

# Integrating Research into Undergraduate Medical Education Curriculum: A 20-year Experience from a Medical School in Coastal South India

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## Abstract

Research is the key to advancement in medical science. Medical school can nurture the skill of research right from the under graduation. Research forms an integral part of the medical curriculum in western countries. We attempted the same in our medical school in India. We developed a structured research methodology program, which was implemented in the undergraduate (UG) curriculum in two phases. Phase I focuses on research methodology and Phase II on manuscript writing. With the implementation of a competency-based medical education curriculum (CBME), we have extended the research methodology program with manuscript writing and introduction to systematic reviews, which is being offered as electives to UG medical students in the third professional year. Our experience in training students at an UG level has been immensely satisfying. We hope that this article will help other medical schools to adopt a similar method of training UG medical students in research methodology and scientific medical writing.

**Keywords:** Manuscript writing, research methodology, undergraduate medical students

## INTRODUCTION

Research is the cornerstone of progress in any field, more so in medical sciences.<sup>[1]</sup> Developing countries, including India, report a high incidence and prevalence of many infectious and chronic diseases, which serves as an excellent source of information and resources for medical research. Research plays an integral role in patient management and disease prevention by identifying the knowledge gaps, and developing tools for the diagnosis, treatment, and prevention of diseases. However, there is a dearth of physician-scientists, especially in developing countries.<sup>[2]</sup> Medical schools can play a major role in inculcating a research-oriented mindset among undergraduates (UGs) by incorporating research into the curriculum.<sup>[3,4]</sup>

Medical graduates across the world are expected to apply evidence-based medicine (EBM) in their clinical decision-making. The 'Standards for Quality Improvement in Medical Education' by World Federation for Medical Education suggests that the medical undergraduate (UG) curriculum must reflect an amalgamation of research and

education. It also recommends training UGs in research to encourage them to conduct research and practice EBM.<sup>[5]</sup> However, not many medical colleges have adopted formal research training in the UG course curriculum.

The Indian Council of Medical Research (ICMR) initiated the short-term studentship (STS) in 1979 to promote interest and proclivity for research among medical UGs. The regulatory bodies for medicine in India have also emphasized the need for including research in MBBS courses as electives.<sup>[6]</sup>

The curriculum formulated by the Medical Council of India (MCI) exposed medical students to the basics of biostatistics and epidemiology during their training in community medicine at the Indian Medical School. It is only

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if a graduate shows further interest, or elects for ICMR or other projects then he/she is introduced to research methodology.<sup>[7]</sup> The competency-based medical education (CBME) curriculum under the National Medical Council (NMC) has incorporated the formulation of research questions as a required competency for UG students in the curriculum.<sup>[8]</sup>

The Department of Community Medicine at Kasturba Medical College, Mangalore, Manipal Academy of Higher Education (MAHE), Manipal had incorporated formal research methodology training for UG students since 2002. This paper describes our experience in introducing research into the mainstream UG curriculum.

## MATERIALS AND METHODS

Our institution started formal training of UGs in research as a part of the community medicine curriculum in 2002.

The MBBS students undergo training in community medicine during their 1<sup>st</sup>-year MBBS (1<sup>st</sup> and 2<sup>nd</sup> semesters), 2<sup>nd</sup>-year MBBS (3<sup>rd</sup> and 4<sup>th</sup> semesters), and 3<sup>rd</sup>-year MBBS (6<sup>th</sup> and 7<sup>th</sup> semesters). The students undergo the mandatory research methodology posting in 2<sup>nd</sup>-year MBBS during their clinical postings in community medicine in the 4<sup>th</sup> semester. The posting is designed in a manner that along with compulsory academic content, the students are also trained in various aspects of research methodology. The students are also encouraged to present their research projects at national and international scientific conferences.

### Evolution of research methodology program

The very first instance of UG research in Kasturba Medical College, Mangalore was during the 1990s in the form of an elective during the internship in community medicine. A group of five to six interns was allotted a faculty, under whom the interns carried out a research project. Completion of the project, its presentation, and submission of the report were mandatory for securing completion from the department. In early 2000, the UG research was shifted to 3<sup>rd</sup>-year MBBS due to the hectic nature of the internship. The students carried out research projects in groups, under a faculty guide during their clinical postings. In both instances, no formal research methodology classes were taken and students were merely involved in data collection and presentation.

However, due to the academic importance of clinical postings in 3<sup>rd</sup>-year MBBS with students appearing for exams in community medicine, the UG research activity was shifted to 2<sup>nd</sup>-year MBBS in 2002. This paved the way for designing a structured research methodology program covering the basics of research, ethical issues, the conduct of a research project, and the submission of the report.

In 2010, two major changes were introduced to the structured program. First, a subcommittee of the Institutional Ethics Committee (IEC) was constituted exclusively for the 4<sup>th</sup>-semester research methodology postings in community medicine to expedite the IEC approval. This resulted in an increase in the

period for data collection and subsequent completion of the project within the duration of the postings, that is, 1 month.

The second change was the introduction of phase 2 of research methodology postings in the form of scientific manuscript writing in 3<sup>rd</sup> year MBBS (6<sup>th</sup> semester). Both these changes contributed to not only making the research methodology posting, a one of its kind comprehensive program for UG students but also increasing the UG research output in the college. At the end of each phase, a formative assessment is done in the form of viva-voce and project activities.

