Globethics Repository



Scientific integrity and research in health in Brazil

This page was generated automatically upon download from the Globethics Repository. More information on Globethics see https://www.globethics.net. Data and content policy of Globethics Repository see https://repository.globethics.net/pages/policy.

Item Type	Article
Authors	Cantisani Pádua, Gabriela Cristina;Guilhem, Dirce
Publisher	Conselho Federal de Medicina
Rights	Creative Commons Copyright (CC 2.5)
Download date	2026-11-09 08:20:19
Link to Item	http://hdl.handle.net/20.500.12424/238172

Scientific integrity and research in health in Brazil: a review of literature

Gabriela Cristina Cantisani Pádua [1], *Dirce Guilhem* [2]

Abstract

Brazil is a country with an emerging and rapidly expanding body of scientific research, and is correspondingly experiencing a significant increase in investment in research and researcher training. It is important to verify the quality and reliability of the knowledge arising from such research, in terms of integrity and adherence to good scientific practices. The aim of this study was to provide an overview scientific integrity in Brazil through an analysis of studies published in scientific journals. A systematic review of the SciELO, PuBMed, LILACS/IBECS and Web of Science electronic databases was performed, using keywords to select the relevant studies. Following application of inclusion and exclusion criteria, 19 publications were selected and classified into six previously defined categories. However, discussion of scientific integrity remains incipient in Brazil. The subjects discussed were plagiarism and conflicts of interest regarding authorship. Early adherence to principles of integrity are important in the academic training of researchers and young scientists.

Keywords: Bioethics. Ethics, research. Scientific integrity review. Scientific misconduct. Fraud. Brazil.

Resumo

Integridade científica e pesquisa em saúde no Brasil: revisão da literatura

O Brasil é um país com ciência emergente, em rápida expansão, apresentando aumento significativo nos investimentos destinados à pesquisa e capacitação de pesquisadores. Torna-se importante verificar a qualidade e confiabilidade do conhecimento produzido, considerando a aderência aos critérios de integridade e às boas práticas científicas. Buscou-se traçar um panorama sobre o tema da integridade científica no Brasil por meio da análise de reflexões e pesquisas publicadas em periódicos científicos. Foi realizada revisão sistemática nos bancos de dados eletrônicos SciELO, PuBMed, Lilacs/Ibecs, Scopus e Web of Science, utilizando-se palavras-chave para capturar os artigos. Após aplicação dos critérios de inclusão e exclusão, foram selecionadas 19 publicações, agrupadas em seis categorias previamente definidas. A discussão sobre a integridade científica é ainda incipiente no Brasil. Os assuntos mais discutidos foram plágio e conflitos de interesses sobre autoria. Torna-se necessária a abordagem precoce desses conhecimentos no processo de formação acadêmica de pesquisadores e jovens cientistas.

Palavras-chave: Bioética. Ética em pesquisa. Revisão de integridade científica. Má conduta científica. Fraude. Brasil.

Resumen

Integridad científica y investigación en salud en el Brasil: revisión de literatura

El Brasil es un país con ciencia emergente, en rápida expansión, con aumento significativo de investimentos destinados a investigación y capacitación de investigadores. Así, es importante verificar la calidad y confiabilidad de los conocimientos producidos, considerándose la adherencia a los requisitos de integridad y buenas prácticas científicas. Se buscó el objetivo de esbozar un panorama sobre el tema de la integridad científica en el Brasil a través del análisis de reflexiones e investigaciones publicadas en revistas científicas. Se realizó una revisión sistemática en bases de datos electrónicas: SciELO, PuBMed, LILACS/IBECS, Scopus y Web of Science, utilizándose palabras-clave para encontrar los artículos. Después de la aplicación de criterios de inclusión y exclusión fueron seleccionadas 19 publicaciones, agrupadas en seis categorías previamente definidas. El debate sobre la integridad científica es aún incipiente en este país. Los temas más discutidos fueron plagio y conflictos de intereses sobre autoría. Es necesario el acercamiento precoz a ese conocimiento en el proceso de formación académica de investigadores y jóvenes cientistas.

Palabras-clave: Bioética. Ética en investigación. Revisión de integridad científica. Mala conducta científica. Fraude. Brasil.

1. Doutoranda gabcanti@gmail.com **2. Pós-doutora** guilhem@unb.br – Universidade de Brasília, Brasília/DF, Brasil.

Correspondência
Gabriela Cristina Cantisani Pádua – Av. Diógenes Dolival Sampaio, Qd. 16, Lt. 8, Jardins Athenas CEP 74885-500. Goiânia/GO, Brasil.

Declaram não haver conflito de interesse.

Research article

Scientific production is an indicator of economic growth that has been receiving attention in the last decades. The technological capacity of a country is regarded as a source of financial independence and may lead to greater autonomy and significant economic advances [1]. The creation of human capital to provide support to an economy of knowledge establishes a scenario in which developing nations may compete with great producers of knowledge as the Unites States or Europe, as long as they start investing in science and technology and seek to qualify their labor through high level education. The BRICS (Brazil, Russia, India, China and South Africa) are countries that presently stand out for their economic and scientific growth, competing with the great economies. They thus follow the trend of investing increasingly more in research, technology, innovation and education [2]. The challenge of science has surpassed the race for new discoveries and creativity, as it became the target of great financial speculation.

Scientific and technological production is necessarily followed by the process of dissemination of knowledge. Data from the 2013 Triennial Assessment of the Brazilian Ministry of Education, performed by the Coordination of Improvement of Higher Education Personnel (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Capes) on the growth of higher education in Brazil, show large extension in the number of graduate courses in the country [3]. In the Global Research Report, published by the Thomson Reuters agency, Brazil has reached significant relevance in terms of the number of scientific publications. The document considered the total number of publications in which at least one of the authors was Brazilian. From 3,000 publications in 1989, Brazil reached 19,000, in 2007, according to the research performed by the agency [4].

