INTEGRATING COMPETENCY-BASED MEDICAL EDUCATION INTO UNDERGRADUATE MEDICAL CURRICULA: STRATEGIES, CHALLENGES, AND FUTURE DIRECTIONS

ІНТЕГРАЦІЯ КОМПЕТЕНТНІСНО ОРІЄНТОВАНОЇ МЕДИЧНОЇ ОСВІТИ У ПРОГРАМИ ПІДГОТОВКИ СТУДЕНТІВ-МЕДИКІВ: СТРАТЕГІЇ, ВИКЛИКИ ТА ВЕКТОРИ ПОДАЛЬШОГО РОЗВИТКУ

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Competency-Based Medical Education (CBME) represents a paradigm shift in medical training, emphasizing the achievement of clearly defined competencies rather than focusing solely on time-based training. This approach aligns with the growing global demand for accountability, transparency, and quality assurance in healthcare education. CBME prioritizes skills, knowledge, and professional behaviors that are essential for patient-centered care, addressing the evolving needs of healthcare systems. Furthermore, its emphasis on personalized learning pathways ensures that students progress at their own pace, depending on their mastery of competencies. While CBME has been successfully integrated into postgraduate programs, its application at the undergraduate level remains inconsistent due to structural, curricular, and cultural barriers. These challenges include misalignment between educational objectives, teaching strategies, and assessment methods. Effective CBME integration requires a comprehensive approach that includes curricular redesign, faculty development, and institutional support. This paper explores the theoretical foundations of CBME, its integration models, pedagogical strategies, and assessment frameworks, with a focus on addressing implementation challenges. Keys to successful CBME implementation are the development of Entrustable Professional Activities (EPAs), formative assessment tools, and the continuous professional development of faculty. Despite its promise, several unresolved issues remain, including the lack of validated assessment tools for early-stage medical learners and the need for longitudinal studies to assess the impact of CBME on clinical performance and professional identity development. The paper concludes with recommendations for further research and adaptive frameworks that can support sustainable CBME integration across diverse educational contexts. The ongoing evolution of CBME offers significant potential for shaping the future of healthcare professionals. This transformation is particularly promising in fostering innovation, enhancing interdisciplinary collaboration, and cultivating competencies essential for addressing the complexities of global health challenges.

Key words: *competency-based education, undergraduate medical curriculum, medical competencies, assessment, medical education*

Компетентнісно орієнтована медична освіта (КОМО) представляє собою парадигмальну зміну в медичному навчанні, яка зосереджується на досягненні чітко визначених компетенцій, а не лише на кількості часу, витраченого на навчання. Цей підхід відповідає зростаючому глобальному попиту на відповідальність, прозорість і забезпечення якості в медичній освіті. КОМО робить пріоритет на навички, знання та професійні поведінки, необхідні для допомоги орієнтованої на пацієнта, що відповідають на змінювані потреби охорони здоров'я. Крім того, акцент на персоналізованих шляхах навчання забезпечує прогрес студентів відповідно до їхнього рівня володіння компетенціями. Хоча КОМО успішно інтегровано в програми післядипломної освіти, його впровадження на додипломному рівні залишається непослідовним через структурні, навчальні та культурні бар'єри. До цих викликів належать невідповідність між освітніми цілями, методами навчання та оцінювання. Ефективна інтеграція КОМО вимагає комплексного підходу, який включає редизайн навчальних програм, удосконалення викладачів та інституційну підтримку. У статті розглядаються теоретичні основи КОМО, моделі інтеграції, педагогічні стратегії та рамки оцінювання з акцентом на подолання викликів впровадження. Ключовими аспектами успішної реалізації КОМО є розробка довірених професійних активностей (ДПА), інструментів формативного оцінювання та безперервний професійний розвиток викладачів. Незважаючи на свою перспективність, існують кілька невирішених проблем, зокрема відсутність валідації інструментів оцінювання для початкових етапів медичного навчання та потреба в проведенні довгострокових досліджень для оцінки впливу КОМО на клінічну ефективність і розвиток професійної ідентичності. У статті наведено рекомендації щодо подальших досліджень та адаптивних рамок, що можуть підтримати стійку інтеграцію КОМО в різних освітніх контекстах. Продовження еволюції КОМО відкриває значні перспективи для формування майбутніх медичних фахівців, зокрема сприяючи інноваціям, посиленню міждисциплінарної співпраці та розвитку компетенцій, необхідних для вирішення складних глобальних медичних завдань.

