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Opinion Paper

Navigating the 2024 revised guidelines for Undergraduate Competency Based Medical Education (CBME) curriculum: Newer insights and implications for biochemistry education

Krishna Mohan Surapaneni[1,2]

[1]Department of Biochemistry, Panimalar Medical College Hospital & Research Institute, Chennai, India
[2]Department of Medical Education, Panimalar Medical College Hospital & Research Institute, Chennai, India

Abstract

The recent release of the 2024 revised guidelines for the Competency Based Medical Education (CBME) curriculum by the National Medical Commission (NMC) marks a pivotal moment in the evolution of medical education in India. Building upon the foundation established in 2019, this revised curriculum introduces critical advancements designed to align medical training with contemporary global standards. These updates not only enhance the educational experience but also ensure that future medical professionals are equipped with the knowledge, skills, and competencies necessary to thrive in modern healthcare environments. This article focuses on the significant changes within the biochemistry curriculum, highlighting its importance and the shift towards integrating clinical relevance, innovative teaching methodologies, and robust assessment strategies. Educators are encouraged to prioritize tailoring their teaching approaches according to these expected standards. The article also provides strategies for incorporating these changes into teaching methodologies, offering educators evidence-informed guidance.

Keywords: Assessment strategies, biochemistry curriculum, clinical relevance, Competency Based Medical Education (CBME), teaching methods

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The National Medical Commission (NMC) of India recently announced the release of the 2024 revised guidelines for the undergraduate Competency Based Medical Education (CBME) curriculum on September 12, 2024 [1]. Building on the success of the CBME framework introduced in 2019, this revised version is expected to include significant enhancements, with modified or additional components designed to better equip medical students with the necessary skills, knowledge, and competencies required for contemporary medical practice. These enhancements aim to globalize the medical education system in India in line with the latest advancements and international educational standards.

In biochemistry, this new upgrade offers several new insights and implications for educators. Understanding these modifications is crucial as they directly impact how biochemistry is taught and delivered to learners. This article explores the changes made to the biochemistry curriculum in terms of competencies, teaching-learning methods, and assessment strategies. By doing so, it offers valuable guidance on how educators can adapt their methods to ensure that students are not only meeting but excelling in the revised curriculum's expectations.

Discussion

In the earlier version of the CBME curriculum, the focus was predominantly on biochemical pathways and metabolites with associated disorders, which provided students with a solid foundation in understanding the intricate processes of life at the molecular level. However, the new curriculum transcends

Address for correspondence: Krishna Mohan Surapaneni, PhD., MHPE. Department of Biochemistry, Panimalar Medical College Hospital & Research Institute, Chennai, India; Department of Medical Education, Panimalar Medical College Hospital & Research Institute, Chennai, India
Phone: 919789099989 **E-mail:** krishnamohan.surapaneni@gmail.com **ORCID:** 0000-0002-5204-5708
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this foundational knowledge by emphasizing the clinical implications of these pathways, particularly in the context of specific disorders related to the metabolism of essential macromolecules like carbohydrates, lipids, proteins, and nucleic acids, as well as their management. This shift is crucial as it bridges the gap between theoretical biochemistry and its practical application in diagnosing and managing metabolic disorders, making the learning experience more clinically relevant and impactful [2, 3]. This not only reinforces students' foundational knowledge but also teaches them how to apply it in a clinical setting.

The curriculum's inclusion of modern molecular techniques, such as CRISPR-Cas9 (clustered regularly interspaced short palindromic repeats and CRISPR-associated protein 9), marks a progressive step towards integrating cutting-edge science with clinical practice. These tools, once the domain of specialized research, are now being brought into the educational fold, reflecting their growing importance in diagnosing and treating genetic disorders [4]. This prepares students not just to understand these techniques but to apply them in real-world clinical scenarios, keeping their education at the forefront of medical innovation.

One of the most forward-thinking additions to the curriculum is the emphasis on Artificial Intelligence (AI) in clinical biochemistry laboratory practices. AI is revolutionizing healthcare, particularly in diagnostic laboratories, where it enhances accuracy, efficiency, and personalized patient care [5]. By incorporating AI into the curriculum, educators are ensuring that students are not only aware of these advancements but are also prepared to harness them in their future careers. This competency is crucial as AI becomes increasingly integral to laboratory medicine, offering opportunities for more sophisticated analyses and improved patient outcomes [6].

Educators can create interactive sessions where students work with AI-powered diagnostic tools in simulated clinical biochemistry labs. Students can experience firsthand how these advancements improve diagnostic accuracy and efficiency, preparing them for future roles in healthcare settings where AI is increasingly utilized.

Notable changes have been introduced in the practical biochemistry curriculum, with a stronger emphasis on case scenario-based interpretation of analytes being tested. This revision encourages students to not only perform biochemical experiments but also interpret results within clinical contexts, fostering critical thinking and practical application. The inclusion of additional demonstrations, such as uric acid estimation, and an increase in the number of certifiable skills from five previously to eleven in the revised guidelines, further enriches the hands-on learning experience, ensuring that students are proficient in a wider range of essential techniques.

