Editorial Article

Education and Training in Clinical Laboratory Sciences: Experiences from IFCC Member Societies

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Clinical laboratory sciences constitute one of the fundamental pillars of modern healthcare systems and play a critical role across the entire continuum of care, including disease prevention, screening, diagnosis, therapeutic decision-making, and patient monitoring. Today, in clinical practice, a substantial proportion of medical decisions are obtained by laboratory data, underscoring the essential contribution of accurate, reliable, and clinically interpretable test results to patient outcomes. Rapid technological advances, the expansion of molecular and high-throughput diagnostics, and the emphasis on precision medicine have further elevated the role of clinical laboratories from supportive services to central components of healthcare system. Within this evolving landscape, the effectiveness, reliability, and clinical impact of laboratory services are fundamentally shaped by the quality of education and training received by laboratory scientists. Education in clinical laboratory sciences extends well beyond technical skill acquisition; it encompasses the development of analytical thinking, clinical reasoning, ethical responsibility, and adaptability to emerging technologies. Well-designed educational systems must integrate theoretical knowledge with practical competencies, align curricula with clinical needs, and remain responsive to scientific and technological innovation.

Understanding the historical evolution and educational structures of clinical laboratory sciences across different countries offers valuable insights into how this profession has adapted to changing scientific, clinical, and societal demands. Comparative perspectives allow educators, policymakers, and professional leaders to identify shared challenges, recognize effective strategies, and learn from diverse national experiences. In this regard, the present special issue of *Acta Biochimica Iranica* is devoted to explore the historical development, educational structures, and training models of clinical laboratory sciences across diverse national contexts. To this end, professional societies affiliated with the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) were invited to contribute review articles describing the historical foundations of laboratory sciences in their respective countries and the evolution of educational and training models in this field. I am pleased that this

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invitation was met with positive responses and high-quality contributions from several countries, including India, Canada, Saudi Arabia, Taiwan, Türkiye, and Brazil. Each of these contributions offers a detail of how clinical laboratory sciences have evolved within distinct cultural, educational, and healthcare contexts. The articles included in this Special Issue explore a range of themes, including the historical origins of clinical laboratory sciences, the establishment of academic and professional training programs, and the ongoing efforts to align education with advances in science and clinical practice. At the same time, the articles highlight common challenges, such as the need to integrate new technologies into curricula, and to ensure that graduates are prepared for increasingly complex professional roles. We hope that this collection will serve as a resource for educators, academic leaders and professional organizations who are engaged in the ongoing task of strengthening clinical laboratory education and training. At the end, I wish to express my sincere appreciation to the national societies that contributed to this special issue. I am particularly grateful to the authors for their willingness to share their national experiences, historical perspectives, and educational frameworks in clinical laboratory sciences.

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