Review Article

Medical postgraduate (MD) program in Laboratory Medicine in India: The Past, Present and Future

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Abstract

A medical postgraduate course in the field of Laboratory Medicine for the Bachelor of Medicine and Bachelor of Surgery (MBBS) degree holders has existed for more than two decades in India, initiated and offered by the All India Institute of Medical Sciences, New Delhi, which was created under the special Act of Parliament of India 1956. This course has recently been included in the draft of National Medical Commission's Post Graduate Regulation 2021 list of medical courses, and the foundation guidelines have been laid for other medical colleges and teaching hospitals across the country to start this course. This article, written purely in academic interest, describes the past, present and future of this postgraduate training program in India with an aim to answer several doubts regarding this unique and holistic course with a view to providing a direction to those who are willing to become a laboratory physician through this post-graduation.

Keywords: Biochemistry, hematology, laboratory, medical education, microbiology, pathology

Introduction

In India, the medical postgraduate (MD) programme in Laboratory Medicine is being offered for more than two decades for candidates possessing the degree of Bachelor of Medicine and Bachelor of Surgery (MBBS). However, very less is known about the utility and necessity of the same in the dynamic world of laboratory-based medical diagnostics in India and also in several other developing countries. This article, written purely in the academic interest, describes the past, present and future of this three-year postgraduate residency program leading to MD degree in the medical branch of Laboratory Medicine with an aim to answer several doubts regarding this unique field.

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Traditionally, the medical graduate course in India is called the Bachelor of Medicine and Bachelor of Surgery (MBBS). After MBBS, the residency program for 3 years in a specialty subject leads to the respective postgraduate MD degree. Following this, the 3-year super-specialty residency program leads to a DM/MCh degree. In India, the specialty courses related to the laboratory are MD degree in Pathology, Microbiology, Biochemistry, and Laboratory Medicine.

Historically, the discipline of Pathology, once included anatomic pathology, chemical pathology, fluid pathology including hematology, and microbial pathology. Over the time, chemical pathology and microbial pathology gave rise to independent disciplines of Clinical Biochemistry and Microbiology, respectively. However, the large part of fluid pathology, especially urinalysis, semen analysis, analysis of other body fluids and excreta, part of routine hematology, routine biochemical investigations, and common microbiological investigations were neglected and almost left out to technical staff without supervision by any specific laboratory expert. As a result, the services of the so-called clinical pathology area covering almost 80% of all laboratory investigations commonly ordered in a hospital, remained without regulatory supervision, and proper educational program and training.[1]

Globally, the area has grown under the nomenclature of either Clinical Pathology and/or Laboratory Medicine. When the nomenclature "laboratory medicine" took ground as synonymous to "clinical pathology" is not exactly stated, although the first article on its history has been published in 1989.[2] Subsequently, the training in Laboratory Medicine has been actively pursued by the Academy of Clinical Laboratory Physicians and Scientists (ACLPS), International Federation of Clinical Chemistry (IFCC) and the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM).[3-6]

According to the recently proposed definition of Laboratory Medicine, this is "a clinical science and discipline, devoted to the quantitative measurement, or qualitative assessment of any substance that can be assayed in any type of biological fluid of any animal species, thus including humans, for either medical or research purposes. The results of these measurements are translated into actionable information for improving the care and/or maintaining the wellness of both a single individual and an entire population".[7] Laboratory Medicine thus, is the application of 'Medicine' at the laboratory level. It deals with all the necessary investigations required for the diagnosis and management of patients. It includes selection, operation, and interpretation of diagnostic testing that uses primarily the specimens from patients, and contributes in clinical management, in addition to administrative, financial, teaching and research activities of the department.[8]

According to ACLPS, Clinical Pathology or Laboratory Medicine is "a field of medical science and encompasses clinical chemistry, hematology, immunohematology, microbiology, immunology and all the other laboratory disciplines applied to care of the sick (and by implication, to maintenance of health). Laboratory Medicine is a specialty demanding professional competence and dedication, and that its promise and importance in medical education are so pervasive that abilities and talents of the highest order must be attracted in order that its potential be fully realised."[2]

The IFCC defines Clinical Chemistry and Laboratory Medicine as "the application of chemical, molecular and cellular concepts and techniques to the understanding and the evaluation of human health and disease. At the core of the discipline is the provision of results of measurements and observations, together with interpretation and informed clinical advice relevant to the maintenance of health, the cause of disease, the diagnosis of disease, predicting and monitoring the response to therapy, and follow-up investigations."[9]

Postgraduate Training in Laboratory Medicine in India: The Past

By convention, the laboratory-related departments of Pathology, Biochemistry, and Microbiology have been offering undergraduate and postgraduate training in the respective specialties and patient services across the country.

