Caveat doctor: a grim tale of medical statistics textbooks

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Textbooks of medical statistics may seriously damage your chances of publication. Although they often promise a quick and easy way to master one of the most difficult of subjects, many are so full of mistakes that any doctor reading them is liable to be led into serious errors and the resulting displeasure of referees. Some texts are so bad that they should carry a government health warning on the front cover.

An example from a recently published text will illustrate what we mean. The author described the χ^2 test for a two way table, the most common significance test used in medical publications, using the usual "observed minus expected squared over expected" formula. In this formula the "observed" are the actual *numbers* of individuals. In an example, however, the author used the observed *percentage* of individuals in each cell of the table, not the observed *number*. This is quite wrong. If it were not, the way to improve the power of a study, and so the chance of getting a significant difference, would be not to increase the sample size, which would leave this novel " χ " unchanged, but to change from percentages to proportions represented per thousand, multiplying the " χ " by 10 and virtually guaranteeing statistical significance. Incidentally, the χ^2 calculation is one of the very few for which sufficient data to check its accuracy are usually given in published papers. We have noticed that these calculations are often wrong.

Lies, damned lies, and statistical textbooks

We know several statistics books intended for the medical profession that abound in fundamental errors like this; some have them on nearly every page. We think that doctors find the subject difficult and alien enough without having to contend with textbooks overflowing with errors.

There are specialist introductory textbooks of statistics for many disciplines in which the subject is applied: statistics for biologists, for geographers, for engineers, for ornithologists, etc. Although some of them are excellent, some are very bad indeed. One curious thing about them is that many, indeed most, are written not by statisticians but by experts in the particular discipline to which it is applied. Thus many textbooks in medical statistics are written by physiologists, pharmacologists, or pathologists rather than by those formally educated in statistics.

Non-expert authorship may have advantages: such authors ought to know what is important to medicine and may be able to communicate with the medical mind in a way mere mathematicians cannot. We do not think that only statisticians should write statistics books any more than we think that only clinicians should write books on medicine, and there are some excellent statistics books by non-statisticians. Furthermore, some pretty bad books have been written by statisticians, though they tend to be incomprehensible rather than wrong. Too many authors, however, are trying to teach a subject of which their own understanding is rudimentary. Errors like that χ^2 test are the result. Inaccuracy is too high a price to pay for readability.

Tread warily

This is a sorry state of affairs, and something should be done about it. Firstly, publishers should have books on statistics refereed by competent statisticians before publication. They have a moral responsibility to try to ensure the accuracy of textbooks. Secondly, journals should get books reviewed by a statistician, who under-

stands the subject, as well as by a clinician, who understands the readership. The clinical reviewer can assess the readability of a statistics book, but usually cannot see any mistakes. Thirdly, before buying a book, as before starting a study, the doctor should consult a statistician. Fourthly, any teacher of statistics should review a textbook very carefully before recommending it. Let the buyer, the doctor, and the teacher beware!

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