CHALLENGES IN TEACHING MEDICAL STATISTICS IN DEVELOPING COUNTRY

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"Biostatisticians" work in diversified medical settings. The process of teaching biostatistics is extremely challenging due to the absence of a formal procedure of statistical education at most places. Irrespective of the nature of statistical education, some of the general challenges encountered are understanding the perspectives of statisticians and clinicians, recognizing the importance of statistical ingredients in the formulation of the research protocol, knowing the methodologies for setting up a research database, acquainting the clinicians with an accurate statistical test to apply, assessing the clinical and statistical significance of the proposed research findings and finally the dissemination of results. The present deliberation specifically aims to address challenges faced by the mid-level biostatistician from India, a developing country. The younger statistics and biostatistics professionals at various levels constitute the target audience.

INTRODUCTION

The application of the statistical methodologies in scientific literature has undergone a major transition in recent times. Adams-Huet and Ahn (2009) drew attention to the increasing collaboration between the statisticians and other professionals beginning with the phase of protocol development. Such collaboration leads to comprehensive scientific pursuit for the research problem.

Statistical professionals are comprised of "statisticians", "biostatisticians", "econometricians", "research methodologists" and "medical and clinical epidemiologists, only to mention a few in the list. Irrespective of their place and designation, these professionals are expected to be conversant with the discipline and to develop core competency in the selected topics of their work. However, development of core statistical competency faces many challenges. This is attributed to the fact that the statistical professionals work in different and diverse settings. One such field is medical sciences, which is composed of heterogeneous environments like medical universities, research organizations and academic institutes, all serving as avenues where biostatisticians play a vital role.

In a developing country like India, the situation of biostatistics education/medical statistics was recently addressed by Singh et al. (2012) through a situational analysis. It was inferred that few institutes are positively contributing towards statistical education, and ideas such as capacity-building initiative and establishment of separate departments of biostatistics are being put forward. The teaching of medical statistics in a developing nation like India has many challenges of its own, and the present investigation attempts to address a few such issues on an experiential basis. The dissemination of such a reflection might serve as a guide, especially to the younger professionals in this field.

METHOD

The present investigation is built on the experiences obtained by serving in varying official capacities. The chronological sequences of such capacities in the past were as "Statistical Investigator" at National Institute for Medical Statistics (NIMS), Indian Council of Medical Research (ICMR), from 2000-2001; "Statistical Fellow" at the department of Biostatistics, Sanjay Gandhi Postgraduate Institute of Medical Sciences (SGPGIMS), Lucknow, Uttar Pradesh, from 2001-2003; "Assistant Professor (Biostatistics)", department of Community Medicine, R.D. Gardi Medical College (RDGMC), Ujjain, Madhya Pradesh from 2003-2006; "Research Officer", at National Institute of Pathology, ICMR, from 2006-2012 and at present as "Assistant Professor of Biostatistics", National Drug Dependence Treatment Centre (NDDTC), All India Institute of Medical Sciences (AIIMS), New Delhi, India.

Figure 1 on the last page, illustrates schematically the challenges encountered during this investigation.

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RESULTS

The exposure of students to statistics occurs in diversified settings such as scientific and research organizations, academic institutions and medical colleges both formally and informally. By formal, we mean a mandatory system of "medical statistics" education integrated within the course curriculum, which may contain some assessment at the end of each semester.

In the scientific and research organizations, the formal process of teaching exists, if there is a provision of terminal academic degree like the doctorate in statistics and other life science disciplines, but this teaching is being challenged due to the numerous positions lying vacant at many places. Moreover, if available the possibility of monotony in the application of statistical procedure may arise, because specific institutions have set goals to achieve. As time passes the repetitiveness of the same methodology might hamper the overall development of the scientific temperament. This is a matter of grave concern in the medical community.

