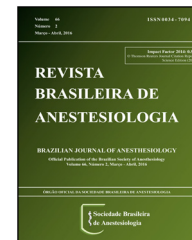## REVISTA BRASILEIRA DE ANESTESIOLOGIA

Publicação Oficial da Sociedade Brasileira de Anestesiologia
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REVIEW ARTICLE

Importance of using basic statistics adequately in clinical research☆

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Abstract

Background and objective: The inadequate use of basic statistics is the main responsible for scientific article misinterpretation. The purpose of this review article was to review some basic statistical topics to alert authors and readers about the importance of basic statistics proper reporting.

Content: A bibliographical and cross-sectional study was carried out, which analyzed publications in books and articles in the following databases: SciELO (Scientific Electronic Library Online) and PubMed (Available from the National Center for Biotechnology Information). Medical research is not free from the risk of false positive and false negative results due to the choice of statistical tests and presence of small sample sizes.

Conclusion: Understanding the correct use of basic statistics leads to fewer errors in reporting the results of studies performed and in the interpretation of their conclusions.

Importância do uso adequado da estatística básica nas pesquisas clínicas

Resumo

Justificativa e objetivo: O uso inadequado da estatística básica é o maior responsável pelo erro de interpretação dos artigos científicos. O objetivo deste artigo de revisão foi rever alguns tópicos básicos de estatística para alertar autores e leitores sobre a importância do relato adequado da estatística básica.

Conteúdo: Foi feita pesquisa bibliográfica e transversal que analisou publicações em livros, artigos nas bases de dados SciELO (*Scientific Electronic Library Online*) e PubMed, do *National Center for Biotechnology Information*. Pesquisas na área médica não estão livres do risco de resultados falso positivos e falso negativos devido à escolha dos testes estatísticos e à presença de pequenos tamanhos de amostra.

Conclusão: A compreensão acerca do uso adequado da estatística básica propicia menores erros nos relatos dos resultados de estudos executados e na interpretação das suas conclusões.

Introduction

Statistics is a science that uses data analysis to test statistical hypotheses, assess the strength of clinical evidence and thus whether there are true associations or phenomena between groups.[1] Researchers must formulate hypotheses, note the biological phenomena occurring in the population and draw a sample from that population to test their hypotheses. The sample similarity with the original population allows the results of data analysis to be more reliable in the elucidation of hypotheses.[1]

Statistical analysis, which is present in scientific researches and reported in original articles, allows readers, patients and health providers to interpret the information derived from data collected during a research and use it for the benefit of society.[2] Concerns about adequately reporting the results of biomedical researches have been present in the world literature since past decades.[3]

The frequency of the adequate use of statistical tests can be seen in a number of medical fields, such as oncology, radiology, surgery, and anesthesiology.[2,4–6] Consequences can be serious if the scientific content analysis is inadequate, such as false results with unwarranted assumptions and conclusions lacking biological support.[3]

There are several guidelines available for data reporting and statistical measurements that have been published by various authors of scientific articles, indicating which items are important to be used in scientific research reports.[7,8] Despite the availability of such guidelines, errors in the use of statistics in research reports still exist and are due to both the use of basic statistics and advanced statistics, but the greater frequency of errors occurs with the use of basic statistics, contrary to what one might think.[2,9]

The present review is an attempt to make anesthesiologists aware of the various aspects of statistical methods used in clinical research, as well as to attempt through this narrative review to reduce as much as possible the statistical errors that are still committed in basic statistics. The objective of this paper was to review some basic statistical topics to alert scientific research authors and readers about the importance of adequately reporting basic statistical data.

Method

A bibliographic and transversal search of books and scientific articles published in electronic media was carried out in the following databases: SciELO (Scientific Electronic Library Online) and PubMed (National Center for Biotechnology Information). The following meSH terms were used: ''biostatistics'', ''anesthesia'', ''and sample size''.

Literature review

Basic concepts of descriptive statistics

Clinicians should be able to make the best decisions before the patient in their routine practice, and acquiring new knowledge will only be possible if they are able to read and critically analyze articles published in scientific journals. Descriptive statistics is a part of statistics that helps researchers and readers understand the information of data collected through its organization and summarization.[10] Descriptive statistics is the only statistic used in descriptive works and some epidemiological studies.[10] The use of raw data in scientific articles, that is, data as collected in the survey, is uncommon and may impair its interpretation and make reading uninteresting.

Descriptive statistics is used to describe data using numbers or statistical measures that may best represent all data collected during a research. It is considered an initial step for the appropriate choice and use of statistical tests of hypotheses.[11] It is essential to know which statistic is most appropriate for the most different levels of measurement.[12] The most used in published health articles may be seen in Table 1.

Descriptive statistics can be divided into measures of central tendency and dispersion.[13] The first uses a value that represents what is more typical and may be used to represent all other values collected in a research.[13] The second uses a value that reveals how data varies around that value that is more typical.[11] The main measures of central tendency are: mean, mode, and median.[13] The main measures of dispersion are: variance, standard deviation and interquartile range.[11]