Ключові слова: *компетентнісно орієнтована освіта, освітня програма для студентів-медиків, медичні компетенції, оцінювання, медична освіта.*

Problem statement in general form and its relation to important scientific or practical tasks. Competency-Based Medical Education (CBME) has emerged as a learner-centered framework that emphasizes the achievement of clearly defined competencies aligned with the needs of patients, healthcare institutions, and society. Unlike traditional curricula that prioritize content transmission and time spent in training, CBME focuses on the development of essential skills, knowledge, and professional attributes through deliberate practice, formative feedback, and performance-based progression.

This shift reflects a broader global movement toward accountability, transparency, and quality assurance in medical education.

While CBME has gained substantial traction in postgraduate medical education, its adoption and implementation at the undergraduate level remain inconsistent across institutions and regions. Undergraduate programs often face structural, curricular, and cultural barriers to the full realization of CBME principles, including misalignment between learning outcomes, teaching methods, and assessment strategies. Furthermore, the effective integration of CBME requires not only curricular redesign but also faculty development, institutional support, and a commitment to continuous evaluation and refinement.

This paper seeks to explore the theoretical foundations and practical applications of CBME within undergraduate medical education. Specifically, it examines models of integration, pedagogical strategies, assessment frameworks, and implementation challenges, with the aim of identifying evidence-informed approaches for fostering competent, reflective, and patient-centered future physicians.

An analysis of recent research and publications. In response to the dynamic and increasingly complex demands of modern healthcare systems, medical education has undergone a significant paradigm shift from time-based training models to approaches centered on measurable outcomes and demonstrable competencies [4]. CBME emphasizes the achievement of pre-defined competencies that align with societal needs, clinical practice, and lifelong learning goals. CBME is rooted in educational theories that promote learner-centered approaches and deliberate practice. Prominent CBME frameworks include CanMEDS in Canada, ACGME competencies in the USA, and the NMC curriculum in India [4; 12]. These frameworks categorize competencies into domains such as medical expertise, communication, collaboration, professionalism, and health advocacy. Sheriff (2020) discusses the implementation of Competency-Based Medical Education (CBME) in India as a shift from traditional models toward a learner-centered, outcome-based framework focused on producing holistic and ethically grounded primary care physicians. He emphasizes the need for faculty development, formative assessment, and institutional support to ensure effective integration of CBME into Indian medical curricula [11].

The CanMEDS Framework provides a comprehensive structure for Competency-Based Medical Education (CBME) by outlining key competencies across seven roles: Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar, and Professional. This framework serves as a guide for curriculum development and assessment, ensuring that all aspects of medical education – knowledge, skills, and attitudes – are integrated and aligned with the expectations of medical professionals. By focusing on the roles and competencies outlined in CanMEDS, CBME enables the development of well-rounded physicians capable of meeting the evolving demands of healthcare systems [14].

The AAMC's resource on Competency-Based Medical Education (CBME) emphasizes a shift from time-based training models toward outcome-driven approaches that prioritize the achievement of clearly defined competencies. It underscores the importance of aligning curricula, assessments, and learning environments with measurable skills and behaviors to better prepare medical graduates for clinical practice. CBME fosters learner-centered education, ensuring readiness for real-world healthcare demands [2]. Scientists Isayeva and Shumylo support the shift toward competency-based medical education by advocating for the integration of cognitive, communicative, and cultural competencies in training future physicians. The authors emphasize the role of interdisciplinary and interactive teaching methods in shaping a new generation of doctors capable of addressing complex healthcare challenges through a holistic, patient-centered approach [7].

Authors Williams et al. explore the incorporation of behavioral assessments into Competency-Based Medical Education (CBME), emphasizing the importance of observable behaviors in evaluating competency. They study how instructional design can effectively integrate assessments that align with the competencies being taught, providing recommendations for improving assessment methods within medical education frameworks [15]. In their research, Laird-Fick et al. describe the creation and implementation of a model milestone framework aimed at supporting a competency-based medical school curriculum. The results demonstrate that integrating progressive milestones enhances curriculum coherence, supports learner progression, and facilitates meaningful assessment aligned with Entrustable Professional Activities (EPAs). The framework was found to improve clarity around expected competencies at each training stage, aiding both students and faculty in tracking developmental progress [8]. Researchers Gummesson et al. explore the development of Entrustable Professional Activities (EPAs) as a framework for work-based training and assessment in undergraduate medical education. They study the role of EPAs in aligning educational activities with professional competencies and emphasize their potential in improving the structure of medical education. Additionally, the authors examine the social validity of these EPAs, evaluating their acceptance and applicability within the medical education community [6].