As far as academic institutions are considered, the three basic mandates are teaching, research and clinical care both at the undergraduate and the postgraduate level. The challenges in all three systems are in the form as teaching is limited to journal clubs and seminars. In addition to these, scholars are also exposed to statistics through thesis dissertation work in clinical fields. It is desirable for learners to be conversant with essential research methodologies such as the development of research protocol, sample size calculation, sampling procedure, techniques of data collection, sensitization with basic and advanced statistical tests, interpretations of results and preparation of research manuscript and dissertation work. These key ingredients can be learnt and acclimatized only in the presence of the statistical faculty of the institution.

In the medical colleges, both at the undergraduate and postgraduate level even within the formal procedure, assessment cannot be made on statistical topics because question papers at the end term of semester are selective in nature. Consequently, the likelihood of this topic being attempted by students is low. Moreover, clinical exposure generally takes precedence over statistics in the medical institutes, and consequently applied statistical knowledge of students remains dismal.

DISCUSSION

In recent times there has been advocacy towards research focused medical education in India by Deo (2009), attributed to the exponential growth of the medical colleges in India during the post-independence era. In imparting research-oriented education the significance of medical statistics cannot be undermined. Therefore, we need to address three basic issues.

The foremost issue is whether there be a restraint on the number of medical colleges that are mushrooming, and this question can be rightly answered as no. This is because India possesses a dismal doctor population ratio to the number of patients in the country, and hence such restraint is a impractical choice. However, whether increasing the number of medical colleges will enhance scientific visibility (one of the many measures being publication output) or not is a big question. One recent report by Mishra et al. (2013) provides the evidence that in India there exist differential growth trajectories of many major public health disciplines. Hence a balance between quantity and quality is the need of the hour.

Second, in a developing country like India there is a scarcity of enough trained professionals. As pointed out by the government of India to the parliamentary committee ET Bureau (2012), one in four posts of statisticians are lying vacant. Consequently, this has the connotation that three fourth of government statisticians are expected to carry the additional work load of one-fourth of statisticians. This work load is translated into the challenges of teaching as well, because statisticians too are a part of this three-fourth human force.

Thirdly, can an objective criterion entrenching assessment of basic statistical abilities at the undergraduate and postgraduate level in medical colleges, scientific and research organizations and in academic institution, be formulated? The answer to this question cannot be labeled as yes or no from the author's perspective. The reason for this is that as per the Medical Council of India/Board of Directors (the statutory body under the government of India with powers for accreditation for opening of medical colleges and regulating medical education), at the undergraduate and postgraduate level the teaching is confined under the department of a "Community Medicine". Therefore, the formal assessment becomes selective in nature rather than being objective. Hence

the transition from selectivity to objectivity during end term examinations may motivate students in giving due importance to statistical discipline too.

The student's academic journey starts as fresh medical graduates (MBBS). The lack of statistical faculty in the medical colleges and academic institutions creates obstacles in providing them with basic statistical knowledge during their MBSS period. Next comes the clearing of postgraduate entrance examination such as MD/MS/DM/MCh for admission into the different scientific and research organizations and academic institutions. Relatively, smaller proportions of students get admitted at the postgraduate level owing to high competition. It is mandatory at the postgraduate levels to carry out thesis dissertation work, which contains substantial statistical components such as protocol development, data collection procedures, sampling methodology and analytical methods of the data analysis. Owing to limited exposure to statistics during their undergraduate level, it becomes difficult for postgraduate medical students to write their thesis comfortably and with confidence. Moreover, the students have to strive to strike a balance between their clinical duties and thesis work as well.

Hence in a developing economy, at scientific and research organizations, academic institution and medical colleges recruitment of statistical professionals is crucial. After this, the policy planners need to think about introducing the formal process of statistical education into the medical curriculum and to also synchronize it with objective assessment criteria. These two strategies might possibly help in effectively addressing, managing and resolving the challenges in the teaching of medical statistics in a developing country like India.

