equal first authors) (XIAOJUN, 2009).

This article aims to present and discuss concepts of author, contribution, authorship order and position in the byline of the article. The methodological procedure adopted was a bibliographic review in the PubMed database, covering the period from 1895 to 2021. The choice for a database specialized in medical sciences was due to the fact that the area has been discussing authorship attribution for years, besides having a specific author typology - the medical writer. The search strategy included the terms authorship, scholarly communication, writing, medical writing, article, paper, medical writer, and professional writer. The total number of records retrieved in June 2021 was 2572, which were reviewed by a preliminary reading of their abstracts and keywords. In

those documents where authorship criteria were indeed mentioned, the full text was read, identifying the standard mentioned, as well as the institution responsible for its elaboration and/or diffusion. The next section presents the author conceptualization, the order, and the types of authorship. Section 3 presents guidelines for authorship attribution. The final considerations conclude the article.

THE AUTHOR, THE ORDER AND THE TYPES OF AUTHORSHIP

Law 9610, which regulates copyright in Brazil, states in its article 11: "Author is the individual creator of literary, artistic or scientific work" (BRASIL, 1998). In a very comprehensive viewpoint, Foucault (2009), like Law 9610, also involves all kinds of works, arguing that the attribution of the author constitutes the crucial moment of the individualization of ideas.

Restricting the discussion to the field of scientific communication, the definition of authorship is made by several academic institutions. At the international level, the Committee on Publication Ethics (COPE) states that authorship [...]

> [...] can refer to the creator or originator of an idea (e.g., the author of the theory of relativity) or the individual or individuals who develop and realize the product that disseminates intellectual or creative work (e.g., the author of a poem or a scholarly article). (COPE Council, 2019, p. 3, our translation)

The discussions contained in the COPE Council document also highlighted that "[...] authorship conveys significant privileges, responsibilities, and legal rights; in the academic arena, it also forms the basis for rewards and career advancement" (COPE Council, 2019, p. 3, our translation). In addition, the document emphasizes the requirement that the author, at least, ensure their participation in the development of the work, as well as the non-violation of other authors' rights during their creative process.

In Brazil, the Scientific Electronic Library Online Program (SciELO) mentions that the "[...] authorship of a document attributes academic recognition and credit to the authors and implies responsibility for the published content" (SciELO, 2020, p. 20). Furthermore, the SciELO document mentions two minimum criteria for authorship, which are: "[...] a. Actively participate in the discussion of the results; b. Reviewing and approving the final version of the paper" (SciELO, 2018, p. 20).

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Considering that the position of a name in the list of authors of a publication provides an indication of the contribution made by the author, several approaches have been proposed. In the opinion of Xiaojun, Rosseau, and Jin (2010), authors' contributions to published articles can be subdivided into three types: those who sign as first author, those who sign as corresponding author, and those who contribute without a special role.

The first author is usually considered the most important, but this rule is not valid in areas where the authors of a publication tend to be ordered alphabetically. Branson (2014) identified the first author as that individual responsible for most of the work. Petroianu (2010, p. 1) extended this description, establishing that this typology of authorship is represented by the one "[...] who had the idea, the one who worked the hardest, the research advisor, the coordinator of the research group, or [...] responsible for the sector or institution where the work was developed."

For Hu, Rousseau, and Chen (2010), the role of first author is established by lead researchers, who play a leadership role in research, directing the research team, by

assigning tasks, guiding the experiments, and checking the resulting articles. The authors consider the first author to be the most important person in the research team and that they may function as corresponding author in multi-authored articles. Especially in biomedical articles, Hu, Rousseau, and Chen (2010, p. 75, our translation) further highlight the phenomenon of "equal first authors," presented through a note by which it is explained that "[...] the first two (or three, or more) authors made an equal contribution to the article." In some countries such as China, funding institutions have started to register only the first or corresponding authorship, in a clear indication that byline positions have become truly relevant in the scientific arena (XIAOJUN; ROUSSEAU; JIN, 2010).

Regarding the corresponding author, Branson (2004, p. 1224, our translation) described him as the "[...] main contact for the journal editorial staff and the contact person for individuals who have questions about the research." Hu, Rosseau, and Chen (2010) point out that articles may have more than one corresponding author, especially in complex investigations where multiple teams join forces, and the leader of each team plays the role of corresponding author.

