Starting a long journey: proposing a roadmap for the development of biometrics in cis countries

Editorial

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It is no secret that the science and practice of medicine in CIS countries are falling behind the global average. During the last 25 years the developed countries have made a tremendous qualitative leap from authority-based medicine to evidence-based medicine. However, in spite of the descent of the Iron Curtain, envelopment of Internet and international contacts, no similar advanced transformation of medicine has occurred in CIS counties. One might assign various reasons for such adverse development, but I believe that the main reason is the absence of national biostatistical school and even the lack of biostatistician in the national occupation lists in these countries. And neglecting the biomedical statistics at national level has resulted in the failure to accept the new paradigm of the medicine based on evidence. In order to overcome the crisis in medicine in CIS countries, it is necessary to immediately revive the biostatistics as a science. I would like to share with readers my views on the eventual practical resolution of this problem which is vital for the medicine in the developing countries.

The most difficult aspect in the adoption of any new, especially revolutionary, technology by the society is the necessity to change people's minds from the unconscious rejection of this technology, caused mainly by lack of understanding, to its active acceptance. The situation becomes even more complicated when the new ideas laying in the basis of such technology are difficult to understand or when they have been even deliberately discredited by previous generations of uneducated diehards. So, in order to successfully master the main concepts of the biomedical statistics one shall possess a developed stochastic mode of thinking based on good knowledge of basic principles of probability theory. Being materially the fundamental laws of nature, the probability regularities are not obvious, and in order to understand them one shall master basic skills in higher mathematics, especially in differential and integral calculus. There has always been disparity in the development of a very good theoretical fundamental statistics (mathematic statistics and classical probability theory) and the applied statistics (biomedical and economic statistics) in CIS countries. Actually, this historical imbalance has been caused first of all by political reasons. Thus, rather good school of biostatistics that used to exist in the first years of the Soviet power was practically destroyed, alongside with the then geneticists. The very idea of verifying the correctness of voluntaristic plans and goals of the communist leaders of all levels using the objective laws of applied statistics and probability theory was alien to the Soviet power. Thus, biomedical statistics and also economical metrics were actually outlawed and were discredited in every possible way. To illustrate this, I would recall the statement accredited to Benjamin Disraeli, the Victorian UK Prime Minister: "There are three kinds of lies: lies, damned lies, and statistics", which has been and is now very popular in CIS countries. However those people who like to quote this utterance could hardly ever state any statistic regularity, and they would be very surprised to learn that the laws of probability theory being the basis of the applied statistics are fundamental laws of the universe.

How can progressive-minded representatives of the medical science and practice in CIS countries navigate through this difficult situation? Indeed, under current circumstances the training of competent national biostatisticians is a very complicated task. Firstly, during recent decade's secondary school curriculum in these countries have not included basics of differential and integral calculus. And the basics of probability theory have never been taught at secondary schools here, since these skills were considered to belong to the higher education. But if we take the curriculum of a higher medical educational institution, we would see that it does not enable the students to master main notions of biostatistics.

Per se, a real way out could be only the self-education for individuals possessing good mathematical abilities. And I strongly believe that enthusiasts who have basic medical training and possess inborn math aptitude would make best biostatisticians.

Thus, if we select a focus group for training of future biomedical statisticians, we would first of all look for individuals with mathematical ability who have undergone an ab initio medical training. Why is it so important? Practice has shown that just this category of people can work and collaborate most successfully during joint projects (firstly when the statistic design of the investigation and the randomization method are selected) with medical specialists that do not have basic knowledge of applied statistics. At the beginning of the training the situation becomes less complicated since there are a lot of good Russian-language self-study handbooks of probability theory and mathematical statistics in CIS countries. Also there is a number of Russian-language self-study manuals for differential and integral calculus. But at a later phase the situation becomes more complicated due to the complete absence of modern Russian-language manuals for basics of applied biomedical statistics, and also the poor command of the English language among the majority of people who start the training.

Under existing circumstances the only thing left is to suggest the future biostatisticians that they should master the subject using one of numerous good English-language guides, e.g. "Biostatistics: a Foundation for Analysis in the Health Sciences" by Wayne W Daniel, Chad Lee Cross, or "The Complete Idiot's Guide to Statistics" by Robert A Donnelly Jr. PhD.

It would be very beneficial to apply graphing calculators like TI-84 plus CE (TI-89 Titanium) or HP 50g (HP Prime) for acquiring statistical skills, since such technical aids expedite the training process considerably. There are also good handbooks relying on the use of

graphing calculators: "Introduction to Probability and Statistics" by William Mendenhall, "Introduction to the Practice of Statistics" by D Moore, "Statistics in Action: Understanding a World of Data" by Ann E Watkins. It should be mentioned that due to the wide spread of smart phones in CIS the task of mastering graphing calculators becomes achievable, since Google Play proposes now a lot of emulator applications for all of the above-mentioned calculator models.

Next stage of training in biomedical statistics should include the use of R Statistic Package and a good handbook based on it, e.g. "Biostatistics with R: An Introduction to Statistics through Biological Data" by Babak Shahbaba, "R For Dummies" by Andrie de Vries and Joris Meys.

Later the training in biomedical statistics could be continued to cover more professional statistics packages like, e.g. Minitab (based on "Minitab Cookbook" by Isaac Newton or "The Basic Practice of Statistics" by David S. Moore), JMP ("Using JMP, Student Edition", "JMP Essentials") or, after all, SAS ("Applied Medical Statistics Using SAS" by Geoff Der and Brian S Everitt).

Speaking of the free-of-charge training in biostatistics, we shall not forget about such important resources like Coursera, edX, Udemy и Udacity; they open tremendous possibilities for learners, though a good command of the English language is a prerequisite. These courses propose also a qualification exam.

When teaching future biomedical statisticians, it is important to familiarize them with basics of special application used for collection and processing of data, such as EpiData and EpiInfo, and also applications for Power and Sample Size Calculation, e.g. nQuery+nTerim, NCSS PASS, GPower, PS-Power. Unfortunately nowadays the majority of professional statisticians in CIS countries with mathematic education are not aware of such software. Also a lot of specialists involved in biomedical investigations do not even know about the concept of a national register of clinical investigations.

Conclusion

In conclusion I would like to underline that the organization of a state-of-the-art training in biostatistics for enthusiasts from CIS countries is a complicated but an achievable task. As ancient people used to say: "Viam supervadet vadens"!

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None.