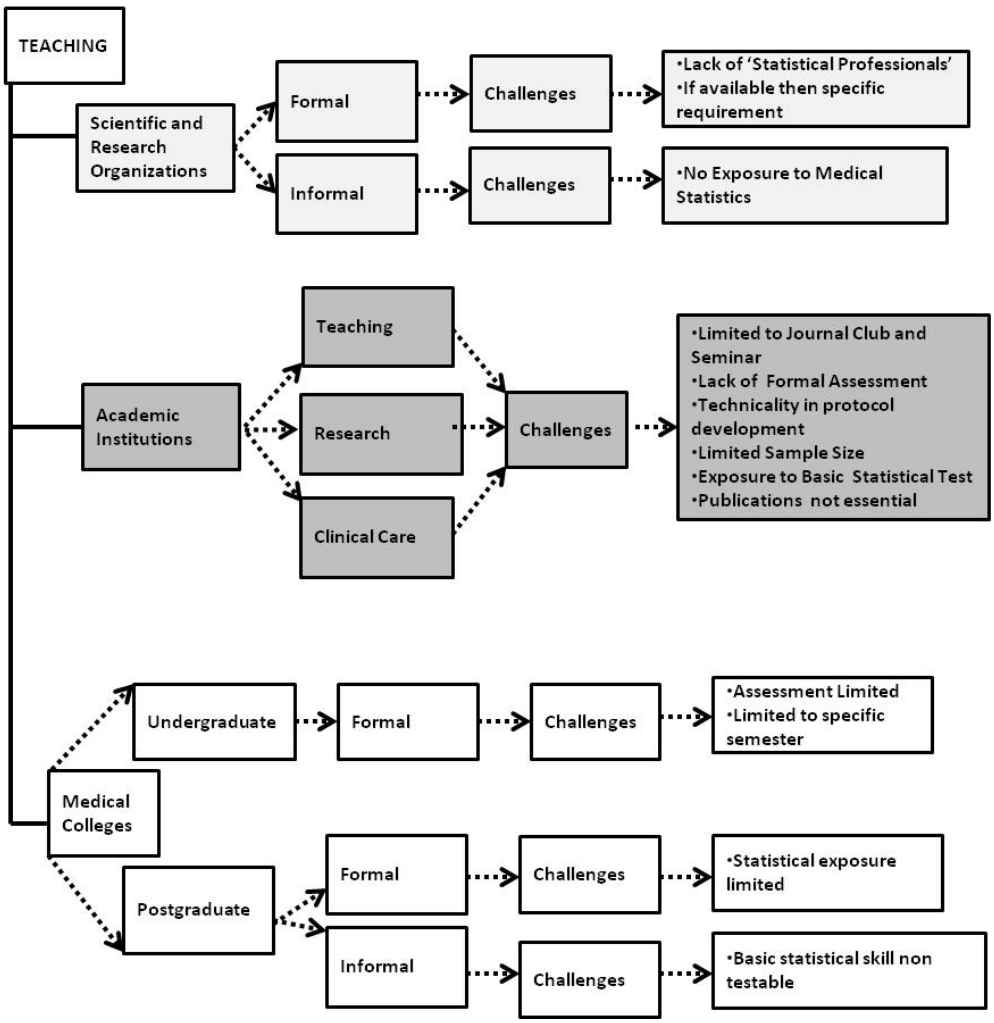

Figure 1: Challenges in teaching of medical statistics in diverse medical settings

REFERENCES

Adams-Huet, B., & Ahn, C. (2009). Bridging Clinical Investigators and Statisticians: Writing the Statistical Methodology for a Research Proposal. *Journal of Investigative Medicine, 57*(8), 818-824.

Deo, M. G. (2009). Need for research oriented medical education in India. *The Indian Journal of Medical Research, 130*(2), 105-107.

ET, Bureau (2012). *India facing shortage of statisticians, govt tells parliamentary committee, New Delhi, India*. New Delhi: Economic Times. Available at *http://articles.economictimes.indiatimes.com/2012-04-30/news/31508398_1_iip-data-nsso-iss*.

Mishra, A.K., & Balhara, Y.P.S. (2013). Statistical methodology for the scientometrics study of the growth of medical sciences in India. *Current Science, 105*(6), 821-826.

Singh, R, Zodpey, S.P., Sharma, K., Bangdiwala S.I., & Ughade, S. (2012). Landscaping biostatistics education in India. *Indian Journal of Public Health, 56*(4), 273-80.