Original article

ETHICS AND INTEGRITY: CODE OF CONDUCT FOR SCIENTIFIC RESEARCH IN BRAZIL

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Objective: To present an analysis of the legal mechanisms that guide scientific research in Brazil in ethics, integrity and its related aspects, regarding misconduct in the production of scientific knowledge. **Method:** Data was collected through documentary research of publications from regulatory agencies that set the standards for scientific research released in the 2010-2017 period. **Results:** Data analysis generated a chart of Guidelines of Conduct and the Institutions that generated the records. Despite the differences in the documents of the sources investigated, they all agreed on the term "research misconduct". **Conclusion:** The institutions should carry out preventive and pedagogical actions targeted to scientific research, as well as promote the standardization of the rules of evaluation and punishment of misconduct.
KEYWORDS: Ethics; Copyright; Research misconduct; Moral; Plagiarism.

ÉTICA E INTEGRIDADE: CONDUTAS PARA PRODUÇÕES CIENTÍFICAS NO BRASIL

Objetivo: apresentar uma análise de dispositivos legais, que sejam norteadores de pesquisas científicas no Brasil quanto à ética, integridade e seus aspectos, em relação às práticas inadequadas de conduta na produção do conhecimento científico. **Método:** a coleta de dados ocorreu por meio de pesquisa documental, correspondente às publicações de órgãos norteadores de pesquisas científicas, lançadas entre os anos de 2010 e 2017. **Resultados:** a análise dos dados gerou um quadro de Orientações de Conduta e as Organizações geradoras. As fontes observadas apresentaram documentações diversificadas e concordância, no que diz respeito ao termo má conduta científica. **Conclusão:** percebeu-se que é necessário esforço por parte das instituições, nas ações preventivas e pedagógicas em relação à produção científica, bem como a padronização das regras de avaliação e de punição em má conduta.

DESCRITORES: Ética; Direito autoral; Má conduta científica; Moral; Plágio.

ÉTICA E INTEGRIDAD: CONDUCTAS PARA PRODUCCIONES CIENTÍFICAS EN BRASIL

Objetivo: presentar un análisis de dispositivos legales que sean parámetros para investigaciones científicas en Brasil asociados a la ética, la integridad y sus aspectos, en lo que se refiere a prácticas inadecuadas de conducta en la producción del conocimiento científico. **Método:** se recogieron los datos por medio de investigación documental, correspondiente a las publicaciones de órganos rectores de investigaciones científicas, publicadas entre los años de 2010 y 2017. **Resultados:** el análisis de los datos generó un cuadro de Orientaciones de Conducta y las Organizaciones generadoras. Las fuentes observadas presentaron documentaciones diversificadas y concordancia acerca del término mala conducta científica. **Conclusión:** se percibe que es necesario esfuerzo de las instituciones, en las acciones preventivas y pedagógicas en lo que se refiere a la producción científica, así como la estandarización de las reglas de evaluación y de punición en mala conducta.
DESCRIPTORES: Ética; Derecho autoral; Mala conducta científica; Moral; Plagio.

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INTRODUCTION

Ethics is formed by principles such as respect, justice and beneficence that permeate the reflection on morality and attitude. This set of principles includes standards that regulate conduct and guarantee the well-being of the individual in society [1] As for Research Integrity, the term refers to the ethical obligations that researchers must meet in conducting scientific research [2].

Since 1980, there has been great concern about ethics and integrity in scientific research due to the increase in cases of fraud in research institutions, particularly in the United States [3]. In Brazil, the issue has emerged more recently. To enrich discussions around the theme, conferences have been held, such as the Brazilian Meeting on Research Integrity, Science and Publication Ethics - Brispe (I Brispe, 2010, II Brispe, 2012, III Brispe, 2014, IV Brispe, 2016).

These events aim to address the main practices used in scientific research and stimulate the involvement of the research institutions of the country. Brazil also hosted the 4th World Conference on Research Integrity (WCRI) in 2015, supported by organizations such as CAPES (Coordination for the Improvement of Higher Education Personnel), CNPq (National Council for Scientific and Technological Development), FAPESP (São Paulo Research Foundation) and the Brazilian Academy of Sciences.

