



## Need to navigate undergraduate medical curriculum towards developing research skills

Meenakshi Bhilwar, Ravi Prakash Upadhyay, Deepti Dabar,  
Timiresh K Das, Shailaja Daral

Department of Community Medicine,  
Vardhman Mahavir Medical College  
and Safdarjung Hospital, New Delhi,  
India.

### Address for correspondence:

Ravi Prakash Upadhyay,  
Department of Community Medicine,  
Vardhman Mahavir Medical  
College and Safdarjung Hospital,  
New Delhi, India, Pin – 110029,  
ravi.p.upadhyay@gmail.com

Received: November 26, 2015

Accepted: January 17, 2016

Published: April 7, 2016

### ABSTRACT

India is coming up as a leader in medical research in recent times and consequently, requires a plethora of medical personnel trained in research. The foundation of sound research sense can be laid down during the undergraduate level and the medical curriculum should include research as one of its important component. In India, there is insufficient exposure to scientific research in medical education as research techniques and methodologies are currently not an integral component of the undergraduate medical curriculum. Undergraduate medical students in India have limited opportunities to participate in research. This is largely due to the fact that the focus of medical education in India, as such, is more on clinical practice and direct patient care and research training is still a neglected element. Moreover, prior research experience and publications do not figure in the selection procedure for post-graduation, unlike in developed countries where an experience in research and a couple of publications makes the resume stand out. In India, undergraduates can hardly foresee any advantage of involving themselves in research, neither in monetary terms nor in terms of academic advantage. It is the need of the hour that undergraduate curriculum should make a niche for training in research and this is essential to produce well informed doctors and an adept researcher. The current paper defines the contours of the areas which could be worked upon in order to promote undergraduate research learning.

### WHY FOCUS ON RESEARCH AND WHY MEDICAL DOCTORS?

Research is required to discover new knowledge, help in the refinement of current knowledge and essentially in the advancement of science. According to World Health Organization, research leading to evidence and reliable information are the foundation for sound health policies [1]. This is the era of evidence-based medicine and demands that physicians are well versed with conducting research as well as critically absorbing research findings from latest research in various medical fields. Immersion into research would nurture a plethora of essential skills such as critical appraising, problem troubleshooting, novel idea generation and thoughtful judgement. Getting involved in research early in their career would help in sensitizing promising doctors to the ethical issues involved in patient care and research. This will possibly get reflected in their attitude not only towards research but also in the way they approach their patients.

### HOW DEVELOPED NATIONS ARE BETTER OFF IN RESEARCH INVOLVING MEDICAL UNDERGRADUATES

The foundation for building of sound medical health research environment should be laid from the undergraduate period. Developed countries have strongly knit research programs for medical students in academics. For instance, Case Western Reserve University School of Medicine (CWRU) in the US

implements a mandatory four months research block for undergraduate students where these students are required to work fulltime with a mentor, starting from identifying research questions to finally concluding with a write up and communicating the findings through either publications or conference(s) [2,3]. The University of California in United States nurtures the University of California, San Diego (UCSD) Research Associate Program to incorporate undergraduates with emergency medicine research [3,4]. University of Western Ontario, Canada introduced a rural summer studentship program which provides students with the opportunity to immerse themselves in rural health research [5]. Research training is provided to all undergraduate students in the Leiden University Medical Center (LUMC) in Netherlands, where the critical appraisal of scientific reports is an essential element in the undergraduate curriculum [6].

### WHERE DOES INDIA STAND?- TARDY YET PROMISING PROSPECTS

In India, there is insufficient exposure to scientific research in medical education as research techniques and methodologies are currently not an integral component of the undergraduate medical curriculum. Undergraduate medical students in India have limited opportunities to participate in research. This is largely due to the fact that the focus of medical education in India, as such, is more on clinical practice and direct patient care and research training is still a neglected

element. Although in their vision 2015 document, the Medical Council of India has proposed to include research methodology as one of the electives of undergraduate medical course, it does not call for a mandatory exposure to research [7,8]. Also, attainment of adequate research capabilities does not even figure in the list of skills a medical graduate should possess. Indian medical education system relies largely on marks and there are no credits for research [9]. This could be a strong factor to dissuade students to devote their time to research. Moreover, prior research experience and publications do not figure in the selection procedure for post-graduation, unlike in developed countries where an experience in research and a couple of publications makes the resume stand out. In India, undergraduates can hardly foresee any advantage of involving themselves in research, neither in monetary terms nor in terms of academic advantage [9]. Consequently, the lack of enthusiastic students in research is strikingly felt.