The diploma course in Clinical Pathology (DCP) encompassing fluid pathology, hematology, and parts of microbiology as well as clinical biochemistry is available, being offered in many colleges in Karnataka, Tamil Nadu, and Jammu & Kashmir. The course has its own limitations on the background of technological advancement in clinical laboratories and increased importance to quality of laboratory test results. Also, in the presence of the co-existing MD training in Pathology, Biochemistry and Microbiology, most of the diploma-holders face insecurity due to competition in academics and service areas. As a result, most of the seats continue to remain unoccupied. Most candidates eventually pursue post-diploma MD training in either Pathology or Microbiology.

It is noteworthy that the Pathology and Microbiology departments have disintegrated into their sub-specialties in the Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh perhaps because of the expansion of the knowledge domain and special skills. Histopathology, Hematology, Immunopathology, and Cytology & Gynaecological pathology (earlier part of the Pathology department) and Medical Microbiology, Medical Parasitology, and Virology (earlier part of the Microbiology department) are separate departments now.[10] PGIMER offers super-specialty DM course in Hematopathology and Histopathology.[11] Hematology is also an independent department at All India Institute of Medical Sciences (AIIMS), Delhi and Christian Medical College (CMC), Vellore and are offering super-specialty DM course and fellowship programs. CMC, Vellore also offers postdoctoral fellowship in Neuropathology, Clinical Hematology and Molecular Hematology and PG Diploma in

Histopathological Laboratory Technology.[12] The National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore offers a PhD, a postdoctoral, super-specialty DM courses in Neuropathology.[13] Further, Transfusion Medicine has emerged as a discipline of its own, independent of pathology and hematology and now is a postgraduate specialty degree available across the country.

The advanced techniques of molecular diagnostics, flowcytometry among many others and studies related to genomics, proteomics and metabolomics are dissolving the boundaries of the investigating disciplines and requires transdisciplinary knowledge for the clinical interpretation of the result. Automation has reduced the turnaround time (TAT). The Biochemistry departments in several medical institutions include tests related to hormones, tumor markers, therapeutic drug monitoring, genetics along with coagulation on automated platforms apart from clinical chemistry and enzymology assays as part of their laboratory services. In almost all medical college hospitals, infectious serology is still carried out in the Microbiology department. However, the molecular tests are not confined to any particular department and require the knowledge of the entire clinical spectrum and etiological factors that are essential for interpretation of the results. All such above-mentioned events called for developing a department and a medical postgraduate course, assembling and integrating the basic diagnostic *knowledge* and *skill* on one platform with a patient-friendly *attitude* to help in clinical management of patients by generating reliable reports.

Postgraduate Training in Laboratory Medicine in India: The Present

In the month of December 1988, when the global movement towards training in Laboratory Medicine had not even started, AIIMS, Delhi, opened up the Department of Laboratory Medicine integrating hematology and coagulation, biochemical tests on fluids and blood, and base line microbiological investigations that included identification of common pathogens offering microscopic and serological tests for infectious diseases with the aim of a patient-centric single diagnostic department. The broad timelines related to its development from the All India Institute of Medical Sciences, Delhi to the national level are highlighted in Table 1. The department is administratively and financially independent of other laboratory-related departments of the teaching hospital and integrates almost 70–80% load of the hospital laboratory investigations and fits in today's concept of central core laboratory of a secondary or tertiary care hospital to offer reliable test reports with minimum TAT. Tagged with a centralized specimen collection center and laboratory information facilities, this department intends to serve as one-window laboratory-based diagnostic solution for the clinicians and the patients.