The graduate programs in Brazil are evaluated by productivity criteria and one of the consequences of this is the increase in the number of scientific publications. Brazilian researchers reproduce what happens in the international context and experience the "*publish or perish*" routine. Through this view, the number of publications and the number of citations become more important than the quality of the production [5,6]. However, the knowledge produced in the area of health brings and additional issue to be evaluated when the quality of the production is evaluated: the dissemination of results that may be directly applied to the improvement of the quality of life of the population [7].

The reflexion on topic of scientific integrity, as well as the design of clear rules of good ethical and scientific practices to subsidize the process of production and dissemination of knowledge may contribute to develop and increased concern on the quality of the scientific practice and of the knowledge produced [8]. The most discussed aspects of inadequate conduct in research – fabrication, falsification, and plagiarism of data or results (FFP) – receive more attention not only in countries potentially creators of science but also in emerging nations that want to make the results of their research visible [9].

Centrality that scientific integrity occupies in the practice of research starts to be felt in Brazil. In 2010 the Primeiro Encontro Brasileiro de Integridade Científica e Publicação Ética – I Brispe [10] ("First Brazilian Meeting on Research Integrity, Science and Publication Ethics") - took place with the purpose to stimulate the engagement of the scientific community to make the principles of scientific integrity and good practices in Science be adopted in the country. Subsequent meetings were promoted in the years 2012 (II Brispe) and 2014 (III Brispe), and the fourth is scheduled for 2015, in the city of Rio de Janeiro.

In Brazil, the design and promotion of guidelines for scientific integrity with national reach are being initially disseminated by research funding agencies and scientific journals. One way to verify the progress of the debate and examine the appropriation of the topic by the Brazilian scientific community is through the analysis of articles on scientific integrity published in the periods indexed in databases. This way, the objective of the present study was to draw an outline on the theme of scientific integrity in Brazil through the analysis of reflections and studies published in scientific journals.

Methods

This is a systematic review study of the literature on the production of articles related to scientific integrity in Brazil. The following research question was designed to reach the proposed objective: "What is the state of the art of the topic of scientific integrity in Brazil?" Seeking to promote transparency on the methods and procedures utilized, the recommendations of the *Preferred Reporting Items for Systematic Reviews and Meta-Analysis* (Prisma) [11] were followed.

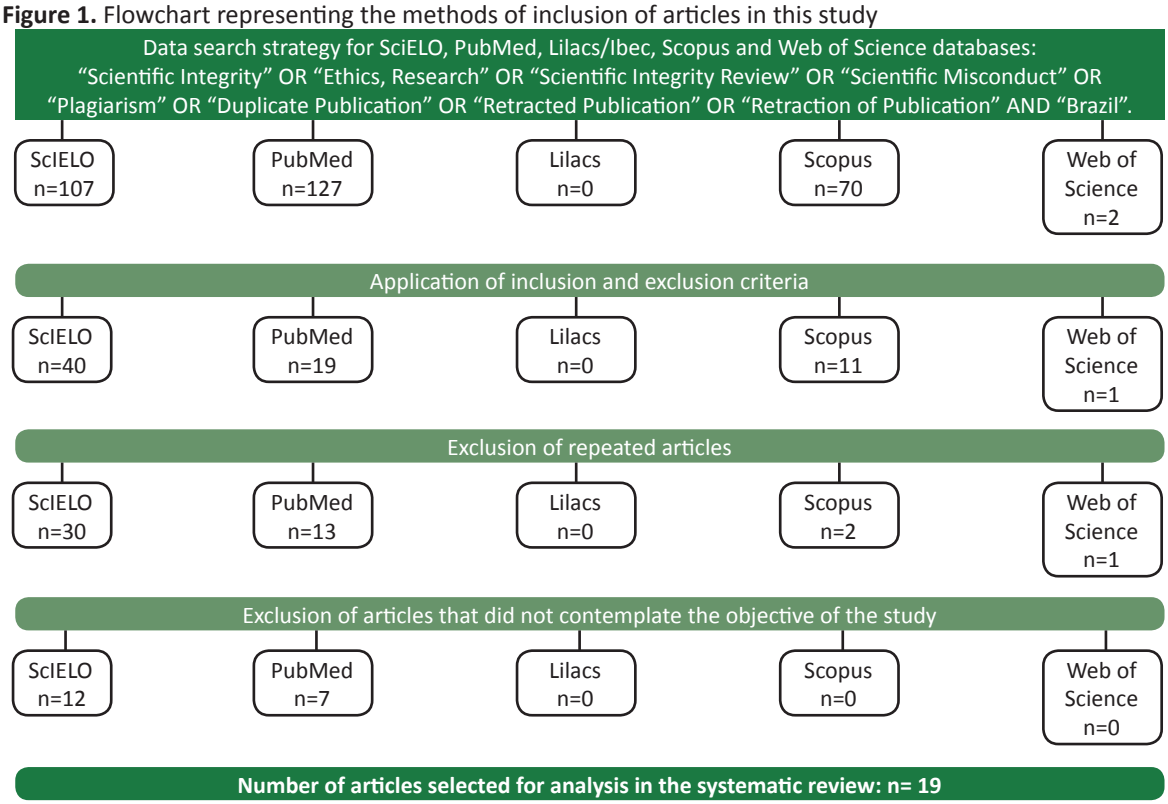
 http://dx.doi.org/10.1590/1983-80422015231053

Procedure for data collection: literature search

Research was conducted in electronic databases that preferably contain Brazilian journals and in Portuguese. Articles on the theme, written in other languages and that referred to Brazil were also analyzed. Databases researched were the Scientific Electronic Library Online (SciELO), Lilacs/Ibecs (Latin-American and Caribbean Literature - *Literatura Latino-Americana e do Caribe/Índice Bibliográfico Español en Ciencias de la Salud*), PubMed, Scopus and Web of Science, as illustrated in Figure 1. The search was conducted in the period between January and March 2014.

