

**LETTERS TO THE EDITOR**

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After reading my Letter to the Editor¹ from an external perspective, I felt a bit conflicted. The problem is that my reflections were somehow wrongly expressed, identifying problems only in other members of the research team, putting the blame on someone else. I ended up neglecting my responsibility as a statistical adviser, as a member of the research team, not a mere provider of statistical services.

As a result, now I am facing the following questions: What validates us as statistical advisers? How much knowledge of "statistics" do you need to be a statistical adviser? How much responsibility do statistical advisers take for these problems?

Regarding the question of what validates us as statisticians (a PhD, a master's, or a qualification in statistical engineering) I think that experience and knowledge allow us to validate ourselves as "statistical advisers". In my case, these five years working as a statistical adviser have only deepened my questions. In this context, it seems relevant to mention a common saying among teachers: "First, we begin teaching what is not known. Secondly, we teach what is known, and in the end when we are old, we teach what is useful". As a statistical adviser I believe and hope to be at the beginning of the second stage.

How much knowledge of statistics is needed to be a "statistical adviser". I think updating and contacting with other statisticians can help a great amount. Almost in all activities, lifelong learning is an essential component. However, possibilities of receiving formal training are limited in our field. Because of the above, I think it is important to maintain active contact networks with other statisticians. It is not uncommon for many research teams to have a single statistician, so there is no continuous contact with other colleagues. This can be improved by keeping active virtual networks. The benefits of these networks are not only for the statistician, but also for the research team as a whole.

My experience in biostatistical advice, self-criticism and some suggestions.

Here are some of the problems exposed in my previous letter:¹

- Difficulties in identifying the type of variables included in the study.
- Lack of certainty as to when a descriptive or inferential analysis must be performed.
- Giving too much importance to the "ubiquitous" p-value of statistical significance tests.
- Little understanding of confidence intervals.
- Excessive enthusiasm for applying a large number of significance tests for the same study or
- Difficulties in estimating sample size.

In all of them I may have been responsible for some errors, as I may have used an excessively strong mathematical approach (demonstration of theorems, discussion of properties of estimators, etc.). Perhaps a better strategy would have been to teach on the basis of real cases, where statistics have been applied correctly and also incorrectly (by means of counterexamples). Another approach to teaching statistics would have been the use of simulations (taking into account students' intuition, using familiar situations in everyday contexts); creating a population where parameters are known and then ask the students to make inferences (all this is just following the advice of many education experts).

I think that many statisticians have made the same mistake, since many teachers end up teaching in the same way they were taught. In my own undergraduate training, three quarters of the courses were focused on basic science. Now I think the challenge we have is to change this approach and take into account the fact that our students have had a different training (for example, my students come from health professions). Therefore, it is necessary to generate a common language to facilitate teaching and promote a reflexive and consensual learning process. Something that I also question is the need to teach using



statistical software, since "statistics" show that students easily forget them later (what is not used is forgotten).

In addition, I believe it is necessary that masters include a compulsory subject of research methodology. This would facilitate the generation of a common language to communicate with professionals from other areas, not only with mathematicians. The incorporation of theses in the masters would also have a positive effect, as practical experience is worth more than theoretical knowledge. Lastly, if possible, masters in statistics should offer lines of specialization, since there are differences in sta-

tistical applications in the industrial, financial or biomedical fields.

As a statistician, some personal challenges would be to continue learning statistics, especially Bayesian statistics and incorporate them into the courses or the advice provided. The difficulties statisticians face are also our responsibility and we have to be part of the solution, not the problem.

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REFERENCES.

1. Luengo L. My experience in biostatistical advice. *J Oral Res.* 2016; 5(7): 264-5.