Still on the corresponding author, McNutt et al. (2018) state that scientific journals should provide clear guidelines to this type of author, especially with regard to their incumbencies when assuming this role. McNutt et al. (2018) and the ICMJE (c2021) mention a number of roles that can be performed by the corresponding author in the quest to ensure credibility and accountability for the data presented in a scientific article, such as "[...] being available after publication to respond to criticism of the paper and cooperating with any journal requests for additional data or information, questions about the article arise after publication" (ICMJE, c2021, our translation).

The corresponding author has gained status as the most important author among several bibliometric analysis approaches (WOUTERS et al., 2015), considered to be the one primarily responsible for the research project, the grouping of coauthors, and the preparation of the manuscript. It is usually the senior researcher in the group, the one who secures the research funding (MAN et al., 2004). The corresponding author has been used in various research on scientific collaboration (BORDONS et al., 2015; CHINCHILLA RODRIGUEZ et al., 2018). Even in the medical sciences where authorship is usually assigned in descending order, the corresponding author and the last author have a prominent role in relation to the other positions and are usually positions held by those responsible for planning the published research and content (GONZÁLEZ-ALCAIDE et al., 2017).

Regarding the last author, Petroianu (2010, p. 4) defined him as "[...] the one who had the idea, the one who worked the least, the research advisor, the person in charge of the institution where the research was developed or the one who funded the work". Digiusto (1994, p. 55) emphasizes that two concepts coexist, one in which "[...] the last author of an article is the one who made the smallest contribution [...] and another in which he is "[...] a senior person who contributed the most in a conceptual sense".

Also considering the identification of authorship, Bhopal et al. (1997) and Branson (2004) suggest that the other authors should be listed according to their order of contribution. Garcia et al. (2010, p. 562) reinforce the weight of the hierarchical position when attributing authorship in articles. Specifically, regarding authorship attribution, McNutt et al. (2018) points out that it is the responsibility of the corresponding author to ensure that all authors are listed, that no authors not deserving of authorship credit are listed, and that the author's contributions, when provided, are expressed accurately in the description of the contribution.

Branson (2004, p. 1228, our translation) also mentions the possibility of including an "acknowledgements" section, in which "[...] people who contributed to the work but not [...] enough to earn authorship [...] such as an internal reviewer, data collection staff, statistical consultant, or typist may be named."

Other categories of authorship are mentioned in the literature, such as guest authorship and/or co-authorship (guest authors), defined by Harvey (2018, our translation) as the inclusion of senior authors because of their respect or influence in the expectation "[...] that this will increase the likelihood of publication and/or impact of the article once published."

Several authors mention the existence of gifted authorship, which occurs when people have their names included as authors in a paper in which they did not participate (SMITH, 1994; KAPOOR, 1995; BHOPAL et al, 1997; MONTENEGRO, 1999; MONTEIRO et al., 2004; FLAHERTY, 2013; WOOLEY et al., 2013; McNUTT, 2018). Harvey (2018, our translation) further adds that gift authorship involves the "[...] practice of offering authorship to an older or younger colleague in the blatant or surreptitious hope that he or she will return the favor."

Harvey (2018) further adds another type of authorship, called honorary, which is very similar to the two mentioned above. According to the author, this type of authorship refers to those who are named as authors merely because they hold senior positions in the institution where the research took place and may have been responsible for the funding.

Another authorship modality found in the literature is incomplete authorship, that is, "[...] the non-inclusion of the list of people who should be on it and are eliminated for various types of spurious reasons" (MONTENEGRO, 1999, p. 160). Matías-Guiu and García-Ramos (2011, p. 258) define this type of authorship as ghost-writer, characterized by "[...] professionals who were part of the development of the manuscript but did not sign it.

About this typology, Peh and Ng (2009, p. 564, our translation) state that the "[...] ghost author is a professional writer paid to write books, articles, and other materials that are then officially credited to someone else." Panter (c2021) further adds that these ghostwriters "[...] may be concealed to obscure industry support for research, to enhance the apparent objectivity of an article while maintaining company control over its content."

In addition to these, unwarranted authorship can be found, i.e., "[...] authors who simply provided technical suggestions and did not participate in the research, did not help in writing the article, and did not see the final version submitted to the journal" (HUTH, 1986, p. 257, our translation). Matheson (2016, p. 27, our translation) describes another type of authorship, called disposable authorship, defined as an author "[...] academic recruited for a commercial project who could easily be exchanged for another without significant impact on the project or publication."