Articles published until January 2014 were considered, without restriction of date previous to this period. Since some articles could be published in English or Spanish ans still deal with Brazilian research, the same search matrix was used for all databases. The following keywords were employed, these are included in the Descritores em Ciências da Saúde - DeCS (Descriptors in Health Sciences), in their versions in English, Portuguese ans Spanish: "Scientific Integrity" OR "Ethics, Research" OR "Scientific Integrity Review" OR "Scientific Misconduct" OR "Plagiarism" OR "Duplicate Publication" OR "Retracted Publication" OR "Retraction of Publication" AND "Brazil".

Figure 1. Flowchart representing the methods of inclusion of articles in this study



Inclusion Criteria

Studies published in Portuguese were preferably included. Articles in English and Spanish were considered only if published by Brazilian authors, representative of the national context. The articles were available in electronic version and dealt strictly with scientific integrity in its interface with the topics: ethics in research, quality of Brazilian research, perception of researchers and students on the theme, and theoretical reflections involving this theme.

Exclusion Criteria

Articles on clinical or observational research in the field of health in which the descriptors were among the keywords and the study object was not properly scientific integrity or research ethics. Articles for which the central object was distant form the discussion on scientific integrity in Brazil or editorials on the theme were not considered. In the case of duplicated articles – that were present in more than one database – one of them was excluded.

Selection and analysis

After the application of inclusion and exclusion criteria, 19 articles were selected for the review. Initially they were analyzed in the sections defined each of the journals, which are: 1) Articles: a) original, b) special, c) opinion, d) update; e) general articles; 2) Review; 3) Comment; 4) Point of view; 5) Free topics. After this, the articles were grouped in six categories representing the themes previously defined for this study: 1) Authorship conflicts; 2) Rules and guidelines of the editorial process; 3) Brazilian rules and guidelines; 4) Plagiarism; 5) Conflicts of interest; 6) Perception of scientific integrity.

In case of doubt about the inclusion of an article, the decision was made by consensus after evaluation of the contents by the authors. After the initial selection, each article was analyzed through its title, abstract and keywords, to check its adequacy to the inclusion/exclusion criteria. In the following stage, the whole text was read and then classified in the thematic categories created.

In the analysis of the selected articles, the following aspects were considered: year of publication, journal in which the article was published, impact factor and section of the journal in which the manuscript was included. Thereafter, each article was analyzed according to: objectives, methods, evidences produced and applicability and/or recommendations.

Results

Table 1 shows the 19 articles selected according to the date of publication.

Table 1. Articles selected by year of publication, journal, impact factor, type of publication and topic category.

Year	Author(s)	Paper Title	Journal	Impact Factor (2013)	Type of Publication	Topic Category
2005	Grieger MCA[12]	Authorship: An ethical dilemma of science	São Paulo Medical Journal	0.09400	Review article	Authorship conflicts
2006	Gollogly L, Momen H[13]	Ethical dilemmas in scientific publication: Pitfalls and solutions for editors	Revista de Saúde Pública	1.21900	Article	Rules and guidelines of the editorial process
2007	Alves EMO, Tubino P[14]	Conflito de interesses em pesquisa clínica	Acta Cirúrgica Brasileira	0.63000	Special article	Conflicts of interest
2007	Grieger MCA[15]	Escritores-fantasma e comércio de trabalhos científicos na internet: a ciência em risco	Revista da Associação Médica Brasileira	0.77000	Original article	Authorship conflicts
2008	Silva OSF [16]	Entre o plágio e a autoria: qual o papel da universidade?	Revista Brasileira de Educação	0.02029	Article	Authorship conflicts e Plagiarism
2009	Camargo Jr. KR[17]	Public health and the knowledge industry	Revista de Saúde Pública	1.21900	Commentary	Conflicts of interest
2009	Vasconcelos S, Leta J, Costa L, Pinto A, Sorenson MM [18]	Discussing plagiarism in Latin American science. Brazilian researchers begin to address an ethical issue	European Molecular Biology Organization Reports	—	Point of view	Plagiarism
2009	Tavares-Neto J, Azevêdo ES [19]	Destaques éticos nos periódicos nacionais das áreas médicas	Revista da Associação Médica Brasileira	0.77000	Original article	Rules and guidelines of the editorial process

Year	Author(s)	Paper Title	Journal	Impact Factor (2013)	Type of Publication	Topic Category
2010	Garcia CC, Martrucelli CRN, Rossilho M de MF, Denardin OVP [20]	Autoria em artigos científicos: os novos desafios	Revista Brasileira de Cirurgia Cardiovascular	1.23900	Special article	Authorship conflicts
2010	Santana CC[21]	O tema da integridade científica nas pós-graduações em saúde no Brasil	Revista Bioética	—	Article	Perception of scientific integrity
2011	Berlinck RGS[22]	The academic plagiarism and its punishments: A review	Revista Brasileira Farmacognosia	0.79600	Opinion article	Plagiarism
2011	Fernandes MR, Queiroz MCCAM, Moraes MR, Barbosa MA, Souza ALL[23]	Padrões éticos adotados pelas revistas científicas brasileiras das especialidades médicas	Revista da Associação Médica Brasileira	0.77000	Original article	Brazilian rules and guidelines
2011	Krokoscz M[24]	Abordagem do plágio nas três melhores universidades de cada um dos cinco continentes e do Brasil	Revista Brasileira de Educação	—	Article	Plagiarism
2012	Schmitz PD, Menezes M, Lins L[25]	Percepção de integridade científica para o estudante de medicina	Revista Brasileira de Educação Médica	—	Article	Perception of scientific integrity
2013	Guerriero ICZ, Minayo MCS[26]	O desafio de revisar aspectos éticos das pesquisas em ciências sociais e humanas: a necessidade de diretrizes específicas	Physis	0.03450	Free Topics	Brazilian rules and guidelines
2013	Souza RP, Rapoport A, Dedivitis RA, Cernea CR, Brandão LG[27]	Conflitos de interesse na pesquisa médico-farmacológica	Revista Bioética	—	Update article	Conflicts of interest
2013	Malafaia G, Guilhem D, Talvani A[28]	Do Brazilian scientific journals promote the adherence of Chagas disease researchers to international ethical principles?	Revista do Instituto de Medicina Tropical de São Paulo	0.95900	Article	Brazilian rules and guidelines
2014	Russo M[29]	Ética e integridade na ciência: da responsabilidade do cientista à responsabilidade coletiva	Estudos Avançados	0.09470	Article	Brazilian rules and guidelines
2014	Watanabe EH[30]	A não linearidade entre a reação de quem copia e de quem é copiado	Estudos Avançados	0.09470	Article	Plagiarism