### Structure of the program

The UG medical students are trained in research methodology in two phases.

#### *Phase 1 (4<sup>th</sup> semester/2<sup>nd</sup> professional year)*

The students are trained in all aspects of research methodology for 4 weeks. The first week of the posting involves classes by faculty of the department on topics ranging from study designs, protocol writing, review of literature, sample size calculation, development of study tool, and its validation and reference writing, to ethical issues in research. The students are grouped into a batch of five and allotted a faculty mentor from the department, under whom the students conduct a research project. The faculty mentor guides the group through various stages of medical research. All groups present their protocol in the department for critical comments and suggestions from the faculty and peers. The modified protocol is submitted to the IEC for approval. The data collection is done for 10 days, followed by data entry, analysis, and tabulation of results. All groups present the findings of their study to the department. The students are required to submit a copy of the project report to the department. A formative assessment is conducted at the end of the posting in the form of viva-voce.

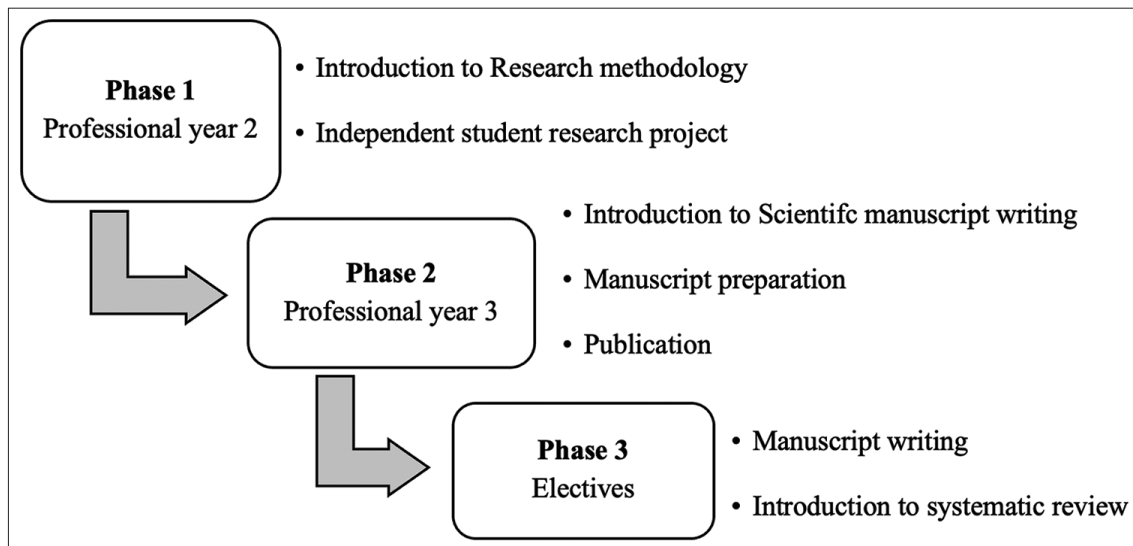
#### *Phase 2 (6<sup>th</sup> semester)*

This phase introduces the students of the 6<sup>th</sup> semester to various aspects of scientific manuscript writing and provides an opportunity to convert their research projects into publication. The faculty briefs the students on topics ranging from the selection of journals and peer review process to plagiarism and submission to quality journals. The students (group), under the supervision of their faculty guides for the project, prepare the manuscript for publication. Submission to a journal is one of the criteria for formative assessment in this phase.

### *Competency-based medical education (CBME)*

With the introduction of CBME, the research methodology program has been extended to manuscript writing and introduction to systematic reviews being offered as electives to UG medical students in the 3<sup>rd</sup> professional year [Figure 1].

Apart from formal training within the curriculum, students are also encouraged to write for extramural grants, the most common being ICMR STS. The university also provides intramural grants for UGs. The University also encourages



**Figure 1:** Conceptual framework for incorporating research in undergraduate medical education curriculum

UG presentations at national and international conferences and provides financial support for attending the conferences.

## DISCUSSION

Traditionally, research is mandatory during post-graduation training in the form of a dissertation as per the MCI.<sup>[9]</sup> Research experience gained during UG years allows them to determine an area of interest. From an academic point of view, research postings help students to understand the concepts behind various study designs, formulation of hypotheses, and test them. Studies have shown that research training during under graduation enhances awareness and positive perception toward research.<sup>[10,11]</sup> NMC also mandates faculty publications in quality journals for promotions in medical schools.<sup>[12]</sup> Many countries in the west have research training as an integrated part of the medical curriculum. Undergraduates in medical schools are one of the richest resources for young fertile minds, where the seeds of research can be cultivated. Research is integral for the practice of EBM and clinical problem-solving.<sup>[13,14]</sup>

## CONCLUSION AND RECOMMENDATION

Exposure of medical students to research methodology early in medical school can inculcate analytical thinking in them and drive them toward practicing EBM in the later part of their career. Also, UG research projects and publications will help in boosting the research output of the medical college. We recommend the regulatory body make research methodology mandatory not only in postgraduate medical education but also in UG medical education and incorporate it in the curriculum early, to encourage them to develop critical thinking and use evidence for decision-making.

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## Conflicts of interest

There are no conflicts of interest.

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