The theme ethics and integrity in scientific research was chosen to provide a better understanding of this discussion. The present study aims to present the legal devices that guide scientific research in Brazil, regarding ethics and integrity. Moreover, aspects related to misconduct in the production of scientific knowledge will be analyzed.

Moral and ethics are two terms widely used and often misinterpreted. This is because both are directly linked to values, such as right and wrong. Ethics is related to the discussion of values, responsibility, and conscience, morality concerns an individual's way of living. Thus, morality is a set of rules of conduct accepted by a group or society about how one should behave. At the same time, ethics is the reflection on the principles that underlie morality [4].

Situations involving Moral and Ethics are frequent in all fields of knowledge, due to the growing technological development. Due to the increasing technological development, such situations occur frequently in the field of research.

The issue of academic and research misconduct is approached by a model that explains its main facilitators [5]. One example is academic performance. Since recognition is based on scientific production, too much pressure is put on the students/authors [5]..

Some common ethical issues in research include academic misconduct, fabrication of data, falsification of data, plagiarism, self-plagiarism, copyright and conflict of interests [6].

These issues are defined by some authors as:

- Academic misconduct: the action intended to make other people think that something is real when it is actually not [6]. The term may refer to fabrication, plagiarism and other practices repudiated by the academic community.
- Fabrication of data and Falsification of data: fabrication of data in research consists of including data that was invented or falsified and information that was deliberately altered [7].
- Plagiarism: According to the Guidelines for Academic Integrity of the Brazilian Academy of Sciences [8] plagiarism is the use of non-referenced ideas or writings of others
- Self-plagiarism: refers to the practice of an author to use previous parts of his/her own writings on the same topic in another publication. Although self-plagiarism is not the theft of text or ideas, several periodicals and magazines ask for confirmation that those data have not been previously published [9].
- Copyright: copyright refers to a set of patrimonial prerogatives of the author on his literary, artistic or scientific work [10].

- Conflict of interest is the incompatibility between one's personal interests and duties. For example, the well-being of a patient may be hampered by secondary interests such as financial gain. [11].

Such ethical problems are caused not only by the authors, but also by publishers, magazine reviewers and journals [12]. It is necessary to understand the concept of ethics and integrity in scientific research. Ethics provides the standards to determine whether the behaviors of individuals in a society are morally appropriate or not. It also establishes limits to the morality of this society.

Thus, research integrity only exists when the ethical standards required in scientific publications are observed. Research integrity is based on ethical principles such as trust, honesty, beneficence, respect, justice and responsibility [13].

Integrity must be associated to scientific research because ethics is the basis of one's own integrity. Ethics is formed by a set of principles that establish a standard conduct and guides the individual s behavior, Integrity in scientific research aims to ensure that ethical practices, such as honesty, prudence and recognition of equality are adopted by researchers within institutions.

It is hoped that this will reduce the problems associated with misconduct in research such as plagiarism, fabrication or falsification of data, among others [3]. It is important to disseminate the importance of integrity and ethics in scientific research through the presentation of the legal provisions that guide scientific research in Brazil to prevent the use of misconduct in the production of scientific knowledge.

METHOD

This is an exploratory study of documentary research type of ´public archives available at the database of the Portal of Periods of the Coordination for the Improvement of Higher Education Personnel (CAPES). This portal includes 128 reference databases, as well as books, encyclopedias, technical standards, among others. The Portal was created to facilitate access to international academic journals by Brazilian libraries.

Data was collected in the first half of 2017, simultaneously by two independent researchers. The following strings were used: Ethics and Scientific Integrity, with 122 publications.

From a historical perspective, publications from regulatory agencies that set the standards for scientific research in the 2010-2017 period were submitted to documentary analysis. To refine the analysis, only publications related to ethical integrity in research were selected.

In the second stage, during which the material collected was organized after reading, the set of documents and their relevance to the purpose of the researchers were examined.. Reading cards containing a summary, bibliographic reference of the publication and transcriptions of excerpts that could be used later by each researcher were created for the five documents selected. A chart of Guidelines for Conduct and Institutions that Generated Records was obtained.