Notably, AIIMS, Delhi was created under the special Act of Parliament of India 1956 that gives it the power to start and develop any new department and course in the medical discipline as and when necessary for the nation, which gets automatically recognized by the Medical Council of India (MCI, now National Medical Council or NMC). So, to address the issue of the disorganised and unsupervised growth of the diagnostic laboratory services in this populous country and to meet the demands of the current era of automation, skilled microscopy, and production of quality results more economically, the medical facility of *'Laboratory Medicine'* came into existence in India in 1988 with the objectives of providing its services to patients, students (education), and science (research) [Figure 1].

Table 1: Major events on the timeline of development of MD course in Laboratory Medicine in India

Timeline	Major Events
December 1988	Inception of Department of Laboratory Medicine at AIIMS, New Delhi
January, 1997	Commencement of MD Laboratory Medicine course at AIIMS, New Delhi
May 2018	Clinical Establishments (Central Government) Amendment Rules, 2018 enumerates the test reports that an MD Laboratory Medicine can sign
September 2018	Ayushman Bharat PMJAY launched by GOI
July 2019	WHO updated list of Essential Diagnostics
August 2019	First National *Essential Diagnostics List* by ICMR
September 2020	MD Laboratory Medicine included in the Post Graduate Regulation 2000 currently called as the Postgraduate Medical Education (Amendment) Regulation, 2020
September 2020	To qualify INI-CET for pursuing medical postgraduate degree in India
February 2021	Guidelines for Competency-Based Postgraduate Training Program for MD in Laboratory Medicine published by NMC
May 2021	Standard Assessment form for PG course in Laboratory published by NMC

AIIMS - All India Institute of Medical Sciences; PMJAY - *Ayushman Bharat* Pradhan Mantri Jan Arogya Yojna, GOI - Government of India; WHO - World Health Organisation; ICMR - Indian Council of Medical Research; INI - CET - Institute of National Importance Combined Entrance Test; NMC - National Medical Commission

Since 1997, the department started the much-desired 3-year curriculum in Laboratory Medicine leading to postgraduate MD degree with an objective to generate specialized expert resource and increase the productivity manifold. The foundational framework of Laboratory Medicine as a postgraduate discipline was laid down.[14]

Through a gazette notification dated 02-09-2020, the Board of Governors in super-session of Medical Council of India, included MD Laboratory Medicine in the Post Graduate Regulation 2020 (PG Regulation 2020) list of medical specialties, currently called the Postgraduate Medical Education (Amendment) Regulation, 2020; this list provides guidelines and enumerates the medical speciality and super-specialty courses that can be run by various medical colleges in India.[15]

The postgraduate training in Laboratory Medicine leading to MD degree is presently being offered only by AIIMS, New Delhi. A candidate possessing MBBS degree or a medical graduation