Emphasizing previously unresolved parts of the common problem. Although the principles of Competency-Based Medical Education (CBME) have gained widespread acceptance, its systematic integration into undergraduate medical curricula remains fragmented and insufficiently addressed in the literature. Critical challenges persist, including the misalignment between conceptual models and their operational implementation, limited preparedness of faculty to adopt competency-oriented instructional and assessment strategies, and a lack of validated, context-appropriate tools for evaluating competencies in early-stage medical learners. Moreover, there is a paucity of longitudinal evidence regarding the impact of CBME on clinical performance and the development of professional identity during undergraduate training. These unresolved issues underscore the necessity for further empirical investigation and the development of adaptive, institution-sensitive frameworks that facilitate sustainable CBME integration.

Formulation of the article's goals. The aim of the paper is to explore the theoretical foundations and practical applications of CBME within undergraduate medical education. Specifically, it examines models of integration, pedagogical strategies, assessment frameworks, and implementation challenges, with the aim of identifying evidence-informed approaches for fostering competent, reflective, and patient-centered future physicians.

Presentation of the basic research material. Integrating CBME into undergraduate medical education involves aligning learning objectives, teaching strategies, and assessment tools with targeted competencies. In their study, Shumylo et.al. emphasize the integration of creativity into undergraduate medical education as a means to align learning objectives, teaching strategies, and assessment tools with targeted competencies. Their research demonstrates that incorporating creative pedagogical methods enhances students' critical thinking, problem-solving abilities, and adaptability, which are essential competencies in medical practice. By fostering an educational environment that encourages independent thinking and creative expression, the study supports the CBME framework's goal of producing competent, reflective, and innovative medical professionals [13]. Besides, curricula must be adapted to include milestones and entrustable professional activities (EPAs) [1]. The integration of Competency-Based Medical Education (CBME) into undergraduate curricula necessitates not only the alignment of content and assessments with professional competencies but also the development of credible tools for evaluating clinical readiness. In this regard, the work of Gummesson et al. (2023) provides a valuable model. Through a national consensus process involving all Swedish medical faculties, the authors developed and validated ten Entrustable Professional Activities (EPAs) specifically tailored to undergraduate medical training. Their study revealed a significant discrepancy between the perceived importance of these EPAs and graduates' readiness to perform them independently. These findings reinforce the necessity of embedding EPAs longitudinally throughout the undergraduate curriculum, supported by structured clinical exposure, progressive responsibility, and frequent formative assessment. The need for faculty development programs that prepare educators to make entrustment decisions and to assess students reliably in real-world clinical environments was also underscored. Thus, successful CBME integration depends not only on the technical construction of competencies and EPAs but also on cultural and structural shifts within educational institutions [6].

We concur with Williams et al., who identified several key strategies for effectively integrating behavioral assessments into competency-based medical education (CBME):

– *Alignment of Assessment with Educational Objectives:* The authors underscore the necessity of selecting assessment methods that directly reflect intended learning outcomes and targeted competencies, thereby ensuring valid measurement and actionable feedback.

– *Standardization of Implementation:* Maintaining assessment validity and reliability requires consistent application across instructors, supported by standardized criteria and clear procedural guidelines to reduce variability.

– *Strategic Rater Selection:* Effective assessment depends on selecting raters with appropriate expertise and familiarity with the competencies being evaluated; subject matter experts or trained observers may be optimal for specific tasks.

– *Development of Behavioral Assessment Guides:* Detailed behavioral descriptors enhance clarity and objectivity, promoting a shared understanding of performance expectations among both raters and learners.

– *Rater Training:* Comprehensive training in tool use, calibration, and bias mitigation is essential to ensure accurate and consistent evaluations.

– *Logistical Infrastructure:* Adequate resources and organizational support are critical for the successful execution and management of behavioral assessments.

– *Continuous Quality Improvement:* The authors advocate for iterative refinement of assessment strategies based on systematic feedback and performance data to maintain relevance and effectiveness in dynamic educational and clinical contexts [15].

These findings provide practical insights for institutions seeking to enhance their CBME frameworks by incorporating robust and effective behavioral assessment strategies.

