Multivariate, Multivariable, Confusion and ... the Light!

Do you like science fiction? Then, just let me tell you a short story. The third planet of Aldebaran is very well known in the galaxy for its famous epidemiological school, therefore your hospital direction is more than happy to receive a visit from Dr. XY, who wants to study some terrestrial diseases. He (or she, there is no sex difference, apparently) is interested in a disease which is unknown on Aldebaran 3rd, and which we call prostate cancer. The epidemiologist carefully reviews all the factors related to the disease, and concludes that, among possible protective factors, one is overwhelming: long hair is clearly inversely related to the presence of prostate cancer!

He (or she) publishes this observation in the *Galaxy Medical Journal*, and shortly after a letter appears in the same journal, signed by a terrestrial doctor: 'Sorry, but you disregarded the sex factor!' In fact, women have longer hair and no prostate cancer, but if one ignores the existence of two genders, then his (or her) univariate analysis may be completely misled.

Let's now move from science fiction to our clinical practice. We clinicians are used to explore one single factor at a time, but need to consider the possible influence of other (known or unknown) factors on our results. This is the reason why we must search for a multivariate (or, more exactly, multivariable) analysis, and look for an adjusted odds ratio related to the factor we are interested in;

however, as clearly pointed out in the article by Reboldi et al. [1], we also need to look at the whole validity of the statistical model which has been developed: does this model correctly reflect our practice and our results? If the explanation the model gives of the influence of our data on the outcome variable is unsatisfactory, we may have one or more 'statistically significant' odds ratios, but we have not solved the problem we are faced with: almost certainly we missed some factor which could have explained our results in a better and more complete way. Thus, physicians have to look at multivariable analyses with the usual attention they give to univariate tests, and be only satisfied when the statistical model is clinically sound and as complete as possible. Modeling usually looks too complex for the average clinician, but it is he or she who knows what factors (and what interactions between factors) should be considered to build it up: we can help switching on the light.

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Reference

- 1 Reboldi G, Angeli F, Verdecchia P: Multivariable analysis in cerebrovascular research: practical notes for the clinician. *Cerebrovasc Dis* 2013;35: 187–193.