RESULTS

Governmental organizations have adopted standards and concepts to stimulate good practices in scientific research. These institutions prioritize the development and dissemination of rules of conduct due to increased improper exercise of ethics and lack of integrity. These institutions prioritize the development and dissemination of standards of conduct due to the growing lack of commitment and adherence to ethical values and integrity. Thus, the Conduct Guidelines were identified in the five documents selected in the inclusion criteria and presented in Chart 1

Chart 1 - Conduct Guidelines. Catalão, GO, Brazil, 2017.

Documents	Conduct Guidelines	Organizations
Report of the Commission of Research Integrity Synthesis	Addresses the need for good research practices such as truth and integrity. False results undermine the advancement of knowledge in Brazil, and have a negative economic and social impact. They have two lines of action preventive and pedagogical actions. Other measures include discouraging misconduct, through infliction of punishment The "Basic Guidelines for Research Integrity" related to copyright and intellectual protection of ideas were established in 2011, as a way of preventing falsification and plagiarism in scientific research [15].	CNPq – National Council for Scientific and Technological Development
Guidelines to Prevent Plagiarism	Policies on intellectual property adopted by public or private institutions, supported by recommendations of the Federal Council of the Brazilian Bar Association (OAB) The recommendation reinforces the fact that misappropriation of third party content can cause immeasurable losses and that easy access to the internet is a major concern due to the fact that many people copy-paste text verbatim from other papers. OAB recommends the use of anti-plagiarism software, but stresses the need for the establishment of a commission to analyze the results [16]..	CAPES - Coordination for the Improvement of Higher Education Personnel
Code of Good Scientific Practices	The researchers must be committed to conduct their scientific research with honesty, objectivity, integrity, justice and responsibility, and the results of their scientific research must be true and reliable [17] After publication, all information collected in the research should be recorded and stored for a reasonable time. This procedure ensures that other researchers have free access to this material, and also that all the doubts arisen are clarified in a timely manner [17]. The researcher's collaboration in case of investigation is essential, and false information configures scientific misconduct [17].	FAPESP - São Paulo Research Foundation
Resolution no 466, of December 12, 2012.	Clarifies the use of words or phrases that may produce confusion in research with human beings and establishes the basis of scientific ethics, which must permeate these studies [18] The ethical analysis of the research is first submitted to the Research Ethics Committee - CEP, which is responsible for analyzing and issuing a statement and subsequently submit the protocols of competence to the National Committee for Ethics on Research (CONEP) [18]. Researchers must elaborate the Free and Informed Consent Term (TCLE) and store their research data for at least five years after the final publication	National Health Council
Accuracy and Integrity in Conducting Scientific Research	Violations arising from bad faith or non-compliance with the principles of research integrity can be as follows: fabrication of data that do not exist, falsification, plagiarism and self-plagiarism [8]. The punishment must be proportional to the offense, taking into account the purpose of the act and the intent of such action. The existence of a gap of understanding between what, in fact, is allowed and forbidden, is emphasized here, and the decision making process is often not clear, and, thus, assessments are subjective. Briefly, it presents the good practices in conducting the research, as well as premises, principles, good and more scientific conducts. Research institutions are primarily responsible for investigating suspected misconduct and should have specific committees for this purpose [8].	Brazilian Academy of Sciences

● DISCUSSION

Only researchers who can distinguish between good and bad professional practices are able to develop good practices. Researchers must possess technical skills, general knowledge in other areas that are not his specialty, and adopt good practices. This last requirement is paramount for professional excellence [19

The principles of scientific integrity - honesty, objectivity, truthfulness, justice and responsibility - mentioned in all the documents analyzed - emphasize that the professional profile of the researcher must be based on such principles. Also, these principles should be the fundamental guiding values of the institution that conducts the research [8, 15-17].

The investigated databases identified different types of documentations regarding their presentation form, as follows: report, manual, resolutions and guidelines. There is no standard format for the presentation of the data related to the research guidelines in Brazil.

There is general agreement in the sources investigated regarding the term research misconduct. The sources unanimously agree in the description of falsification, fabrication and plagiarism. These misconducts are specified in a clear and concise manner, so that the researcher and the institution do not make mistakes about what should be considered a misconduct [8, 15-17]. The sources agree that unethical behavior in scientific research causes financial and moral damage and discredit.