The 19 articles analyzed were included in different sections of the scientific journals, as follows: general articles: eight; special articles: two; original articles: three; opinion article: one: update article: um. The sections of Review, Commentary Point of view and Free Topics showed one article each. The main themes approached were computed in decreasing order of frequency of occurrence in the articles analyzed: 1) Plagiarism: five; 2) Authorship conflicts: four; 3) Brazilian rules and guidelines: four; 4) Conflicts of interest: three; 5) Rules and guidelines of the editorial process: two; 6) Perception of scientific integrity: two. It is important to mention that one of the articles approached two different

themes – authorship conflicts and plagiarism –, and was included in both categories.

Table 2 at the end of this paper, shows the results according to the thematic category the article was classified in, according to aspects of its scientific classification. Concerning the methods adopted, the following designs were recorded: 1) Exploratory study: five; 3) Qualitative research: three; 3) Narrative review: three; 4) Documentary descriptive research: one; 5) Literature review and case study: one; 6) Without any scientific method, based on experience and register: one; 7) Methods not mentioned: five. In all articles selected it was possible to find or infer the objectives proposed and the evidence produced, from the research or the arguments presented.

Table 2. Distribution of the selected articles according to the following aspects: objectives, methods, evidence produced, applicability and/or recommendations.

Author(s)	Title of the article	Objective(s)	Methods	Evidence produced	Applicability and/or recommendations
THEMATIC CATEGORY: PLAGIARISM					
Vasconcelos S, Leta J, Costa L, Pinto A, Sorenson MM [18]	Discussing plagiarism in Latin American science. Brazilian researchers begin to address an ethical issue	To check the conception of plagiarism among Brazilian scientists	Qualitative research. Procedures: 2 focal groups, including 16 researchers from different areas of knowledge	1) The concept of plagiarism is not clear to the researchers 2) Plagiarism is a sensitive issue that is still not properly discussed and specific guidelines are almost inexistent in Latin-American institutions	1) The theme must be introduced in the process of academic training 2) There is a need for the design of specific guidelines to orient specific institutional policies in Brazil and in Latin-America
Berlinck RGS [22]	The academic plagiarism and its punishments: A review	Introduce the concept of plagiarism, its implications, consequences and possible penalties	Not mentioned	1) The concept of plagiarism is complex and must be understood from its historical-cultural integration 2) Teachers must introduce the early discussion on the theme, including notions of authorship and authenticity of sources	Early discussion of the theme in the process of academic training, including issues related to early detection and possible penalties

Research article

http://dx.doi.org/10.1590/1983-80422015231053

Author(s)	Title of the article	Objective(s)	Methods	Evidence produced	Applicability and/or recommendations
Krokoscz M [24]	Abordagem do plágio nas três melhores universidades de cada um dos cinco continentes e do Brasil	1) Identify and analyze the approaches to plagiarism adopted in these institutions 2) Compare the approaches of the world's best universities with the approaches of the best Brazilian universities 3) Present proposals to combat plagiarism in Brazil	Documentary descriptive research	1) Presentation of comparative data on plagiarism in the five continents and the three best Brazilian universities 2) Systematization of information about plagiarism: a) Institutional *hotsite* with exclusive content on plagiarism; b) institutional policy on plagiarism; c) Availability of guides, manuals and/or official documents on the subject; d) academic integrity committee, disciplinary committee, inquiry committee etc. 3) Adoption of preventive, diagnostic and corrective measures.	1) The confrontation of plagiarism should include a set of actions and strategies of training and capacity building 2) Adoption of a formative approach for the promotion of scientific culture of integrity 3) Elaboration and adoption of institutional policies for the prevention of plagiarism 4)Introduction of the theme and specific strategies to minimize this problem
Watanabe EH [30]	A não linearidade entre a reação de quem copia e de quem é copiado	To present some measures taken within Coppe/UFRJ to prevent plagiarism and certain correlated problems	No specific scientific method was adopted. Experience and record along the years	Discussion on the following aspects: a) declaration of non-infringement of third party rights; b) important definitions; c) Ordinance 13/2006 by Capes; d) inclusion of parts copied from others or from the author himself; e) interesting examples of copyright violations	Construction of a culture of plagiarism prevention, adopting the following actions: a) raise awareness of the need to respect the copyrights of others; b) indicate the authorship of material published (published or not) when using quotes, third-party ideas; c) obtain permission from the copyright owners when using copyrighted material; d) end the culture of "copy and paste"; e) comply with Articles 297-299 of the Brazilian Penal Code (Código Penal Brasileiro)

