The importance of the quality of the Methodology in Research

This issue of the Revista Brasileira de Saúde Materno Infantil (RBSMI), by publishing various articles on Research Methods, fulfills one of its most important aims of not only presenting its readers and the scientific community in general with different approaches and points of view regarding methodology in the field of medicine and epidemiology, but also but also providing authors with an opportunity to expound their ideas on the subject.

The topic addressed here covers statistical and epidemiological methods and qualitative analysis used to children, adolescents and pregnant women in the following articles:

1. Child and adolescent mental health services in Brazil: structure, use and challenges
2. Infant mortality rate in Brazilian municipalities: a proposal of an estimation method
3. Comparison of multivariate regression methods in the study of determining factors for tooth decay in children
4. Method of the Populational Researches in Maternal and Child Health: a transversal series held in the State of Ceará from 1987 to 2007
5. The "management of narratives" in qualitative research: study in a regional health organ
6. The number of replications of dietary investigations needed to estimate the ingestion of nutrients in pregnant women in Brazil

This participation of all is extremely important, since care with regard to the methods used for scientific investigation and the publication of new proposals or reviews of the subject are always necessary for the advancement of knowledge. An investigation of this subject is particularly apposite at this point in time. In fact, an overview of the literature on the adequate use of research methods in the field of health reveals countless questions that lead us to reflect on the importance of methodological quality for the execution and analysis of every study, which is a fundamental element for consistency and later clear dissemination. And there are more than a few problems in this area.

Suffice it to mention here the publication of the article "*Who's Afraid of Peer Review*?" by the biologist John Bohannon[1] in Science on 4 October 2013, in which he identifies – much to the consternation of the scientific community – more than a hundred journals that publish articles without even minimal quality criteria, including those relating to methodology and ethics (although Bohannon's own article has been criticized for failing to cover high quality open access journals).[2] Another grave symptom of the disease of "publish or perish" is the fact that the non-scientific periodical The Economist also published a report entitled "*Trouble at the la*b",[3] in an issue with the eye-catching cover headline "How Science goes wrong". This article comments not only on Bohannon's findings but on numerous other problems with scientific investigation identified by other researchers, such as John Ionnides,[4] a Stanford epidemiologist, Prinz *et al*.[5] in the *Nature* article "*Review of Drug Discovery*" and Callaham and McCulloch[6] of the University of California. The problems identified by these articles include fundamental ones such as poor study design, inadequate calculation of sample size and sample power and insufficient care in the case of some periodicals with regard to the selection of articles for publication. All of this may lead to difficulty replicating findings.

However, despite the gross methodological errors and shortcomings revealed by these authors (especially statistical ones, which make it impossible to reproduce many published studies), it is worth recalling that many of these problems can be avoided by consulting Altman *et a*l.'s [7] 1983 Guidelines, knowledge of which was (and still is) a sine qua non for obtaining reliable research methods (and obviously results) in the health sciences and related disciplines, in observational studies, clinical trials and so forth. This subject has certainly

generated great interest. It is therefore surprising that, thirty years later, methodological errors can still be found in scientific studies, at least in the fields of biology, sociology, psychology and medicine, as identified by Ioannides himself[4] in 2005 and Bousfield[8] in 2009, which has also led to high rates of non-publication.

Thus, although this issue does not deal specifically with identifying methodological errors, but rather presenting new methodological proposals or re-evaluation of methods, we strongly recommend that these be used cautiously and critically.

We firmly believe that these may contribute to investigative analysis, understanding and the search for solutions in the field of human health, particularly that of women and children, which is the scope of this journal.

The proposal of new or different approaches to methodology evidently runs the risk of miscomprehension or inappropriate application with all the consequences that this may entail, but this is a risk inherent in any innovation. Each author is responsible for his or her proposal and self-criticism is therefore essential.

However, as Ioannides[4] himself concludes in his article, "[m]ost research questions are investigated by many groups and it is misleading to lay emphasis on the statistically significant findings of a single group". A single result - however striking or promising - is thus not enough for a study to be considered the final word on a subject. Exposition, criticism from the scientific community, evaluation and responsibility must also be taken into account. This is fundamental for conclusions to be used adequately and reliably by society.

One final observation should be made regarding the ethical consequences of a poorly planned study. It is essential that these ethical consequences of the application of the results of an investigation be appreciated, especially when applied to human beings. The ethical dimension is intrinsically relevant because the appropriate use of consistent conclusions depends on the quality and correction of analytical methods, data collection and study design. Otherwise, undesirable, damaging or even fatal consequences may ensue. Thus, to give just one example, a sample size calculation not founded on firm statistical principles may carry unnecessary risks, when it is underestimated or its statistical power not rigorously calculated, as it leads to unreliable results. An overestimated sample size, on the other hand, will involve more individuals than is technically necessary.

Hence the importance of the scrupulous use of research methods.

References

1. Bohannon J. Who's afraid of peer review? Science. 2013; 342 (6154): 60-5.

2. Aventurier P. Sobre o artigo "que tem medo do peer review?" publicado na Revista Science. [Out 2013] [Internet]. [acesso em 7 nov 2014]. Disponível em: http://publicient.hypotheses.org/675

3. The Economist. Trouble at the lab. October 19th 2013. p. 26-30.

4. Ioannides JPA. Why most published Research Findings are false. PloS Med. 2005; 2 (8): 696-701.

5. Prinz F, Schlange T, Asadullah K. Believe it or not: how much can we rely on published data on potential drug targets? Nat Rev Drug Discov. 2011; 10 (9): 712.

6. Callaham M, McCulloch C. Longitudinal trends in the performance of scientific peer reviewers. Annals of Emergency Medicine. 2011; 57 (2): 141-8.

7. Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributes to medical journal. Brit Med J. 1983; 286 (6376): 1489-93.

8. Bousfield D. Identifying reasons for failure in biomedical research and publishing. Braz J Med Biol Res. 2009; 42 (7): 589-92.

José Eulálio Cabral Filho [1]

[1] Executive Editor of the Revista Brasileira de Saúde Materno Infantil.