excellence in medical research – can we make it in india?

Subhash C. Lakhotia

Introduction

The health-care system across the world has witnessed a phenomenal improvement so that the life expectancy in almost every country has increased significantly. Besides improvements in public hygiene, the newer non-invasive methods of diagnosis, newer drugs and unprecedented technological advances in treatment and patient-care have all contributed to the longer life span. This puts further demands on applied research for developing new drugs, tests, imaging techniques, surgical modalities etc, especially because the increasing population burden and longer lifespan have generated novel health issues that were not so critical even a few decades ago.

The recent unprecedented progresses in our understanding of Nature, biological systems and the amazing technologies now available to common man give an impression that we have solved most mysteries of the Nature's laws and principles that govern us. Armed with this belief, most of the economically advanced countries have placed priorities on "applied research", especially in the biomedical field, in order to ameliorate the increasing load of old age and life-style diseases. With detectable improvements in the overall performance of scientific research in India, it is often asked if India should also not place greater priorities on applied research in Medical Institutions.

Basic research as tool for transforming medical practice

Basic research in bio-medical field is usually understood as a tool to help unravel the disease mechanisms and identify drug targets through genetic and/or biochemical analyses. Such studies are generally carried out by MSc-PhDs. Ability to reading the human genome fuelled ideas that we understand most human disorders and therefore, can develop and apply personalized medicine. However, a deeper probing compels us to ask if we have really learnt enough about Nature's laws and life processes? A serious reflective thinking makes us realize that a very

long path still lies ahead before we reach even near that goal. Consequently, concerns are already being expressed in the US and other developed nations about the wisdom on relegating basic research to non-essential, and therefore, avoidable entity. India has so far followed a balanced view and not succumbed to oft repeated question as to why we should spend limited resources on basic research. While technological advances appear stupendous and attractive, one must not forget that their roots are deeply embedded in knowledge gained through basic research carried out by passionate people whose only objectives were to unravel mysteries of nature. Only when the "mystery" becomes "knowledge", we can apply and exploit it. Mysteries of Nature continue to exist and baffle us and, therefore, stimulate basic research. Newer basic findings in conjunction with appropriately developed technology leads to affordable and integrative healthcare.

Where are the roadblocks?

While basic research efforts have generally been supported in India, we have not had many breakthroughs, either in biological or in physical sciences. Unfortunately, as a nation we do not also have many technological advances to our credit. Obviously, there is something wrong in the system, notwithstanding the large human and other resources being used in the process. Paradoxically, Indian scientists outside India have been doing very well and make us proud but when it comes to 'make in India', we are not able to feel the same sense of pride as most of the drugs, diagnostic kits or equipments used in healthcare are made outside India, including in China. Obviously, besides the limited resources, we have more serious systemic issues that underlie the country's generally poor performance.

Overburdened with patient load or human resources or both?

Our medical institutions, medical colleges as well as the mandated research institutions, are expected to be actively involved in research since all MD, MS, MCh, DM aspirants are required to carry on some "original" research and submit a thesis for earning the degree. In addition, the various regulations for appointments and

promotions require research publications as essential components. Several institutions have also introduced MD-PhD dual degree programmes beside the PhD programmes. Thus, there is, in principle, a sizeable work force in place for carrying out research in the medical colleges and institutions. Unfortunately, only a small proportion of this large work force has the opportunity to work at places with fairly well-equipped infrastructure. Most others work under rather difficult conditions including very long continuous "duty" hours. They are also constrained by inflexible time-limit for completing the "research" component of the degree. A continuity of research is also not maintained so that each new student works on different topics rather than extending the theme where the previous one had left. As a result, the research output remains rather disappointing and the enormous advantages offered by the human resource on one hand and the diversity of Indian population on the other is almost completely lost, and we continue to rely, for diagnosis as well as prognosis, on data generated in other countries with very different genetic and physiological backgrounds.

The formal teaching load of a typical medical college faculty is usually not as high as those teaching in basic science departments in a university or college, although in most of the clinical disciplines, teaching continues in OPDs, wards and on the operation table as well, somewhat parallel to "teaching" that goes on in basic research labs. A common explanation for the rather limited novel research output from medical institutions is that the medical college faculty members have patient load amidst meager infrastructure which leaves them with little time and energy to think about any serious research. This may possibly be true to some extent for faculty in clinical disciplines at a medical college attached to big hospital. However, the medical faculty in better endowed medical institutions may not be engaged with OPDs/surgeries or wards on every working day and, therefore, the average per week workload may not be exceptionally or unduly high.