Studies conducted in medical colleges across the country among the undergraduates show that most of the students have positive attitude towards research and most are willing to take research as career option in future but lack of research component in the curriculum, lack of adequate knowledge about research methodology, inadequate mentoring, insufficient funding and laboratory facilities prevents them to do so [10-12]. A study done in Melaka Manipal Medical College, Manipal, India documented that mentoring undergraduate students in health research through a structured "Mentored Student Project programme" successfully fostered positive attitudes among medical students towards scientific research [13]. More such mentorship programmes could potentially attract interested undergraduates to health research. Moreover, interest of medical students in undertaking research activities may be catalysed through efforts aiming to develop research-based competencies and nurturing inquisitiveness.

Indian Council of Medical research (ICMR) has appreciated the fact that research exposure should be provided to medical undergraduates and in lieu of this, ICMR-STs (Short Term Studentship) scheme has been started [14]. The Indian Council of Medical Research initiated the Short Term Studentship Program in 1979 with the aim to uphold interest and aptitude for research among medical undergraduates. The main objective of this program is to provide an opportunity to undergraduate medical students to familiarize themselves with research methodology and techniques under a skilled mentorship, on ongoing research program or by undertaking independent projects. Students are free to choose any topic related to medical research depending on their interest. The topic needs to be relevant and should lead to creation of new knowledge or help in gaining new knowledge or skills by the student. The value of the studentship is Rs. 5,000/- per month for 2 months duration and is meant to be a stipend for the student. This is paid only after completion of research and approval of

final report. Costs of research must be borne by Institution/ Medical College where research is conducted. Gore CR et al conducted a study among the undergraduate medical students to assess the impact of short term studentship program on attitude of undergraduate medical students toward future research. They found an increase in knowledge and confidence, orientation toward data collection, analysis, its presentation or publication, and understanding the importance and contribution of research in patient care [12].

Another good initiative is the Kishore Vaigyanik Protsahan Yojana (KVPY) [15]. It is an on-going National Program of Fellowship in Basic Sciences, initiated and funded by the Department of Science and Technology, Government of India. The problem with this initiative is that it is not well publicized and thus, it does not find too many applications from medical undergraduates when compared to programmes like the ICMR-STs. Moreover, the process of securing the fellowship is time consuming -starting from general screening of applications, followed by an aptitude test and then concluding with an interview. Further, as the website does not clearly identify the type of projects that are likely to be funded, it is hard for the students to make out the exact requirement of the scholarship. This calls for the process of funding to undergraduate research to be made more undemanding and realistic. There are other sources of support as well such as the Jawaharlal Nehru Centre for Advanced Scientific Research offering a Summer Research Fellowship Programme (JNCASRSRFP); ICMR-CRI-UConn-Imperial College research workshop; TIFR, IISc and NCBS Bangalore programs etc [16] Interestingly, a student body organization has also taken the initiative to promote research based activities among undergraduate students. INFORMER is an all India medical students' body, formed in 2009, aimed at advocacy and promotion of research amongst undergraduate medical students [17]. They also organize a national level annual conference which serves as a platform for undergraduates to present their research work at a national level.

## WHERE DOES THE ROLE OF MEDICAL COLLEGES/ UNIVERSITIES FIGURE?

The above mentioned initiatives that aim to promote the involvement of undergraduate medical students in research could be considered as alternative sources of nurturing and supporting undergraduate research and the main driving force should essentially come from within the medical colleges. This would be a more pragmatic and sustainable way. The medical colleges need to set aside finances to fund small undergraduate research and also, the faculty in various departments should at least try to absorb undergraduates in the externally funded studies that are ongoing in their department. In most of the medical colleges, there are undergraduate projects that are meant for the learning of the students. These student projects, if carried out and supervised adequately, can provide enough opportunity for

the students to learn the basic research skills and enhance their intellectual and practical skills.

### **“PUBLISH OR PERISH”: A DOUBLE EDGED SWORD**

Undergraduate research can be transformed into one of the most potentially rewarding experience and one thing that could do so is the publication attached to the research. In the current era of “Publish or Perish”, conducting research and getting it published has become highly relevant [18-19]. From a student’s perspective, acquiring adequate research skills along with getting papers published in their early careers could help them obtain highly competitive scholarships for higher studies, land into a decent job and above all, helps to establish an identity as a good researcher and a bright student. This makes all the more reason for undergraduate students to be involved in projects undertaken in the various departments. The dip side to the “getting the research published” aspect is that, often there is a lack of clarity in authorship when a manuscript is carved out of an undergraduate research. Apart from the overall mentoring, the faculty should help students learn to write for publication, learn the intricacies of the publication process and help to get the work published. Successful faculty-student collaboration demands that faculty take responsibility for safeguarding boundaries, allow open discussions about the roles assigned, tasks, workload, and order of authorship with the student. This would go a long way in inculcating interest and etiquette in scientific research amongst medical students.