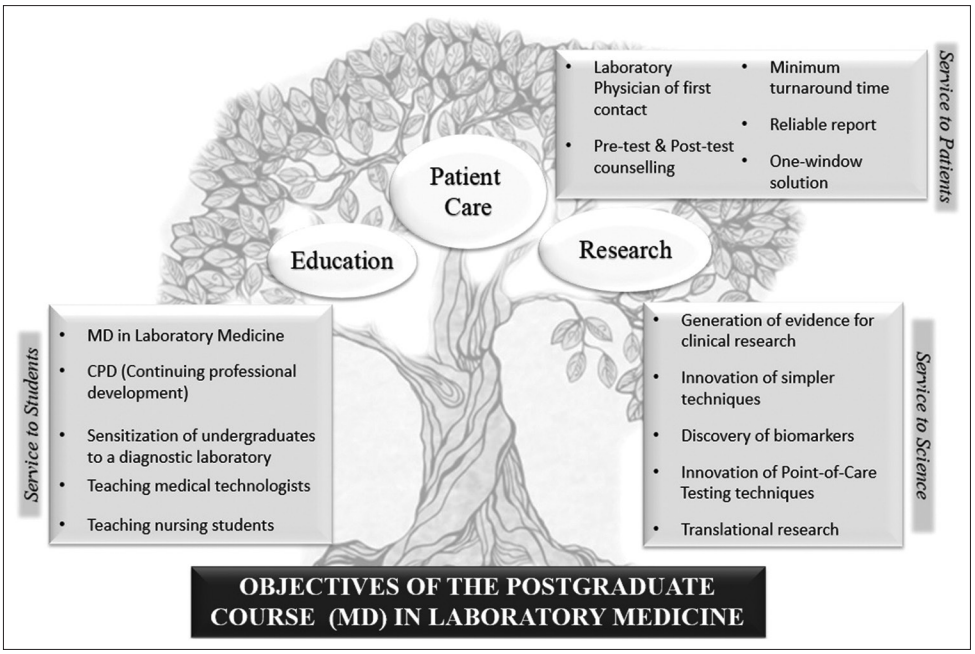

Figure 1: Objectives of the Postgraduate (MD) course in Laboratory Medicine

certificate recognised by the MCI, has to qualify the Institute of National Importance Combined Entrance Test (INI-CET) [MD/MS)/MDS (3 years)/M.Ch/DM (6 years)] for admission into this course.[16] Till date, more than 40 postgraduates have pursued this course. Till recently, the options to train in Laboratory Medicine, if one is already a specialist in other laboratory fields were limited to: (i) 1 to 2-year fellowship program (FNB) in Laboratory Medicine for MD candidates in different laboratory science subjects (Pathology, Microbiology and Biochemistry), offered by the National Board of Examinations, and (ii) a comprehensive 6 months post-MD (Laboratory Medicine, Pathology, Microbiology and Biochemistry) post-doctoral certificate course (PDCC) in Laboratory Medicine offered by Neuberg Anand Academy of Laboratory Medicine, Bangalore.[17] However, in view of the initiative taken by MCI (now National Medical Commission) the choices are bound to widen.

Postgraduates of Laboratory Medicine and their expertise

The candidates who are awarded the MD degree in Laboratory Medicine after 3 years residency training program are the 'laboratory physician of first contact' for both clinicians and patients. They are experts in optimizing test selections, test operations, test interpretations, provide intelligible and holistic quality test reports on a wide range of patient samples to the treating physicians or the patients with diagnostic and prognostic inputs with minimal TAT in limited resource settings (space, equipment, trained manpower, budget, etc.) with a thorough consideration toward pre-analytical, analytical, and biological variations, which often remains unappreciated by many clinicians as well as hospital administrators.[18] The residents can proficiently refer the advanced and the complex cases to super-specialist diagnosticians for their opinion. Also, such laboratory physician can suitably address and counsel the patients on pre-test (patient preparation, specimen collection) and post-test (test reporting and interpretation) activities and aid in judicious specimen collection for a wide range of laboratory tests. They are trained to provide Quality Assured Affordable Laboratory Services (QAALS). The skills expected to be learned during the training have been described.[19]

The training covers expertise in most of the tests included as higher-priority tests out of the Essential Diagnostic List (EDL) created by the World Health Organization (WHO) and the National Diagnostic Essential List (NDEL) formed by the Indian Council of Medical Research (ICMR) based on the country's needs from the village level to the district hospital level.[20,21] To have a comprehensive knowledge of the sensitivity, specificity, false positivity and negativity, positive and negative predictive value of various laboratory investigations is prerogative of the laboratory physician.

There are many barriers to the maintenance of high standards of laboratory diagnostics in resource-limited countries like India, the foremost being that most of the government clinical laboratories are not accredited by any national or international accreditation bodies. The cadre of postgraduates in Laboratory Medicine can prove to be an invaluable resource in the pursuit of solving issues faced by remote diagnostic laboratories of the small hospitals and healthcare centers. By appointing one diagnostician who can manage different facilities of one diagnostic laboratory, especially in the sub-metro cities, towns, and suburban hospitals will help in reducing the economic burden, while ensuring timely and best quality diagnostic laboratory services without a compromise on quality. Thus, most of the population will have access to low cost, quality-assured laboratory diagnosis.