Author(s)	Title of the article	Objective(s)	Methods	Evidence produced	Applicability and/or recommendations
THEMATIC CATEGORY: AUTHORSHIP CONFLICTS AND PLAGIARISM					
Silva OSF [16]	Entre o plágio e a autoria: qual o papel da universidade?	To reflect on authorship, authorship conflicts and plagiarism	Qualitative research with 20 language undergraduate students taking a semi-presential course	1) The interface to technology allows the use of virtual hypertext as the main source of information 2) Ease of access predisposes students to use third party material as their own 3) The constitution of authorship should be seen as an exercise of autonomy and awareness of the other	1) It is necessary to broaden the discussion on the subject of authorship and plagiarism in academic context 2) There is the need to promote actions to minimize the occurrence of this problem in the academic environment
THEMATIC CATEGORY: AUTHORSHIP CONFLICTS					
Grieger MCA [12]	Authorship: An ethical dilemma of science	1) To review articles in the literature regarding misconduct in authorship: its types, causes, consequences and ethical guidelines 2) To propose alternatives for ethical commitment in scientific publications	Narrative review	1) Frequent types of misconduct are cases of ghost-writer and shared and redundant publications 2) The main causes of these practices are the pressure to publish and the desire for social and professional mobility 3) These practices are still present despite the criteria defined by the International Committee of Medical Journal Editors (ICMJE)	Academic institutions, research funding agencies, regulatory agencies and professional associations should establish assessment policies on the quality of publications and adherence to ethical principles of scientific research
Grieger MCA [15]	Escritores-fantasma e comércio de trabalhos científicos na internet: a ciência em risco	To analyze the trade of scientific papers and how these services are offered	Exploratory study. Analysis of 18 internet sites that offer services of elaboration of scientific articles, monographs, dissertations and theses	1) Ten enterprises accepted the order and, except for one, they did not object to the conditions imposed: Field research, approval by a research ethics committee (REC) and the use of the Vancouver norms. Six did not reply and two did not accept the order alleging that they have no staff available 2) The trade of scientific papers is a fact which can negatively interfere in the ethical, scientific and professional development of undergraduate and graduate students, as well as in scientific production by adulterating data and information from the literature	Necessity to develop reliable strategies for assessment of final projects and monographs

 http://dx.doi.org/10.1590/1983-80422015231053

Author(s)	Title of the article	Objective(s)	Methods	Evidence produced	Applicability and/or recommendations
Garcia CC, Martrucelli CRN, Rossilho MMF, Denardin OVP [20]	Autoria em artigos científicos: os novos desafios	To reflect on criteria for authorship attribution, the reasons for the growth of co-authorship rates and the challenges of establishing authorship in electronic journals	Literature review and case study (database)	1) There are strategies to avoid misconduct regarding the authorship attribution from affecting the credibility of science 2) Bad behaviors in relation to authorship are: guest, pressured and ghost authoring and co-authoring	1) Disseminated practices such as a guest, pressured or ghost authoring must be fought 2) Journals should require transparency on the contribution of each of the co-authors
THEMATIC CATEGORY: BRAZILIAN RULES AND GUIDELINES					
Fernandes MR, Queiroz MCCAM, Moraes MR, Barbosa MA, Souza ALL[23]	Padrões éticos adotados pelas revistas científicas brasileiras das especialidades médicas	To analyze ethical standards in the guidelines for authors of Brazilian scientific journals of various medical specialties and to investigate the standardization available	Exploratory study performed on the Health Sciences Portal of BVS (*Portal de Ciências da Saúde da BVS*). 95 journals were included	Of the journals analyzed: a) 80% referred to the approval of the study by a REC; b) 43.15% mentioned the Declaration of Helsinki and informed consent; c) 32.63% reported uniform requirements; d) 15.78% reported protection of confidentiality; e) 9.47% made no mention of ethical aspects to submit articles; f) 90% mentioned ethical aspects for article submission.	The Brazilian scientific journals should improve the requirements for submission and review of articles in order to ensure the quality and reliability of the results presented
Guerriero ICZ, Minayo MCS [26]	O desafio de revisar aspectos éticos das pesquisas em ciências sociais e humanas: a necessidade de diretrizes específicas	Question the undue standardization of ethical procedures focused on research in the social sciences and humanities	Narrative review	Brazilian regulations on research ethics are inadequate to assess the research projects from the social sciences and humanities	The need to discuss the specificity of ethics in research in social sciences and humanities
Malafaia G, Guilhem D, Talvani A [28]	Do Brazilian scientific journals promote the adherence of Chagas disease researchers to international ethical principles?	To examine the ethical aspects of publications on Chagas disease in the 1966-2010 period and the policies adopted for publication by Brazilian medical journals	Exploratory study conducted in the SciELO database	1) Of the 158 articles analyzed, 58.9% did not mention the ethical aspects used in the study 2) Among the 25 evaluated journals, only 13 clearly indicated the ethical aspects required for publication of articles	Brazilian scientific journals should improve the ethical requirements for submission and review articles in order to adapt to the Brazilian guidelines on ethics in research involving human subjects

Author(s)	Title of the article	Objective(s)	Methods	Evidence produced	Applicability and/or recommendations
Russo M [29]	Ética e integridade na ciência: da responsabilidade do cientista à responsabilidade coletiva	To show that issues on ethics and integrity in research must be addressed both from the discussion on the responsibility of the scientist as from the collective responsibility	Narrative review	Three questions were designed to support the discussion on the subject: a) "We are less ethical and less righteous than our ancestors?"; b) "What values are coupled to scientific work and publication today?"; c) "Watch, punish, prevent or transform? Where are we and where do we want to go?"	1) It is necessary to resume values in scientific practice as a form of opposition to the impulse of fraud 2) Responsibility emerges as a possibility which will direct one's own scientific research toward ethics
THEMATIC CATEGORY: CONFLICTS OF INTEREST					
Alves EMO, Tubino P [14]	Conflito de interesses em pesquisa clínica	To reflect on issues related to conflicts of interest in clinical research	Not mentioned	1) Conflicts of interest are common and inevitable in academic life 2) The challenge is not to eradicate them, but their recognition allows managing them properly	1) All research involving human subjects should be evaluated by ethics review committees; 2) The results of the studies must meet the standards for the management of conflicts of interest proposed by the ICMJE
Camargo Jr KR [17]	Public health and the knowledge industry	To examine issues related to the interface between public health and the knowledge industry	Not mentioned	1) There is an industry of knowledge that confers powers to the countries, institutions and researchers 2) Often the knowledge is linked to marketing as a way to allow their sale to possible bidders	Production and distribution of knowledge should be addressed as a strategic component of public health
Souza RP, Rapoport A, Dedivitis RA, Cernea CR, Brandão LG [27]	Conflitos de interesse na pesquisa médico-farmacológica	To reflect on issues related to conflicts of interest in medical and pharmacological research	Not mentioned	1) Research conducted with funding from the pharmaceutical industry have higher proportion of favorable results 2) Conflicts of interest represent biases that may affect results	1) Transparency in the declaration of conflicts of interest involved in research 2) Contribute to rigorous analysis of clinical research projects, which should be reviewed by ethics review committees