The CNPq is a body attached to Brazil's Ministry of Science, Technology and Innovation, which encourages and funds scientific research in the country, in several areas of knowledge [15]. For CNPq, fabrication and falsification of data, plagiarism and self-plagiarism should be curbed through mechanisms that identify research misconducts. [15].

FAPESP and CNS Resolution no 466/12 address the potential conflict of interest in research [17-18] This Resolution describes in detail the nature of this conflict, clarifying the research institution and the researcher on what measures should be taken in the event of a conflict of interests throughout the research process [18]. These documents also emphasize the importance of retaining the information and records generated by the research, both by the researcher and by the Research Ethics Committee (CEP). According to the Resolution, research data must be stored for at least five years after the final publication [18].

Because they are responsible for promoting integrity and ethics in research, institutions have some responsibility in scientific production. They are responsible for disseminating the standards, policies and procedures regarding the practices adopted in the studies. The institutions must count on their own mechanisms to verify research compliance with ethical principles and integrity, because in the event of an investigation of misconduct, they must be immediately informed of such fact, and their procedures should be clear and easy to understand [17].

Every research institution, whether public or private, must make available to the academic community the general provisions that guide the process of conducting research. The institution must also explain all steps, including the question of research, in case of misconduct in the research. If there is confirmation of misconduct, the criteria of punishment, consequences and measures to be taken must be clearly stated. These measures [15] are of responsibility of the research institution.

The application of measures aimed to prevent research misconduct was not found. The sources investigated report education and information to academic communities as preventive measures, but the concept was presented in a broad way. However, evidence of its applicability has not been obtained.

● FINAL CONSIDERATIONS

In view of what was proposed, it is understood that the objective was achieved and that legal provisions were presented, which guide scientific research in Brazil. The subjectivity of the legal provisions examined was one difficulty faced during the present study.

The promotion of the discussion on issues of integrity and ethics in research is of great value to increase prevention of misconduct in research. It is also very important that this discussion is not restricted to the institutions and universities, but also involve society. More assertive and clear definitions on prevention, inhibition and punishment of misconduct in research are needed..Non-communication by researchers or institutions of research misconduct detected made it difficult for the investigated sources to take the necessary measures to curb this practice.

In Brazil, the concern with integrity and ethics in research has emerged more recently, in the 1980s. Conferences such as the IV BRISPE, in 2016, and the 4th World Conference on Research Integrity (WCRI), in 2015 were held to stimulate the debate on the issue. However, much remains to be done to ensure the integrity and ethics of research.

Several aspects observed in the analysis of the sources, such as the creation of the CEP in all the institutions that conduct research, are positive steps towards the progress of the construction of this process. Research promotion agencies should use the CEP as a criterion for collaboration in the conduct and publication of research. It is often not possible to apply the punishment for research misconduct at the institutional level, and thus, support of civil law is necessary to curb such practices.

It is suggested that further studies on ethics and integrity in research are conducted in several areas of knowledge, with analyzes of statistical techniques. Also, the use of qualitative research is recommended due to the lack of consensus on these concepts in the academic environment. Finally, inclusion of the subject in the academic curriculum is suggested to approach the subject in all areas of knowledge. This would certainly contribute to reduce the occurrence of research misconduct.

● REFERENCES

1. El-Guindy MM. Metodologia e ética na pesquisa científica. São Paulo: Santos; 2004.

2. Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP). Sobre a integridade ética da pesquisa. [Internet] São Paulo: FAPESP; 2011 [acesso em 25 mar 2016]. Disponível: http://www.fapesp.br/6566.

3. Russo M. Ética e integridade na ciência: da responsabilidade do cientista à responsabilidade coletiva. Estud. av. [Internet] 2014;28(80) [acesso em 25 mar 2016]. Disponível: http://dx.doi.org/10.1590/S0103-40142014000100016.

4. Nosella P. Ética e pesquisa. Educ. Soc. [Internet] 2008;29(102) [acesso em 25 mar 2016]. Disponível: http://dx.doi.org/10.1590/S0101-73302008000100013.