McNutt et al. (2018, p. 2558, our translation) further mention orphan authorship, in which authors are contemplated "[...] who contributed materially to the work but are omitted from the author list unfairly by the writing team." These same authors also listed as "forged authorship" a mode of authorship in which "unintended authors who did not participate in the work but whose names are attached to the article, without their knowledge, to increase the likelihood of publication" (McNUTT et al. 2018, p. 2558, our translation).

Another phenomenon observed with regard to author attribution is hyper authorship. Kapoor (1995, p. 1039, our translation) termed it polyauthoritis, established as "[...] more than ten authors for an original article and more than six for a case report." Cronin (2001, p. 558) presented it as "massive levels of co-authorship". For Knudson

(2011) it is defined when the article has six or more authors. Birnholtz (2006, p. 1758) did not quantify the number of authors that characterize hyper authorship but described it as "[...] extremely long lists of authors that provide approximately formalized credit for everyone involved with a research effort. Knudson (2011, p. 838) states that this "[...] has complicated the attribution of credit and responsibility for scientific work [...]" in addition to leading "[...] journals to require statements of specific contributions by all authors in published articles."

Another authorship typology, which does not fit into the previously described characterizations, is the so-called medical writer. Cited in the medical literature at least since 1790, this expression has presented several definitions throughout history. For example, it represented the physician who was also a writer/author of scientific publications (CLARKE, 1790; TAYLOR, 1902; PARSONS, 1916; RUSSEL, 1935), as well as the exercise of writing by the professional in the scope of fiction and scientific literature (OLIVER, 1916; CANDIB, 2005).

In the mid-20th century, McVeagh (1963, p. 104) argued that the "[...] principle of specialization has been productive in all fields". In the author's view, delegating scientific writing to a professional with expertise would benefit everyone involved in the process (researchers, journal editors, readers of the articles).

In the same article, the author also states that "[...] we can expect to find men professionally qualified to function as specialists in medical writing: the 'professional writers' and the 'competent amateurs. For McVeagh (1963, p. 104), the first group would be submissive to the researcher's ideas and final revision, which would guarantee "accuracy of thought and content". Those physicians would represent the second group "intensely interested and well qualified for medical writing". Mc Veagh (1963, p. 105) concludes by stating that the ultimate goal in both cases "[...] would be an article saying what the researcher wishes to say, in an interesting, readable, and understandable way."

The thesis advocated by McVeagh (1963) has permeated the following decades possessing opponents (DAVIDOFF et al., 2001; ABBASI, 2004; SISMONDO, 2009; MATÍAS-GUIU; GARCÍA-RAMOS, 2011; FLAHERTY, 2012; BRAUN, 2013; COLLIER, 2017; KIRKPATRICK et al, 2017) and promoters (MOORE, 2004; JACOBS, 2004; FOOTE, 2003, 2004; FOOTE; SOSKIN; 2006; WOOLEY, 2006; LANGDON-NEUNER, 2008; PEH; NG, 2009; SHARMA, 2010; SHASHOK, 2013; DAS; DAS, 2014; HAMILTON, 2016; CLEMON et al., 2018; AMWA; EMWA; ISMPP, 2021).

In this same era, Graham (1965) reaffirmed the importance of the researcher(s) themselves writing the communication of their research findings. Graham (1965) and other authors emphasized the importance of scientists seeking to improve their skills in scientific writing (GODDEN, 1967; ASHER, 1969; DUDLEY, 1979; MACLIESH; BARON, 1985).

The discussion of the concept of author and co-author, and the recognition and description of several types of authors reveals the amplitude of scientific writing. This discussion pervades the ethical dimension and may reveal misconduct by researchers and journal editors regarding the attribution of responsibilities and, consequently, the privileges of these characters (RELMAN, 1983; TYNAN; ANDERSON, 1984; MATHESON, 2011; BOSNJAK; MARUSIC, 2012; AL-HERZ et al., 2013; HILÁRIO; GRÁCIO; GUIMARÃES, 2018; McKNUTT et al., 2018). In view of this, several academic organizations have sought to establish criteria, with the aim of regulating the correct and complete identification of authors in scientific articles, as well as their respective competencies and prerogatives.

THE ATTRIBUTION OF AUTHORSHIP

Several guidelines regarding criteria for authorship attribution have been published by research institutions and publishers. In this article, the following documents are presented and discussed: Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals, proposed by the International Committee of Medical Journal Editors (ICMJE); CSE Recommendations for Group-Author Articles in Scientific Journals and Bibliometric Databases, published by the Council of Science Editors (CSE); and the Contributor Roles Taxonomy (CrediT) - proposed by the Consortia Advancing Standards in Research Administration (CASRAI) and National Information Standards Organization (NISO).