 http://dx.doi.org/10.1590/1983-80422015231053

Author(s)	Title of the article	Objective(s)	Methods	Evidence produced	Applicability and/or recommendations
THEMATIC CATEGORY: PERCEPTION OF SCIENTIFIC INTEGRITY					
Santana CC [21]	O tema da integridade científica nas pós-graduações em saúde no Brasil	To know the concern of health graduate programs about the theme of research integrity	Exploratory study through research in 126 pages of Brazilian programs in the field of health	1) There is still no concern over the issue of integrity in research in most health graduate programs in the country 2) Scientific honesty is still not a priority in educational institutions	Educational institutions and the scientific community should assume a fundamental role in the formation of ethically responsible research
Schmitz PD, Menezes M, Lins L [25]	Percepção de integridade científica para o estudante de medicina	1) To understand the perception of the medical student on scientific integrity 2) To discuss the need to address the issue in the training of ethically responsible research 3) To clarify the importance of educational practices aimed ethics education the formation of students	Qualitative Study. Thematic analysis technique. Procedure: semi-structured interview	1) the need for more effective approach was evident on the REC / ERC System 2) The subject of scientific integrity seems to be little discussed in the academic environment, which can lead to the practice of misconduct in scientific production, for lack of recognition of these behaviors by students	1) Theoretical and practical strategies for the scientific integrity of education must be adopted in the medical curriculum 2) The issue must be introduced early in the academic process
THEMATIC CATEGORY: RULES AND GUIDELINES OF THE EDITORIAL PROCESS					
Gollogly L, Momen H [13]	Ethical dilemmas in scientific publication: Pitfalls and solutions for editors	To provide definitions, ways to document the extent of the problem and examples of initiatives to contain editorial fraud	Not mentioned	1) Common problems of misconduct in science are: manufacturing, falsification, duplication, ghost authorship, gift authorship, lack of ethics in the approval of manuscripts, non disclosure of these facts, “salami” (fractionated) publication, conflicts of interest, self-citation, duplicate submission and publication as well as plagiarism 2) Editorial misconduct includes failure to follow the due process, delay in decision making and communication with the authors, failure to review and confusion of the contents of a journal with their promotional and advertising potential	1) Editors take privileged positions in the process of promoting appropriate practices for publication 2) Journals should adopt clear ethical guidelines about the procedures adopted for publication

Author(s)	Title of the article	Objective(s)	Methods	Evidence produced	Applicability and/or recommendations
Tavares--Neto J, Azevêdo ES [19]	Destaques éticos nos periódicos nacionais das áreas médicas	To evaluate existing ethical highlights in the instructions to authors of national journals jointly cited by the four medical areas of Capes and qualified nationally as "A" internationally as "I".	Exploratory study. Procedures: analysis if the instructions to authors of 20 national journals	1) Regarding research ethics, 50% of the analyzed the journals require that the study has been approved by a research ethics committee 2) Regarding scientific integrity, 55% of the journal require declarations of conflict of interest. However, all (100%) Periodicals are silent as to the verification of conflicts of interest between authors and reviewers, as well as the prevention of fraud, plagiarism and manufacturing data 3) About editorial policies, 65% of the journals require the copyright to be transferred to them and the rest (35%) do not mention the subject	The prevention of scientific dishonesty must be a responsibility shared by researchers, funding agencies, educational institutions, scientific journals and the society in general

Discussion

It is shown that the topic of scientific integrity is still recent in the Brazilian context, considering the first article found on the subject dates back to 2005. However, this discussion has grown in Brazil as it exposes the need to establish clear rules about the conducts of researchers. Funding agencies, such as the *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (CNPq) and the *Fundação de Amparo à Pesquisa do Estado de São Paulo* (Fapesp), develop guidelines to ensure the adoption of good scientific practices in the projects supported by these institutions [31,32]. Such strategy is very welcome, considering the growth of Brazilian science.

The articles dealt with various issues about scientific integrity, among them the most discussed by authors were plagiarism [16,18,22,24,30] and authorship conflicts involving several collaborators [12,15,16,20]. This concern is understandable in a scientific scenario where researchers are pressured to increase their production of articles for publication, putting at risk the quality and validity of the results presented [33].

Although the concept of plagiarism is complex and must be understood from its historical-cultural context 22, it is a delicate issue that has not been discussed properly, also because there are specific guidelines on the subject in Latin-American institutions are practically nonexistent [18]. It was shown that this topic was approached by publications in journals form several fields, such as molecular biology, pharmacology, education and multidisciplinary, as it equally affects different areas of knowledge. Another important aspect in this discussion refers to the possibility of violation of rights of third parties, authorship rights, which implies the unduly use of texts and ideas without the due mention and or authorization when dealing with copyrighted documents [30]. Authors are unanimous in pointing to the need of early approach to this theme in the academic training, through educational strategies and the promotion of a culture of plagiarism prevention [16,18.22,24,30].

Authorship conflicts entered the repertoire of scientific integrity especially when the growing number of articles published in scientific journals form the 1990s is considered. This is attributed to the way of assessment the quality of a researcher is performed through the number of scientific articles the researcher publishes [12]. The high demand for productivity in shorter time may be harmful to the creativity and the originality of the studies published. As a consequence, co-authorship has grown significantly as a way of demonstrating the establishment of national and/or international partnerships of researchers and research groups, which also increased the chances of publication in journals of international visibility. An interesting strategy co-authored studies is to establish transparency criteria that show the effective participation and col-

laboration of each of the authors in the production of the material submitted for publication [20].

Regarding the thematic category "Brazilian rules and guidelines" [23,26,28,29], the authors point out interesting aspects. Two articles focused in the analysis of the adherence to ethical requirements from the Brazilian normative framework by journals of different medical specialties. It was also observed that there are gaps in the standardization or the orientations to authors presented in the journals. In this sense, it becomes urgent to improve the requirements for submission and assessment of articles, in order to ensure the quality and reliability of the results presented [23,28].