The Ministry of Health and Family Welfare through gazette notification no. 327, dated 21-05-2018 has notified the Clinical Establishments (Central Government) Amendment Rules, 2018 defining the minimum standards for medical diagnostic laboratories and enumerates the test reports that a qualified MD in Laboratory Medicine can authorize.[22] Their expertise is especially valuable in those hospitals, which are not attached to any medical college or in the stand-alone laboratories.

Residency program in Laboratory Medicine at AIIMS, New Delhi

The day of the residents and faculty starts with an academic session for an hour or two, three times a week where a topic is presented by a resident in the form of a seminar that is moderated by a faculty. Besides teaching, case discussions, journal clubs, interdisciplinary discussion and research in areas related to laboratory workup for various disease conditions are also presented and discussed.

This is followed by hands-on-learning in the laboratory in which one is posted. The residents are posted for 2 years in the main Department of Laboratory Medicine, which consists of the centralized collection center and the central core laboratory and boast of the state-of-the-art 'Smart Laboratory' which has Integrated Total Laboratory Automation, one of its kind in the country and provides round-the-clock services, performing more than 30,000 tests per day. They are trained in the basics of blood and fluids chemistry, hematology, coagulation and clinical microbiology including manual tests, microscopy and automated estimation along with methods of quality assurance, laboratory informatics and laboratory statistics. Here, one also learns the basics of laboratory sciences, and those are laboratory safety, hospital waste management, requirements for accreditation of laboratory, equipment and reagent procurement, quality laboratory management, and so forth. The resident actively participates in the activities related to sample receiving, screening them for pre-analytical errors, analysis of the test reports, verification of the results, and ways to identify and prevent analytical and post-analytical errors. Residents are also posted in the emergency laboratory during the night shifts as and when required.

For one year, the residents are posted in the individual specialized Departments of Pathology, Microbiology, Genetics, Immunology, and Transfusion Medicine. During this time, the residents follow the ongoing teaching schedule of the respective departments.

During the daily ward rounds, the clinician—laboratory physician interaction aims to address clinicians' queries and problems related to laboratory tests for better patient outcomes by giving inputs not only on the test selection and test interpretation, but also on their limitations.

Department of Laboratory Medicine is a research-hub

Today, a large number of research projects find their roots in a diagnostic laboratory, especially the ones with translational value. This discipline is a research and publication-hub in the era of evidence-based medicine, because of the sheer gamut of clinical material and availability of different types of equipment. One can pursue research of clinical importance in different fields of medicine using the traditional as well as the most advanced laboratory methods. In this modern era of precision and personalized medicine, the medical field being connected to both the laboratory and the clinical side, the scope of research can range from discovering novel biomarkers, diagnostic techniques, molecular markers for apoptosis, aging, and so on as well as development of point-of-care devices.

Laboratory physicians in the context of India's planned healthcare system

MD in Laboratory Medicine, the multifaceted postgraduate course, is likely to produce the much-required human resources in adequate number for the success of the present Prime Minister's *National Health Mission, Free Diagnostic Services*. Also, in order to fulfil the goals of Universal Health Coverage, India has recently launched the Ayushman Bharat *Pradhan Mantri Jan Arogya Yojna* (PMJAY).[23] A post-graduate in Laboratory Medicine is capable of filling up the voids in the diagnostic healthcare administratively as well. When needed, they are capable of managing and authorizing laboratory reports consisting of a wide

Table 2: Advantages of postgraduate training in Laboratory Medicine

Contribution to the nation
Facilitate the Prime Minister's National Health Mission for free diagnostic service
Establish and run laboratory in zonal/district/sub-divisional hospitals including Employee State Insurance and railway hospitals
Run laboratories in hospitals of remote areas of the armed forces and paramilitary forces
One-window-solution to clinicians and patients
Integrated report for the patient thereby reducing turnaround time
Ensure total quality management of the laboratory executed by one qualified specialist
Facilitate availability of an authorized signatory as per Clinical Establishment Act
Point-of-Care testing at the disaster site and during pandemics (with lab-on-the-wheel concept or inflatable lab concept)
Provide economical services in terms of budget, manpower, resources, space, and time
Job opportunities for medical postgraduates in Laboratory Medicine, Biochemistry, Pathology, and Microbiology
Contribution to medical education
Support the Tier II departments in teaching and training
Support the clinicians in laboratory test selection and test interpretation
Training of various paramedical staff
Proposed undergraduate teaching
Contribution to research
Support basic clinical research
Support research in the field of Translational Medicine

range of investigations in case of scarcity of other specialists in a peripheral center. The added advantages of having postgraduates in Laboratory Medicine are summarized in Table 2.