This may be due to large number of physicians in such Institutes. Compared to

the many private/corporate hospitals, faculty positions at publicly funded medical colleges generally fare poorly in terms of service conditions, salary/promotions and facilities. Existence of significant disparity amongst different state and central institutions, poor infrastructure for research in medical colleges, inevitable bureaucracy associated with administrative issues of running hospitals, all add to the medical teaching institutions becoming less favoured places of work. This adversely affects the academic output of the institution.

Medical colleges generally seem to have a strong hierarchical and authoritative set-up. This thwarts the enthusiasm of young and capable faculty who wish to go beyond the routine health-care. A healthy academic and productive environment demands equal participation, incentives and opportunities for research.

Collaborative involvement of basic scientists in research, administration and policies relating to medical research

Medical institutions also have “non-clinical” or “para-clinical” departments/units whose faculties are not directly involved in clinical practices or patient care. Unfortunately, even their research output is also generally not impressive. At the same time, the administrative dichotomy created by differential privileges and responsibilities of the “clinical” and “non-clinical” faculty members remains a major cause, often unnecessary and avoidable, for heart-burn and conflict that affects basic as well as applied bio-medical research in medical institutions

Notwithstanding our *ad libidum* appreciation of practices followed in western countries, we have kept the medical education and research separate from basic sciences as well as technology. On the other hand, almost all the leading biology departments in US universities are parts of Medical schools. Although models for integrative learning and teaching have been frequently discussed in the country and many detailed reports prepared, the fact is that we continue to ensure compartmentalization and fragmentation that percolate down to the smallest unit possible. Absence of integrative research with collaborative basic science leadership remains a major impediment to ‘Make in India’ based innovation in Medical Institutions.

In the context of “conflicts” between “clinical” and “non-clinical” or “basic”

scientists in our medical institutions, an idea has sometimes been mooted that the country should have “Basic Science Council” along the lines of the existing “Medical Council”, “Dental Council”, “Pharmacology Council” etc. However, whether establishment of such councils and formulation of rules will solve the conflict or promote any better research environment remains to be seen. An example of well-meaning but poorly formulated and implemented rules that result in more serious ill-effects is the introduction of the “Academic Performance Index” by the University Grants Commission to ostensibly promote academic activities. Paradoxically, these measures have generated more graft than promoting any better academic environment or performance. Thus even well-intentioned rules can become counter-productive when driven in the wrong direction.

It is indeed a sad commentary on the state of affairs that while we have not been able to make significant inroads in modern medicine, we have also failed to capitalize on our age-old health-care system of Ayurveda, in spite of our sense of pride at the great wisdom of our far-removed ancestors. As discussed elsewhere, including in these pages (Lakhotia, 2013, Ann Neuro), Ayurveda continues to suffer because of want of serious unbiased inter-disciplinary research, which alone will help us understand its principles and to resolve between myths and reality. It is notable that Chinese have smartly integrated Chinese Medicine as part of formal Medical curriculum. Such integration in Indian context can be promoted by inclusion of multi-disciplinary basic science experts together with practicing clinicians in various committees, governing bodies and other advisory bodies of Ministry of Health and Family welfare.

Basic scientists and clinicians as complementary stakeholders in medical education and research

How do we initiate and establish a more stable and interactive dialogue between the clinical and basic scientists and also involve technological experts in translating basic bio-medical research into real applications? One of the steps initiated in recent times to bring in some integration is the introduction of M.D.-Ph.D. dual degree programmes. However, it is not clear as to how these would be qualitatively different from the regular MD or PhD dissertations, since such programmes do

not ensure interactive participation of basic and medical scientists, especially when PhD-MD candidates are rather rare (Anand and Rao, Ann Neuro 2014). In any case, what we need are long-term research collaborations on specific themes which, on one hand generate new basic knowledge/databases and on the other promote better health-care or usable indigenous technology.