One of the articles in quite incisive in pointing out the inadequacy of Brazilian regulations for research involving human beings when applied to the areas of social sciences and humanities. The authors argue on the need to define specific regulations for the assessment of projects in these areas [26]. Another text considers that it is necessary to resume using values in the scientific practice, in order to keep ethics and integrity in science. This is a responsibility shared by researchers and the general society, a principle that emerges as an element that will subsidize the conduct of researches and oppose the impulse of [29]. That is, it becomes necessary to advance in the consolidation of specific regulations that contribute to the adoption of reliable and trustworthy behaviors.

Conflicts of interest in clinical research emerged as a relevant topic that causes concern among researchers who propose the discussion on scientific integrity [14,17,27]. An issue related to the interface between financing coming from the pharmaceutical industry and the distribution of knowledge as a strategic component for the process of attention in public health also arose [17]. The authors point out that conflicts of interest are inevitable and constitutive of academic life and scientific practice. The great challenge, then, is not their eradication but to approach them transparently, because their recognition allows for their proper management [14].

In order to minimize the conflicts of interest arising from biomedical research, all studies involving human beings must be assessed by research ethics committees before their start [27]. This idea must be widely disseminated and adopted in order to ensure the safety and dignity of the research participants, and presented to students early in their academic life.

Two studies presented research results on the subject of scientific integrity: one focusing on the conception of health graduate programs on the subject [21], and another addressing the perception of scientific integrity on the part of medical students [25]. In the first one, web sites of 126 Brazilian programs in health were analyzed. It became clear that, besides the lack of concern over the issue of integrity in research in most graduate programs, scientific honesty is still not a priority for educational institutions [21]. In the second study, medical students were interviewed using qualitative research, and their results showed three distinct needs: 1) more effective approach to the Research Ethics Committee System; 2) further discussion in academia on the subject of scientific integrity; 3) adoption of theoretical and practical strategies for teaching scientific integrity in the medical curriculum [25].

The last thematic category – Rules and guidelines of the editorial process – included two articles with distinct approaches [13,19]. In the first one, the authors set the objective as to supply definitions, ways of documenting the extension of the problem and examples of measures to avoid editorial fraud. Listed common problems of misconduct in science include: manufacturing, falsification, duplication, ghost authorship, gift authorship, lack of ethics in the approval of manuscripts, non disclosure of these facts, "salami" (fractionated) publication, conflicts of interest, self-citation, duplicate submission and publication, as well as plagiarism. At the same time, editorial misconduct includes failure to follow the due process, delay in decision making and communication with the authors, failure to review and confusion of the contents of a journal with their promotional and advertising potential. It was also evidenced that editors take privileged positions in the process of promoting appropriate practices for publication [13]. In the second article, the authors sought to assess the ethical highlights in the instructions to authors of national journals jointly cited by the four medical areas of Capes and qualified nationally as "A" internationally as "I". Although several gaps were found in the instructions to authors, the prevention of dishonesty mus be a responsibility shared among researchers, funding agencies, educational institutions scientific journals and the society in general [19].

One of the recurring aspects in the articles analyzed was the need of early insertion of the scientific integrity theme and its different sides in the process of academic education. It becomes necessary to develop strategies to teach scientific integrity values in the undergraduate and graduate curricula [15,16,18,19,21,22,24,25,29,30]. The incorporation of ethical values and the consolidation of adequate behaviors

for the scientific practice must be widely diffused during the training of students and researchers. This must come with adequate methods that stimulate personal and collective strengthening toward scientific good practices and ethics [34].

Final considerations

It is important to point out that the limitations of this research are related to technical aspects as the restricted or inadequate use of the descriptors used for article indexing, which prevented the capture of some publications that could prove relevant to the discussion; and the unavailability of some articles in the electronic format.

However, this study verified the complexity the theme of scientific integrity assumes nowadays due to the accelerated growth of the scientific production. The early approach of this issue becomes mandatory, so that young scientists and researchers may acquire the terminology and concepts related to science integrity, which will contribute to the adoption of an ethical culture of scientific integrity.

Brazil needs to advance in the discussion of this theme, incorporating it to the process of academic training and continued education of researchers. However, this responsibility is not restricted to educational institutions. It must be shared by different actors and social institutions, extending to society as a whole. It is necessary to work in conjunction in toward establishing standards to be followed without costs for science and the producers of knowledge. It is necessary, still to define the possible penalties in case of misconduct in research so that abusive behaviors can be identified and corrected.