The curriculum also places greater emphasis on quality control and the identification of analytical errors, highlighting the importance of accuracy in laboratory work. New components, such as the identification and interpretation of Levey-Jennings charts, further contribute to preparing medical graduates with a strong foundation in analytical precision and error management in clinical biochemistry.

Additionally, a new component requires students to actively observe, interpret, and discuss baseline, diagnostic, prognostic, and discharge investigations in clinical biochemistry. This hands-on approach enhances their ability to connect laboratory results with clinical outcomes, fostering a deeper understanding of the role biochemistry plays throughout patient care.

The revised guidelines for the CBME biochemistry curriculum have introduced a range of innovative teaching and learning methods designed to enhance student engagement and deepen understanding. While foundational methods such as Large Group Teaching (LGT), Small Group Teaching (SGT), DOAP (Demonstration-Observation-Assistance-Performance), Self-Directed Learning (SDL), demonstrations, and case studies continue to play a crucial role, the curriculum now integrates several new approaches to further enrich the educational experience.

Among these new methods, the flipped classroom model stands out. This model shifts the focus from passive to active learning, requiring educators to carefully curate pre-class materials and plan interactive, in-class activities that encourage deeper student engagement and critical thinking [7]. Role play has been introduced to help students simulate real-life clinical scenarios, fostering critical thinking and communication skills in a controlled environment. Home assignments now play a more significant role, promoting self-directed learning and ensuring that students engage with the material continuously outside the classroom [8]. These enhancements further highlight how educators have to restructure their approaches to teaching in a way that is more relevant, inclusive, and impactful. Educators will need to plan these experiences carefully to align with theoretical lessons, ensuring a well-rounded education.

The curriculum also places greater emphasis on experiential learning through lab visits, providing students with direct exposure to the working environment of a clinical biochemistry laboratory. Most notably, Early Clinical Exposure (ECE) has been integrated into the curriculum through Small Group Teaching (SGT) during bedside or ward visits and interactions with the medical record department in biochemistry. This new element fosters early exposure to real patient cases, helping students connect theoretical knowledge with practical application, offering a comprehensive understanding of biochemistry and its critical role in diagnosis [9], treatment, and patient care. This will require collaboration between educators and clinical departments, strengthening the link between classroom learning and patient care. Together, these enhancements foster a more interactive, reflective, and clinically relevant learning experience directing educators to shift from classroom-based teaching in biochemistry.

Assessment and Teaching

Assessment and teaching are always complementary to each other. Learners should be assessed using the same methods in which they have been taught [10]. The recent revisions to the

biochemistry curriculum represent a significant shift in the assessment paradigm, moving towards a more holistic, relevant, and outcome-based evaluation model. The revised guidelines of the curriculum now place a stronger emphasis on Objective Structured Practical Examinations (OSPE), which have become a central component of practical skill assessment. OSPEs are designed to objectively evaluate students' ability to perform specific tasks in a controlled, standardized environment, ensuring that the assessment of practical skills is both rigorous and fair [11].

In addition to the integration of OSPE, the new curriculum has expanded its assessment framework to include direct observation and case study interpretation. Direct observation allows educators to assess students' procedural skills and decision-making abilities in real time, providing valuable insights into their clinical proficiency and areas for improvement. Case study interpretation requires students to analyze complex clinical scenarios, fostering a deeper understanding of the biochemical principles underlying patient care. These methods collectively ensure that students are evaluated not only on their knowledge but also on their critical thinking and application skills, aligning the assessment process with the practical demands of medical practice [12].

Furthermore, the introduction of logbooks and reflective exercises in biochemistry further enhances the assessment process by promoting a culture of formative evaluation with effective feedback, continuous self-assessment, and lifelong learning [13, 14]. Overall, these comprehensive assessment methods, particularly the emphasis on OSPE, ensure that the curriculum not only tests students' knowledge but also prepares them for the practical realities of clinical biochemistry, making the assessment process more robust and aligned with the principles of Competency Based Medical Education (CBME).

Conclusion

The 2024 revised guidelines for the CBME curriculum in biochemistry signify a transformative shift in medical education, focusing on the integration of clinical relevance, innovative teaching methodologies, and comprehensive assessment strategies. By moving beyond traditional approaches, this curriculum equips students with the critical skills and knowledge required to excel in modern medical practice. The emphasis on practical application, early clinical exposure, and cutting-edge technologies such as AI and molecular techniques reflects the evolving demands of the healthcare landscape. Moreover, the holistic assessment framework ensures that students are not only knowledgeable but also adept at translating their learning into real-world clinical scenarios.

This curriculum challenges educators to focus on practical applications, foster critical thinking, and utilize hands-on assessments like OSPEs. By tailoring their teaching to these new standards, educators will play a vital role in preparing students to excel in the complexities of contemporary medical practice.

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