5. Yokomizo CA. Desvios de conduta na pesquisa acadêmico-científica. In: XXXII Encontro Nacional Associação Nacional de Pós-Graduação e Pesquisa em Administração (ENANPAD). Rio de Janeiro: ANPAD; 2008.

6. Coury HJCG. Research and scientific publication integrity. **Rev. bras.** fisioter. [Internet] 2012;16(1) [acesso em 12 abr 2016]. Disponível: http://dx.doi.org/10.1590/S1413-35552012000100001.

7. Hossne WS, Vieira S. Fraude em ciência: onde estamos? Rev. bioet. [Internet] 2007;15(1) [acesso em 25 mar 2016]. Disponível: http://revistabioetica.cfm.org.br/index.php/revista_bioetica/article/view/29.

8. Academia Brasileira de Ciências. Rigor e Integridade na Condução da Pesquisa Científica. Guia de Recomendação de Práticas Responsáveis. [Internet] Rio de Janeiro: Academia Brasileira de Ciências; 2013 [acesso em 23 mar 2016]. Disponível: http://www.abc.org.br/IMG/pdf/doc-4311.pdf.

9. Panter M. Em suas próprias palavras: Melhores práticas para evitar o plágio. [Internet] AJE; 2015 [acesso em 12 abr 2016]. Disponível: https://www.aje.com/br/arc/dist/docs/AJE-em-suas-proprias-palavras.pdf.

10. Araya ERM, Vidotti SABG. Criação, proteção e uso legal de informação em ambientes da *World Wide Web*. São Paulo: UNESP; 2010.

11. Alves EMO, Tubino P. Conflito de interesses em pesquisa clínica. Acta Cir. Bras. 2007;22(5) [acesso em 25 mar 2016]. Disponível: http://dx.doi.org/10.1590/S0102-86502007000500015.

12. Vázquez SC, Vilà MAV. Ética em lãs publicaciones científicas. Rev de La Facultad de Ciencias de La Salud. [Internet] 2006;4 [acesso em 25 mar 2016]. Disponível: https://revistas.uax.es/index.php/biociencia/article/view/652/608.

13. Instituto Bioética, Phitan LH, Oliveira AP. Ética e integridade na pesquisa: o plágio nas publicações científicas. Rev. AMRIGS. [Internet] 2013;57(3) [acesso em 12 abr 2016]. Disponível: http://www.amrigs.com.br/revista/57-03/1250.pdf.

14. Lakatos EM. Marconi MA. Fundamentos de Metodologia Científica. São Paulo: Atlas; 2017.

15. Centro Nacional De Desenvolvimento Científico e Tecnológico (CNPq). Relatório da Comissão de Integridade de Pesquisa do CNPq. [Internet] Brasília: Centro Nacional De Desenvolvimento Científico e Tecnológico; 2011 [acesso em 28 mar 2016]. Disponível: http://cnpq.br/documents/10157/a8927840-2b8f-43b9-8962-5a2ccfa74dda.

16. Coordenação De Aperfeiçoamento De Pessoal De Nível Superior (CAPES). Orientações Capes - Combate ao plágio. [Internet] Brasília: CAPES; 2011 [acesso em: 25 mar 2016]. Disponível: https://www.capes.gov.br/images/stories/download/diversos/OrientacoesCapes_CombateAoPlagio.pdf.

17. Fundação de Amparo À Pesquisa do Estado de São Paulo (FAPESP). Código de Boas Práticas Científicas. [Internet] São Paulo: FAPESP; 2014 [acesso em 25 mar 2016] Disponível: http://www.fapesp.br/boaspraticas/FAPESPCodigo_de_Boas_Praticas_Cientificas_2014.pdf.

18. Ministério da Saúde (BR). Conselho Nacional de Saúde. Diretrizes e normas regulamentadoras de pesquisa envolvendo seres humanos. Resolução n. 466, de 12 de dezembro de 2012. Brasília; 2012.

19. Volpato GL. Ciência além da visibilidade: ciência, formação de cientistas e boas práticas. Botucatu: Best Writing; 2017.