The standards proposed by the International Committee of Medical Journal Editors (ICMJE) were first developed in 1978 and are regularly updated. The latest update, conducted in December 2019, is published in English (http://www.icmje.org/icmje-recommendations.pdf). In Portuguese, the last translated version was in 2014 (https://bityli.com/Hdpck). The ICMJE recommendations define authorship to be based on the four criteria below:

> (1) substantial contributions to the conception or design of the study; or the acquisition, analysis, or interpretation of the data in the paper;
> (2) preparation of draft versions of the paper or critical review of important intellectual content;
> (3) final approval of the version to be published;
> (4) agreement to be responsible for all aspects of the work, to ensure that questions regarding the accuracy or completeness of any part of the work are thoroughly investigated and resolved. (ICMJE, 2019, our translation)

Although widely used, the ICMJE recommendations are also subject to questioning. Matheson (2011) states that the ICMJE definitions of "authorship versus contribution" have been used by the industry to manage authorship for commercial gain, considering that the various actors (academic author, industry, manuscript writers) can be included or excluded as authors. Matheson (2011, p. 2) adds that these "[...] resources give industry the opportunity to hide its original function behind the names of academic contributors [...]," despite the fact that industry even performs "

In the document CSE Recommendations for Group-Author Articles in Scientific Journals and Bibliometric Databases, CSE lists a series of guidelines for those involved in publishing so-called collaborative, corporate, collective, or group-authored articles. The Council recommends that journals and editors, among others involved, "[...] should ask authors to identify the name of the group and the named individual authors who accept responsibility for the article" (COUNCIL, 2006, our translation). Also in this category, the CSE recommends that non-authors, members of the group and identified appropriately, be listed in the acknowledgements section.

In these recommendations, the CSE also contemplates the bibliographic databases, seeking to minimize the effects of the "[...] absence of a standard format for citing articles by group authors". This situation causes complexity in locating these articles and results in "[...] citation errors and miscalculated citation statistics" (COUNCIL, 2006). To mitigate this dynamic, databases are advised not to limit characters in the search by name (individual author or full group name) and also to display the group author's name as it appears in the original signature, without abbreviations or further expansion. In addition, according to the CSE recommendations, "[...]

bibliographic databases should not list author fields in citations of group-authored articles as anonymous or no author listed" (COUNCIL, 2006, our translation).

The publisher PLOS ONE, in addition to corroborating the use of the ICMJE recommendations for individual and group authorship, includes along with these the Contributor Roles Taxonomy (CrediT), in order to describe the contributions of all authors (PLOS ONE, [2020]). CrediT is defined as "[...] a high-level taxonomy, including 14 roles, which can be used to represent the roles typically performed by contributors to scholarly scientific production" (CASRAI, 2020, our translation). Developed by a partnership between Consortia Advancing Standards in Research Administration (CASRAI) and National Information Standards Organization (NISO), the CRediT taxonomy roles describe the specific contribution of each participant in a scholarly production. This classification technique considers 14 different authorship or contribution roles: Project Administration, Formal Analysis, Conceptualization, Data Curation, Writing - First Draft, Writing - Review and Editing, Research, Methodology, Obtaining Funding, Resources, Software, Supervision, Validation, and Visualization (SciELO, 2020).

Since 2019, the Brazilian Association of Linguistics (ABRALIN) has adopted the taxonomy and published in the ABRALIN Journal a description of these roles in Portuguese language:

> 1. Conceptualization - Formulation or evolution of overarching research ideas, objectives, and goals.
> 2. Data Curation - Managing activities to annotate (produce metadata), cleanse data, and maintain research data (including program codes, when this is necessary to interpret the data itself) for initial use and later reuse.
> 3. Formal Analysis - Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.
> 4. Acquisition of Funding - Acquisition of financial support for the project leading to this publication.
> 5. Investigation - Conducting the investigation and research process, specifically performing the experiments, or collecting data/evidence.
> 6. Methodology - Developing or designing methodology; creating models.
> 7. Project Administration - Responsibility for the management and coordination for the planning and execution of the research activity.
> 8. Resources - Provision of study materials, reagents, supplies, patient, laboratory specimens, animals, instrumentation, computer resources, or other tools of analysis.
> 9. Software - Programming, software development, computer program design; implementation of computer code and supporting algorithms; testing of existing code components.
> 10. Supervision - Leadership and supervisory responsibility for the execution and planning of the research activity, including external mentoring for the core team.
> 11. Validation - Verification, as part of the activity or separate, of reproducibility/replication
> general reproducibility/replication of results/experiments and other research outputs.
> 12. Visualization - Preparation, creation, and/or presentation of published work, specifically data visualization/presentation.
> 13. Writing - original draft Preparation, creation, and/or presentation of published work, specifically the initial draft (including substantive translation).
> 14. Writing - analysis and editing Preparation, creation, and/or presentation of published work by members of the original research group, specifically critical analysis, commentary, or review - including pre- or post-publication stages. (ABRALIN, 2019)

About this taxonomy, Nassi-Calò (2018) states that "[...] are evidence-based and were selected by a group of stakeholders from author statements and acknowledgments in research articles in the physical sciences, social sciences, and life sciences." For McNutt et al. (2018, p. 2559, our translation) the CrediT categories listed several potentialities in their adoption by the scientific community, such as

> To reliably link author records across publications, [...] capture author contributions in journal metadata, [...] track and retrieve individual authorship contributions across different publications and over time [...] In addition, by confirming author contributions as the manuscript is finalized it is possible to create a more accurate record of what happened than asking participants to recall post facto information (e.g., when authors are considered for promotion, research grants, or major awards).

In addition to the aforementioned recommendations, it is necessary to mention those organizations that guide the work of the medical writer/professional writer, as it does not fit the four authorship criteria defined by the ICMJE. This category was named by PLOS ONE as Professional Medical Writers and the entity further stated that the "[...] involvement of any professional medical writer in the publication process should be declared." PLOS, ONE states that the European Medical Writers Association guidelines "[...] contain additional information about the role of medical writers" (PLOS ONE, [2020], our translation).

Other organizations similar to the European Medical Writers Association (EMWA) act as regulators of medical writers, such as American Medical Writer Association (AMWA) - established in the 1940s of the 20th century; Medical Writers Group - established in the 1980s; Indian Medical Writers Association; Australasian Medical Writers Association; Chinese Medical Writers Community (CMWC); International Society For Medical Publication Professionals (ISMPP) and World Association of Medical Editors (WAME).

In 2017, three of these organizations (AMWA; EWMA; ISMPP) published a joint statement, in which they claimed to be aligned with updated guidelines from several other international organizations, such as ICMJE, Medical Publishing Insights and Practices (MPIP), World Medical Association (WMA), World Health Organization (WHO), and others. The document was developed with the objective of describing

> [...] the appropriate role of professional medical writers in developing medical and scientific publications, including articles and supplementary content (e.g., video abstracts) for publication in daily peer review; abstracts, posters, and oral presentations for dissemination at scientific conferences (AMWA; EWMA; ISMPP, 2017, p. 1, our translation).

Chart 1. Declaration of responsibilities in the authorship in Medicine

Responsibilities of professional medical writers	Responsibilities of authors who collaborate with professional medical writers
- follow the guidelines contemplated in Good Publication Practice (GPP3) and the recommendations of the ICMJE; - consult appropriate reporting guidelines (e.g., CONSORT and EQUATOR); - ensure that authors and sponsors are aware of their obligations under these guidelines guidelines;	- ensure that they, as authors, have access to all relevant information (e.g., protocols, statistics, analysis plans, statistical analyses, and clinical trial reports); - provide intellectual input before writing begins and throughout the development of the content; - ensure that the final text fully reflects the authors' views and is approved by all authors; - affirm the appropriateness of the final journal or conference choice - acknowledge the provision of medical writing support, including the nature of the support, and the names, highest relevant qualification (e.g., degrees or professional credentials), and

- keep up to date with advances in ethics and best practices in medical communication.	- affiliation of the professional medical writer responsible for the support provided, and acknowledge the sources of funding for the provision of medical writing support; - recognize as coauthors all contributors (including a professional medical writer) who meet the ICMJE authorship criteria.

Source: [adapted from AMWA; EWMA; ISMPP, 2017, p. 1-2]

The benefits that can be identified by adhering to the recommendations presented above are the constant review of standards of good practice and ethics in the conduct of scientific research as well as other materials published in medical journals; supporting authors, editors, and others involved in the biomedical publishing process to create and disseminate articles in a clear, reproducible, and unbiased manner; providing useful information about the editing and publishing process to the media, to patients and their families, and to readers in general (RECOMMENDATIONS, 2014, p. 1).