### **CONCLUSION(S)**

The current paper defines the contours of the areas which could be worked upon in order to promote undergraduate research. The actual implementation plan needs to be developed in detail by the curriculum development experts, in consultation with other academicians and inputs from the medical student bodies as well. The authors are surefooted of the fact that the undergraduate curriculum should make a niche for training in research and this is essential to produce well informed doctors and an adept researcher. Medical colleges/universities should make arrangements to provide the necessary funds and logistics for undergraduate research. Mentorship programmes led by senior faculty members could be thought of as a way to sustain the interest of students in health research.

### **REFERENCES**

1. Research: Health topics of WHO. Available via <http://www.who.int/topics/research/en/> (Accessed on August 2015)
2. Fennimore TF. Structured research activity as a vehicle for fostering reflective practice among medical students. *Med Sci Educ* 2009; 19 (2S): 7-16.
3. Sreedharan J. Introduction of a research component in the undergraduate medical curriculum – review of a trend. *Nepal J Epidemiol* 2012;2(3):200-4
4. Davis DP, Poste JC, Kelly D. The UCSD research associate program: a recipe for successfully integrating undergraduates with emergency medicine research. *J Emerg Med* 2005; 28:89-93.
5. Zorzi A, Rourke J, Kennard M, Peterson M, Miller K. Combined research and clinical learning make rural summer studentship program a successful model. *Rural Remote Health* 2005; 5:401.
6. Dekker FW, Halbesma N, Zeestraten EA, Vogelpoel EM, Bles MT, de Jong PGM. Scientific training in the Leiden Medical School preclinical curriculum to prepare students for their research projects. *Med Sci Educ* 2009;19(2S):2-6.
7. Reddy MVR. Need to integrate student research with the medical course curriculum in India. *The Health Agenda* 2013; 1(3): 45-48
8. Vision 2015. Medical Council of India. Available via [http://www.mciindia.org/tools/announcement/MCI\\_booklet.pdf](http://www.mciindia.org/tools/announcement/MCI_booklet.pdf) (Accessed on August 2015)
9. Singh S, Pruthi S. Undergraduate medical research: tapping the untapped potential. *Indian J Med Res*. 2010;131:459-60
10. Rani RJ, Priya M. Knowledge, attitude and practice on medical research: The perspective of medical students. *Biosci Biotech Res Asia* 2014; 11(1): 115-19
11. Harsha Kumar H, Jayaram S, Kumar GS, Vinita J, Rohit S, Satish M, Shusruth R, Nitin, Akhilesh. Perception, practices towards research and predictors of research career among UG medical students from coastal south India: A cross-sectional study. *Indian J Community Med*. 2009;34(4):306-9.
12. Gore CR, Jadhav SL, Dubhashi SP, Buch AC, Chandanwale SS. Assessment of the impact of short term studentship program on attitude of undergraduate medical students toward future research. *Med J DY Patil Univ* 2014;7:696-700
13. Devi V, Abraham RR, Adiga A, Ramnarayan K, Kamath A. Fostering research skills in undergraduate medical students through mentored students projects: example from an Indian medical school. *Kathmandu Univ Med J (KUMJ)*. 2010;8(31):294-8.
14. Indian Council of Medical Research Short Term Studentship Program. Available via <http://icmr.nic.in/shortr.htm> (Accessed on August 2015)
15. Kishore Vaigyanik Protsahan Yojana (KVPY) National Program. Available via <http://www.kvpy.iisc.ernet.in/main/index.htm> (Accessed on August 2015)
16. Venkatraman A, Nagpal SJS. Research opportunities for medical students in India. *Natl Med J India* 2008;21(4):202-3
17. Indian Forum for Medical Students Research - INFORMER. Available via <http://www.informer.org.in/> (Accessed on August 2015)
18. McGrail M, Rickard C, Jones R. Publish or perish: a systematic review of interventions to increase academic publication rates. *Higher Education Research and Development* 2006;25(1):19-35
19. O'Neill GP, Sachis PN. The importance of refereed publications in tenure and promotion decisions: a Canadian study. *High Educ* 1994;28:427-35