Creating positions of basic scientists within the medical colleges/institutions, who lead well furnished and independent laboratories, can provide opportunities for MD/MS/DM/MCh as well as PhD students to work under joint supervision of Scientists and medical faculty. Physical placement of such labs within the medical college/hospital is expected to facilitate better interaction since the clinician can walk in any time for interaction with scientists, who can similarly walk to OPDs or surgery tables. Such basic research scientists can guide and monitor “directed basic research” in identified core areas that impinge on basic health-care in the country. A model of “directed basic research” was initiated some years ago, with success, to revive understanding of the basic science underlying Ayurveda.

Recent years have witnessed an increasing number of better equipped corporate health-care systems with lucrative pay-packages. These are good destinations for utilization of basic science research skills but have remained untapped. With increasing involvement of the better equipped corporate sector in health care, it would be prudent to engage them into a public-private partnership so that they function as technology incubators utilizing research outputs from both public and private medical institutions.

Initiating teaching programmes which involve co-participation of basic scientists and clinicians is another avenue that fosters sustainable partnerships. An example is the discipline of Human Genetics. An increasing proportion of contemporary health issues centres around genetic factors. Unfortunately, the medical curriculum does not adequately prepare the medical doctors to understand the complexities of genetic disorders, their diagnosis and possible treatment. Formal co-training of science students by basic scientists and medical professionals, through didactic lectures, would not only prepare appropriately skilled human resource, whose demand is continuously increasing world-wide, but would also

foster a better dialogue between the basic scientists and medicos. The Molecular and Human Genetics MSc programme started at the Banaras Hindu University about 15 years ago is an example of such success story. Next step in this direction should be to prepare courses for Genetic Counselors. Equally rewarding would be development of training and research programmes in metabolomics and microbiomes, which have also become hot areas in contemporary health-care.

Appropriate changes in the archaic rules that govern medical education and profession together with active participation of all concerned would make a value addition and generate the much needed manpower to collect and understand data for genetic and physiological makeup of Indian populations. Such data are essential to provide "Make in India" health care in the country.

Conclusion

Medical research is not singularly poor in our country. We have less than impressive performance in other spheres of research, innovation and technological development. The poor performance of medical research, however, has more serious repercussions since it directly affects health of people and therefore, of the nation. Obviously, we need to ensure quality medical research on a much larger scale. More than rules and regulations, what we really need to achieve these goals include: i) commitment and

passion, rather than compulsion, for research and innovation combined with necessary mentoring, ii) bi-directional interactive and integrative environment that promotes and sustains collaboration between clinical and basic scientists on one hand and the technologists on the other, who can convert innovative findings into usable technology for affordable healthcare, iii) good training of medical students in clinical research especially for those who are inquisitive and research-oriented and iv) adequate independence of doing research to take their discovery to masses.

There is an element of "conflict of interest" when it comes to considering the medical profession as a profession that is directed solely to treat patients and earn the livelihood in return. It is argued that to be able to get into active clinical profession, which usually implies obtaining super-specialization degree, the young person has to spend many more years of life, often under rather unpleasant conditions, than is the case in other professional courses. Therefore, they feel that they are entitled to greater monetary rewards than the NPA available in most academic institutions as a compensation for losing on private practice. Such disgruntled persons cannot obviously give their best just like those basic scientists who seek introduction of non consultancy allowance (NCA). New salary structures of medical faculty, normalized to per hour risk free engagement, is often argued

to provide remunerations equivalent to private centres. A substantial increase in the NPA or introduction of NCA for basic scientists may, therefore, not be the best or lasting solution. As long as we do not develop a system of identifying the right kind of human resource for a given job, such conflicts of interests and poor outputs would continue. Just as every MSc or PhD degree holder does not by default become a scientist, a basic medical or even a super-specialty degree would not generate a medical researcher. While we need a large number of researchers in the bio-medical fields, we need equally large numbers or more of medicos to attend to basic health issues in rural and semi-urban areas. Therefore, what is required is to identify and promote the young aspirants into paths that better suit their temperament and capabilities than stereotypes. There is no point in trying to fit square pegs in round holes or vice-versa. Facilitation of suitable matches and optimally promoting their activities is essential for us to really make excellence in India.

doi : 10.5214/ans.0972.7531.220201

Subhash C. Lakhotia, PhD, FNA¹

Akshay Anand, PhD²

¹ Banaras Hindu University, Varanasi, INDIA.

² Neuroscience Research Lab, PGIMER, Chandigarh, INDIA.