When analyzing the document produced by COPE (2019), other advantages can be added in addition to these stated above, such as reducing the incidence of harassment, intimidation, threats, or other forms of coercion such as retaliation. The enhancement of institutional research offices as promoters of integrity, and an important part of a system to educate new researchers and protect potential whistleblowers, can also be included as a benefit. COPE (2019) also highlights that the implementation of these recommendations can serve as an incentive for journal editors to receive requests from institutions or authors to correct or even retract an article after publication.

Considering these ethical aspects, Goldim (2013, p. 1) emphasizes that the "[...] scientific development cannot be dissociated from its consequences and its ethical aspects." In this context, Panter (c2021) considers the accurate attribution of authors' contributions an ethical practice in research. The author also lists a series of good practices, to be promoted by the authors themselves, seeking to "[....] avoid the ethical pitfalls of authorship attribution" (PANTER, c2021): keep a careful record of all those who have contributed, their specific contributions, and their affiliations throughout the research process; review the relevant ethical guidelines and their implications; credit all their contributions in their article, whether in the authorship list, the conflict of interest statement, or the acknowledgements section; maintain open communication with their collaborators, including technical staff, about expectations for acknowledgement; become familiar with the guidelines on authorship and contribution of their target journal.

FINAL CONSIDERATIONS

Scientific collaboration has been identified since the seventeenth century through co-authorship of articles. More recently, discussions about authorship, authorship order and author contribution have been taking place in some specific areas, especially those where scientific collaboration happens in greater intensity. Although aware that the methods of counting authorship and citation are basically based on the equal division among the number of authors, it is worth mentioning that the literature has discussed the advantages of proportional counting, aiming at a greater accuracy in attributing authorship credit to people and institutions.

In this sense, it is important to highlight a definition of authorship, built from the mentioned guidelines (Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals, proposed by the International Committee of Medical Journal Editors - ICMJE); CSE Recommendations for Group-Author Articles in Scientific Journals and Bibliometric Databases, published by the

Council of Science Editors (CSE); and the Contributor Roles Taxonomy (CrediT) - proposed by the Consortia Advancing Standards in Research Administration (CASRAI) and the National Information Standards Organization (NISO).

An author, in the context of scientific publishing, is one who actively participates in the writing, reviewing, and final approval of the work, which may involve roles described by the CRediT taxonomy. Through the exercise of these roles, this individual (or organization) obtains legal rights and privileges, and most importantly, responsibility for the published content.

In addition, the identification of the various existing typologies of authorship (invited, gifted, honorary, incomplete, unjustified, disposable, orphan, and forged) is also gaining prominence. These denominations and their implications on scientific communication, besides the well-known ghost authorship, are added to hyper authorship as phenomena to be recognized and investigated in Brazilian publications, in all areas of knowledge.

Also considering the professionalization of scientists, derived from the development of science, it is worth mentioning the role of the medical writer, as found in the international literature. This function, although duly defined and organized at a global level, still lacks investigation and structuring in Brazil. Therefore, interactions between Information Science and Health Sciences, especially in the field of Medicine, provide the opportunity to exchange valuable information about the dynamics of scientific production, in a construction of knowledge based on reciprocity.

The position of authors in the byline is another theme that has been attracting attention from the scientific community since the advent of hyper authorship after World War II. Being a corresponding author has become a symbol of leadership and responsibility, and is the only position considered in some countries, such as China, when it comes to granting funding. Even in fields such as the medical sciences, where authorship is usually assigned in descending order, the corresponding author and last author have a prominent role in relation to the other positions and are usually positions held by those responsible for planning the published research and content. In this sense, it becomes fundamental to discuss the author roles among the scientific community, so that everyone is aware of the role that corresponds to each position in the byline.

In view of this, it is fundamental to broaden the discussion on these issues in Brazil, aiming to clarify with authors, editors and members of the scientific community, the various types of authors and differences intrinsic to the position in the byline of articles. The international recommendations proposed by ICMJE, CSE and CASRAI/NISO may support such a discussion. Some benefits may emerge from adherence to these recommendations, such as constant review of standards of good practice and ethics in the conduct of scientific research; support for authors, editors and others involved in the publication process to create and disseminate articles in a clear, reproducible, and unbiased manner.

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