Laboratory Medicine or Clinical Pathology training in the international context

There is a significant concurrence between Laboratory Medicine training program in India and the Clinical Pathology training in the United States of America (USA), albeit with some differences. It follows the view of 'Pathology and Laboratory Medicine' unlike IFCC, which propagates the view of 'Biochemistry and Laboratory Medicine.' Microbiology and Clinical Chemistry related curriculum are incorporated within the Clinical Pathology program in the USA. It encompass a 4-year training of both Anatomic (AP) and clinical pathology (CP). However, residents do have an option of a 3-year AP-only or CP-only residency. The CP only program is similar to Laboratory Medicine in India. Although subspecialty fellowships are available for Clinical Chemistry and Medical Microbiology that are usually a 1-year program, it is not considered necessary for practice and there are too few fellowships for these disciplines in the country. Fellowships for Hematopathology, Transfusion Medicine and Molecular Genetics are more popular. In addition, the trend in the USA is more toward a subspecialty practice irrespective of a broader training during residency.

The royal melbourne institute of technology (RMIT) University, Australia offers a degree called the Masters of Laboratory Medicine.[24] In their 2-year curriculum, one can choose any two of the five options namely, anatomical pathology, clinical biochemistry, hematology, medical microbiology, and transfusion and transplantation science.

The University of British Columbia (UBC), Vancouver offers master and doctoral degrees in the course called the Science of Pathology and Laboratory Medicine for medical graduates and scientists.[25]

Postgraduate Training in Laboratory Medicine in India: The Future

At the national level

Under the Pradhan Mantri Swasthya Suraksha Yojana (PMSSY) scheme, the AIIMS-like institutes for example, in Bhubaneswar, Raipur, Patna, Rishikesh, Jodhpur, Bhopal, Bibinagar have the department of Pathology and Laboratory Medicine as a single specialty department, but have not started offering a separate MD Laboratory Medicine training and degree yet.[26]

Other medical colleges in India are yet to offer MD in Laboratory Medicine. The process involves various important steps that may take some time. The first step is to have a central core laboratory with a common specimen collection center in the medical college premises to cater to the needs of the associated hospital (s). The second step is to establish the Department of Laboratory Medicine with faculties, preferably who are having MD degree in Laboratory Medicine; however, initially faculty from fields of Pathology, Microbiology, and Biochemistry could play the formative role until enough number of MD Laboratory Medicine are available. These steps are prerequisites to enter the third step in starting a post-graduation program in Laboratory Medicine with administrative and college's academic council support. Therefore, the timeline for the same may vary from institution to institution depending on the felt need and the intent of the administration.

MD Laboratory Medicine under the Postgraduate Medical Education (Amendment) Regulation, 2020 offers a new avenue to the postgraduate aspirants across the country an additional opportunity for post-graduation. This also opens up new job opportunities for Pathologists, Microbiologists, and Biochemists to join the discipline of Laboratory Medicine as faculty for few years initially. For the new experts in the field, job opportunities in the National Diagnostic Services loom large.

The Sanjay Gandhi Post Graduate Institute of Medical Sciences in Lucknow, the Tata Memorial Hospital at Mumbai, the School of Tropical Medicine in Calcutta, the Delhi State Cancer Hospital, the Safdarjang Hospital and the institute of liver and biliary sciences (ILBS), Delhi are some of the prominent medical colleges and institutes in India that have opened up Laboratory Medicine department, but none offer the degree yet.

Further, the current existing 2-year DCP course under various state universities could be converted into the 3-year MD course in Laboratory Medicine. This would require minimal inputs in infrastructure, equipment, and recurrent budget.

The existing fellowship programs in Molecular Medicine, Immune-Medicine, Cytopathology, Oncopathology, and Histopathology offered by different medical institutes colleges of national importance could be packaged as post-doctoral super specialty DM courses following MD in Laboratory Medicine, Pathology, Biochemistry, and Microbiology.

