Statistics in medicine

GULLER, U, BUEHLER, Leo Hans, CLAVIEN, P A


DOI: 10.2003/39/smw-10504
PMID: 14655051

Available at: http://archive-ouverte.unige.ch/unige:45061

Disclaimer: layout of this document may differ from the published version.
For most of its history, the practice of medicine has been a profoundly empirical enterprise. While this empiricism continues by necessity to exist in the clinical environment, the advent of scientifically rigorous epidemiology has tremendously changed medical research in the 20th century.

The driving force behind the maturation of an epidemiological approach to medicine has been the incorporation of statistics in modern medical research, a practice that has become mandatory in past decades [1, 2]. Sound statistical methods are essential to medical science, as they transform uninterpretable raw data into meaningful results [3]. However, trends toward evidence-based medicine can only flourish in a culture of statistical literacy. Such a culture requires physicians who are equipped with the knowledge and skills to critically and accurately interpret statistics [2, 4–6].

Unfortunately, there is ample evidence that many physicians are poorly prepared for accurately interpreting statistical computations in medical literature [2, 7, 8]. The vast majority of medical schools and residency programs in Switzerland do not provide appropriate training in the understanding and application of statistics in medicine. Nonetheless, it has been reported that the little statistical knowledge acquired during medical school is rapidly lost in the years thereafter [7]. Given the ever-increasing importance of evidence-based practices, such a lack has potentially grave implications for the medical community.

Dr Sprent’s manuscript “Statistics in Medical Research” is an excellent start to systematically improve physicians’ ability to critically analyze statistical computations. It represents a concise and very helpful summary of the most relevant basic concepts of statistical computations in medical research. Simple, yet frequently misunderstood notions such as p-values, 95% confidence intervals, error of first and second kind, and power computations are explained in easily understandable language. Important caveats such as the difference between standard deviation and standard error of the mean, over-analysis of data by doing multiple comparisons, and putative discrepancies between statistical significance and clinical importance are emphasised. A simple and intuitive hypothetical example of a randomised controlled trial comparing post-operative complications after two surgical procedures highlights the tremendous importance of the appropriate assumption of whether or not the data are normally distributed.

Dr. Sprent’s manuscript represents an expansion of his statistical lectures during the first “Science Writing Course” organised by the Research Section of the Swiss Surgical Society (RS-SSS) in May 2003. The primary objective of this course was to teach young physicians with a potential interest in research and an academic career how to write a scientific manuscript as well as to provide some basic statistical knowledge. The first course enjoyed an overwhelmingly positive feed-back from the participants, which has stimulated the RS-SSS to organise further courses. From 2004, we plan to organise two courses per year, one focusing on basic knowledge of statistics and epidemiology, mainly intended for junior physicians interested in clinical or basic research, and a second one for more advanced investigators covering other more sophisticated aspects of statistics and grant writing.

Basic knowledge about statistical computations in medical literature is invaluable for the critical assessment of scientific findings and their implementation in clinical practice. The learning curve for the appropriate interpretation of statistics is, however, steep and the process highly iterative. Dr. Sprent’s manuscript only scratches the surface of statistics in medicine. Nonetheless, it is certain that this publication will facilitate the critical appraisal of medical literature and hopefully represents a stimulus for physicians to further deepen their ability in the interpretation of statistical computations.

References

The many reasons why you should choose SMW to publish your research

*What Swiss Medical Weekly has to offer:*

- SMW’s impact factor has been steadily rising, to the current 1.537
- Open access to the publication via the Internet, therefore wide audience and impact
- Rapid listing in Medline
- LinkOut-button from PubMed with link to the full text website http://www.smw.ch (direct link from each SMW record in PubMed)
- No-nonsense submission – you submit a single copy of your manuscript by e-mail attachment
- Peer review based on a broad spectrum of international academic referees
- Assistance of our professional statistician for every article with statistical analyses
- Fast peer review, by e-mail exchange with the referees
- Prompt decisions based on weekly conferences of the Editorial Board
- Prompt notification on the status of your manuscript by e-mail
- Professional English copy editing
- No page charges and attractive colour offprints at no extra cost

*Editorial Board*

Prof. Jean-Michel Dayer, Geneva  
Prof. Peter Gehr, Berne  
Prof. André P. Perruchoud, Basel  
Prof. Andreas Schaffner, Zurich  
(Founder and Editor-in-chief)  
Prof. Werner Straub, Berne  
Prof. Ludwig von Segesser, Lausanne

*International Advisory Committee*

Prof. K. E. Juhani Airaksinen, Turku, Finland  
Prof. Anthony Bayes de Luna, Barcelona, Spain  
Prof. Hubert E. Blum, Freiburg, Germany  
Prof. Walter E. Haefeli, Heidelberg, Germany  
Prof. Nino Kuenzli, Los Angeles, USA  
Prof. René Lutter, Amsterdam, The Netherlands  
Prof. Claude Martin, Marseille, France  
Prof. Josef Patsch, Innsbruck, Austria  
Prof. Luigi Tavazzi, Pavia, Italy

We evaluate manuscripts of broad clinical interest from all specialties, including experimental medicine and clinical investigation.

We look forward to receiving your paper!

*Guidelines for authors:*

http://www.smw.ch/set_authors.html

---

*Impact factor Swiss Medical Weekly*

- Schweiz Med Wochenschr (1871–2000)
- Swiss Med Wkly (continues Schweiz Med Wochenschr from 2001)

---

*All manuscripts should be sent in electronic form, to:*

EMH Swiss Medical Publishers Ltd.  
SMW Editorial Secretariat  
Farnburgerstrasse 8  
CH-4132 Muttenz

Manuscripts: submission@smw.ch  
Letters to the editor: letters@smw.ch  
Editorial Board: red@smw.ch  
Internet: http://www.smw.ch