Referências

1. Organisation for Economic Co-operation and Development. Policy Brief: Science, technology and innovation in the new economy. [Internet]. Paris: OECD; 2000 set [acesso 10 out 2014]. Disponível: http://www.oecd.org/science/sci-tech/1918259.pdf
2. Scientific Electronic Library Online. Países em desenvolvimento liderados pela China ameaçam domínio norte-americano na ciência. SciELO em Perspectiva. [Internet]. 2014 abr [acesso 8 out 2014]. Disponível: http://blog.scielo.org/blog/2014/04/17/paises-em-desenvolvimento-liderados-pela-china-ameacam-dominio-norte-americano-na-ciencia
3. Brasil. Ministério da Educação/Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Capes divulga resultado final da avaliação trienal 2013 após análise de recursos. [Internet]. 2014 maio [acesso 10 out 2014]. Disponível: http://www.capes.gov.br/36-noticias/6908-capes-divulga-resultado-final-da-avaliacao-trienal-2013-apos-analise-de-recursos
4. Adams J, Christopher K. Global research report Brazil: Research and collaboration in the new geography of science. New York: Thomson Reuters; 2009 jun [acesso 10 out 2014]. Disponível: http://sciencewatch.com/sites/sw/files/sw-article/media/grr-brazil-Jun09.pdf.
5. Fischer J, Ritchie EG, Hanspach J. Academia's obsession with quantity. Trends Ecol Evol. 2012;27(9):473-4.
6. Reverter Masià J. Publicaciones científicas y evaluación de la vida profesional de un científico. Nutr Hosp. 2012;27(4):1.368-9.
7. Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E *et al*. Systematic review: Impact of health information technology on quality, efficiency, and costs of medical care. Ann Intern Med. 2006;144(10):742-52.
8. Macrina FL. Scientific integrity: Text and cases in responsible conduct of research. 3ª ed. Washington: American Society for Microbiology (ASM) Press; 2005.
9. Fanelli D. How many scientists fabricate and falsify research? A systematic review and meta-analysis of survey data. PLoS ONE. [Internet]. 2009 [acesso 15 out 2014]; 4(5):e5738; 2009. Disponível: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0005738
10. First Brazilian Meeting on Research Integrity, Science and Publication Ethics. I Brispe; 2010 dez 10-16 [acesso 15 ago 2014]; Rio de Janeiro e São Paulo, Brasil. Disponível: http://www.ibrispe.coppe.ufrj.br/port.php
11. PRISMA Statement. Transparent reporting of systematic reviews and meta-analyses. [Internet]. [acesso 22 maio 2014]. Disponível: http://www.prisma-statement.org
12. Grieger MCA. Authorship: An ethical dilemma of science. São Paulo Med J. 2005;123(5):242-6.
13. Gollogly L, Momen H. Ethical dilemmas in scientific publication: Pitfalls and solutions for editors. Rev Saúde Pública. 2006;40(N Esp):24-9.
14. Alves EMO, Tubino P. Conflito de interesses em pesquisa clínica. Acta Cir Bras. 2007;22(5):412-5.
15. Grieger MCA. Escritores-fantasma e comércio de trabalhos científicos na internet: a ciência em risco. Rev Assoc Med Bras. 2007;53(3):247-51.
16. Silva OSF. Entre o plágio e a autoria: qual o papel da universidade? Rev Bras Educ. 2008;13(38):357-414.

17. Camargo Jr KR. Public health and the knowledge industry. Rev Saúde Pública. 2009;43(6):1.078-83.
18. Vasconcelos S, Leta J, Costa L, Pinto A, Sorenson MM. Discussing plagiarism in Latin American science. Brazilian researchers begin to address an ethical issue. EMBO Reports. 2009;10(7):677-82.
19. Tavares-Neto J, Azevêdo ES. Destaques éticos nos periódicos nacionais das áreas médicas. Rev Assoc Med Bras. 2009;55(4):400-4.
20. Garcia CC, Martrucelli CRN, Rossilho MMF, Denardin OVP. Autoria em artigos científicos: os novos desafios. Rev Bras Cir Cardiovasc. 2010;25(4):559-67.
21. Santana CC. O tema da integridade científica nas pós-graduações em saúde no Brasil. Rev. bioét. (Impr.). 2010; 18(3):637-44.
22. Berlinck RGS. The academic plagiarism and its punishments: A review. Rev Bras Farmacogn. 2011;21(3):365-72.
23. Fernandes MR, Queiroz MCCAM, Moraes MR, Barbosa MA, Souza ALL. Padrões éticos adotados pelas revistas científicas brasileiras das especialidades médicas. Rev Assoc Med Bras. 2011;57(3):267-71.
24. Krokoscz M. Abordagem do plágio nas três melhores universidades de cada um dos cinco continentes e do Brasil. Rev Bras Educ. 2011;16(48):745-68.
25. Schmitz PD, Menezes M, Lins L. Percepção de integridade científica para o estudante de medicina. Rev Bras Educ Med. 2012;36(4):447-55.
26. Guerriero ICZ, Minayo MCS. O desafio de revisar aspectos éticos das pesquisas em ciências sociais e humanas: a necessidade de diretrizes específicas. Physis. 2013;23(3):763-82.
27. Souza RP, Rapoport A, Dedivitis RA, Cernea CR, Brandão LG. Conflitos de interesses na pesquisa médico-farmacológica. Rev Bioét. (Impr.). 2013;21(2):237-40.
28. Malafaia G, Guilhem D, Talvani A. Do Brazilian scientific journals promote the adherence of Chagas disease researchers to international ethical principles? Rev Inst Med Trop São Paulo. 2013;55(3):159-65.
29. Russo M. Ética e integridade na ciência: da responsabilidade do cientista à responsabilidade coletiva. Estud Av. 2014;28(80):189-98.
30. Watanabe EH. A não linearidade entre a reação de quem copia e de quem é copiado. Estud Av. 2014;28(80): 199-212.
31. Brasil. Conselho Nacional de Desenvolvimento Científico e Tecnológico. Diretrizes sobre integridade científica. [Internet]. Brasília: CNPq; 2012 [acesso 20 out 2014]. Disponível: http://www.cnpq.br/pt/web/guest/documentos-do-cic
32. Estado de São Paulo. Fundação de Amparo à Pesquisa do Estado de São Paulo. Código de boas práticas científicas. [Internet]. São Paulo: Fapesp; 2014 [acesso 20 out 2014]. Disponível: http://www.fapesp.br/boaspraticas/FAPESP-Codigo_de_Boas_Praticas_Cientificas_2014.pdf
33. Tijdink JK, Vergouwen ACM, Smulders YM. Publication pressure and burn out among Dutch medical professors: A nationwide survey. PLoS ONE. [Internet]. 2013 [acesso 10 out 2014]; 2013;8(9):e73381. Disponível: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0073381
34. Guilhem D. Ética em pesquisa: avanços e desafios. RECIIS – R. Eletr. de Com. Inf. Inov. Saúde. [Internet]. 2008 [acesso 10 out 2014]; 2008;2(Sup 1):91-7. Disponível: http://www.reciis.icict.fiocruz.br/index.php/reciis/article/view/212/191

Participation of the authors

Gabriela Cristina Cantisani Pádua took part in the conception of the article, the database research process, the analysis of the results and in producing the final version to be published. Dirce Guilhem took part in the conception of the article, the analysis and interpretation of the results, writing, critical review and in producing the final version to be published.

Recebido: 28.10.2014
Revisado: 31. 1.2015
Aprovado: 5. 2.2015

Research article