Academic persuasion at the individual level

Following the completion of the 3-year residency, to pursue on academics, one has an option to join as a senior resident/registrar in the Department of Laboratory Medicine for further 3 years to sharpen one's skills with practical experience, teach residents from the same and other disciplines. This also fulfils the requirement of 3 years' teaching experience to apply for a faculty position in the institutes of national importance.

One can also pursue DM in Hematopathology in AIIMS, New Delhi and AIIMS, Rishikesh after completion of the MD curriculum.[27] To be eligible for super specialty degrees (DM) in already existing laboratory-related courses nation-wide, certain amendments in the rule books are awaited. Presently, one can opt for different Post-Doctoral Certificate Courses (PDCC) to gain a higher level of skill and expertise. Currently, PDCC in

Blood Banking & Immunohematology and PDCC in Apheresis Technology and Blood Component Therapy in the ILBS, Delhi are available for Laboratory Medicine postgraduates.[28] PDCC in Apheresis Technology and Blood Component Therapy is also offered to MD Laboratory Medicine candidates in AIIMS, Jodhpur.[29]

One also has the choice to get trained as a Technical Assessor to conduct on-site assessment of medical laboratories in India under the program run by the National Accreditation Board for Testing and Calibration of Laboratories (NABL), India, like for other laboratory-related specialties.

If one chooses to be a researcher, one can pursue a PhD program as well.

Non-academic persuasion at the individual level

Most of the corporate hospitals in the country have opened up the Department of Laboratory Medicine with potential position for laboratory physicians. One can seek attachment in such hospitals or institutions as one may deem fit.

Furthermore, the personal choice to start a private diagnostic medical laboratory setup, offering a comprehensive list of laboratory tests, being an entrepreneur, is always available to the candidates. The broad knowledge base makes one capable of running a modern automated laboratory with minimal errors, optimizing resources, and managing the quality of testing even on the most advanced testing platforms.

At the institutional level

With the start of MD course in Laboratory Medicine nationwide, structural organization and academic reform would follow in the laboratory-related disciplines of medical colleges and institutions. The Three-Tier-concepts of laboratories with nested hierarchy would come in; Nest I is the premise of the Laboratory Medicine, Nest II constitutes the Departments of Pathology, Microbiology, and Biochemistry and Nest III accommodates the Common Research Facilities [Figure 2]. Structural organization will lead to functional demarcation of diagnostic tests by different departments.[30] The National Medical Commission has acknowledged this three-tier laboratory structure in the preamble of the documents on the Competency-Based Postgraduate Training Program for MD in Laboratory Medicine dated 15-2-2021. NMC has also published the Standard Assessment form for the PG course Laboratory Medicine.[31,32]

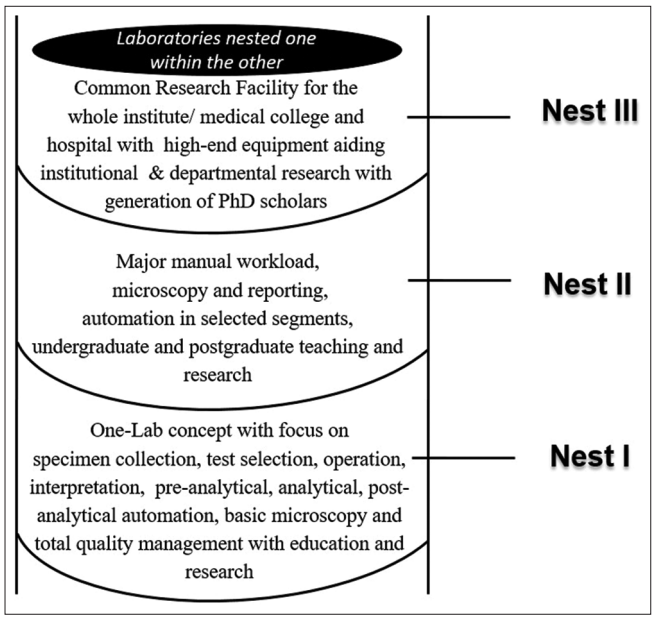

Figure 2: The proposed three tiered-structure of medical laboratories in India

The other departments that are laboratory based-Pathology, Microbiology and Biochemistry have their academic base related to the pathobiology and of the normal and the abnormal causative organisms and discipline-based diagnostics. In the constantly changing dynamics of generalization and specialization, there would be co-evolution of all the laboratory-based departments. The DM courses in various super-specialties with inputs from multiple disciplines are another direction for this evolution.

Also, at present Biochemistry, Pathology, Microbiology are MBBS subjects, with respective MD specializations. At present Laboratory Medicine is not synchronized with undergraduate curriculum. The curriculum of MD in Laboratory Medicine, at least currently, has to run in parallel with MD in Pathology, Microbiology, and Biochemistry. The proposed tiered structure is a vision, which will require co-operation among all laboratory disciplines to give rise to a composite integrated educational structure.

Laboratory Medicine for the medical undergraduates

The concept of "Medical Education Continuum" has been introduced where undergraduates, postgraduates and Continuing Professional Development (CPD) form a spectrum.[33] Laboratory Medicine, at present is not a part of the current curriculum of medical undergraduates in India. Most MBBS students are neither aware nor educated about the course or its content. At AIIMS, New Delhi, the Laboratory Medicine faculty participates in the undergraduate training on 'Organ Function Tests' and the 'Pre-Analytical variables influencing the Laboratory Results.' Increasing the awareness toward current-day laboratories, their functioning, basics of specimen collection, transport, processing and reporting builds the foundation for a more holistic practitioner and can reduce pre-analytical errors in the long run.[34] To address the lack of exposure to effectively use the clinical laboratory and the tests curriculum in majority of the medical schools globally, the WHO also has set establishing a course to develop the knowledge and skills for the final year medical graduates.[35] It should be added to the core undergraduate competency-based curriculum early-on.

Table 3: List of unique features of postgraduates in Laboratory Medicine

Uniqueness of postgraduates in Laboratory Medicine
Laboratory physicians of first contact for both patients and clinicians
Expertise in test selection, operation and interpretation of almost 70-80% of all hospital laboratory investigations
Expertise in judicious specimen collection
Expertise in providing quality-assured affordable laboratory services
Expertise in total laboratory management

Conclusions

The medical postgraduate course, MD in Laboratory Medicine is a made-in-India postgraduate curriculum, economically suited to deliver quality within the constraints of resources. Laboratory Medicine is an independent postgraduate discipline with its own niche [Table 3] like other existing laboratory specialties in the country. Opportunities are plenty. Building a pool of trained postgraduates in Laboratory Medicine could be a promising step not only for providing quality and reliable laboratory reports to the people of the country, but also in offering a large cohort of laboratory educators and trainers along with a huge number of research cadres. It also enables to lead the nation-wise structural reorganization and academic reform of the laboratory-related disciplines of the teaching medical institutions and hospitals.

Key messages

India is the first country in the world to start a medical postgraduate MD course with a 3-year residency program in Laboratory Medicine for the Indian Medical graduates (MBBS). All India Institute of Medical Sciences (AIIMS), New Delhi, took the lead and opened up the department of Laboratory Medicine in 1988, administratively and financially independent of the existing departments of Pathology, Biochemistry, and Microbiology. Since 1997, the department started the postgraduate MD course in Laboratory Medicine, which has been running parallel to postgraduate MD course in Pathology, Microbiology, and Biochemistry. Following more than 20 years of its existence, Medical Council of India (MCI), now National Medical Commission (NMC), recommends this course for the whole nation, with Gazette notification on 2 September 2020, and publishing on their website the course curriculum and syllabus in February 2021 and the minimum structural requirements for the medical colleges willing to start this course in May 2021. This paper is a narrative of the historical march of this postgraduate MD course from AIIMS, Delhi to its national fruition. The paper also highlights the uniqueness of the course, the cost-effectiveness of informed quality laboratory service, additional new option for the postgraduate aspirants, and multiple opportunities for those who have completed the course.

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Conflicts of interest

There are no conflicts of interest.

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