Competency-Based Medical Education (CBME) represents a paradigm shift from traditional time-based training models toward an outcome-oriented framework, wherein learner progress is evaluated through criterion-referenced assessments. These assessments are anchored in clearly defined performance standards and competencies, enabling objective measurement of learner achievement independent of peer comparison. This approach ensures that educational outcomes are aligned with professional expectations and that all learners are assessed according to their ability to demonstrate specific, observable competencies. *Formative assessments* play a central role in CBME by providing continuous feedback to learners, fostering self-directed improvement and reflection. Examples include direct observation, mini-clinical evaluation exercises (mini-CEX), and structured feedback sessions, which help identify gaps early and guide learners toward competency achievement. *Summative assessments,* meanwhile, are used to make high-stakes decisions about progression and certification. These are increasingly being designed to evaluate not only knowledge but also performance in real or simulated clinical settings.

Tools frequently used include: *Workplace-Based Assessments (WBAs):* such as the *Mini-CEX, Direct Observation of Procedural Skills (DOPS),* and *Case-Based Discussions (CbDs),* allow assessment of real-time performance in clinical environments; *Portfolios:* serve as a longitudinal record of learner development and reflective practice, providing evidence of competency achievement over time; *Simulation-based assessments:* enable the safe evaluation of complex skills, including decision-making, communication, and procedural competence, in a controlled setting. These tools allow for multi-source feedback (e.g., from peers, patients, and supervisors), promoting a more holistic evaluation of a learner's abilities. Importantly, they support Entrustable Professional Activities (EPAs), which integrate various competencies into tasks that learners must be trusted to perform independently [5; 9].

Faculty development is a cornerstone of effective Competency-Based Medical Education implementation, as it equips educators with the knowledge, skills, and attitudes necessary to fulfill their evolving roles as facilitators, assessors, and mentors. In the CBME framework, faculty are expected not only to deliver content but also to provide individualized coaching, conduct formative and summative assessments, and offer meaningful feedback that supports learner progression toward clearly defined competencies. Comprehensive faculty development programs are required to support this transformation. These programs typically include training in direct observation, use of workplace-based assessment tools, effective feedback techniques and calibration processes to ensure consistent and fair assessment practices across faculty members. Moreover, faculty must develop a deep understanding of Entrustable Professional Activities (EPAs), milestones, and entrustment decision-making to accurately judge when learners are ready to assume professional responsibilities independently. In addition to technical training, faculty development also fosters a cultural shift in educational institutions, encouraging collaborative teaching, reflective practice, and a commitment to continuous quality improvement. Without such preparation, educators may revert to traditional, content-heavy teaching methods that undermine the principles of CBME [3; 10].

The integration of Competency-Based Medical Education (CBME) faces several significant challenges, including logistical complexity**,** resource constraints, and resistance to change. The implementation of CBME necessitates comprehensive restructuring of medical curricula, which involves aligning learning objectives with competency frameworks, redesigning assessment methods, and adjusting teaching practices across diverse clinical settings. This requires considerable institutional coordination and faculty engagement, often compounded by limited financial and technological resources, which may hinder effective integration. Additionally, resistance to change is frequently encountered, particularly among faculty members and administrators who are accustomed to traditional time-based education models. Overcoming this resistance requires not only extensive faculty development but also a shift in institutional culture towards the adoption of competency-driven teaching and assessment paradigms. Furthermore, the successful implementation of CBME is contingent upon the availability of reliable, valid, and feasible assessment tools capable of accurately measuring competencies across various stages of training. The lack of sufficiently validated tools, combined with the practical challenges of their application in real-world clinical environments, presents an ongoing barrier to effective competency evaluation [1; 4].

Conclusions. The integration of Competency-Based Medical Education (CBME) into undergraduate medical curricula presents a promising framework for enhancing the development of competent, reflective, and adaptable healthcare professionals. By aligning learning objectives, teaching strategies, and assessment tools with targeted competencies, CBME ensures that students are assessed based on their ability to demonstrate specific, observable skills, rather than on their performance relative to peers. However, several challenges remain, including the need for reliable assessment tools, faculty development, and institutional support to facilitate CBME implementation. The integration of creativity and innovative pedagogical methods can enhance critical thinking, problem-solving, and adaptability

among medical students, aligning well with CBME's goals. Additionally, studies have shown that the use of Entrustable Professional Activities (EPAs) and formative and summative assessments plays a crucial role in ensuring that students are prepared to take on professional responsibilities independently.

Despite significant strides in embedding Competency-Based Medical Education (CBME) into medical curricula, further research is essential to refine and validate assessment tools, particularly within real-world clinical environments. There is a need for ongoing exploration into overcoming resistance to change and ensuring alignment with competency-based approaches across institutions. This will necessitate continued efforts in faculty development and the cultural transformation of educational practices. Future studies should focus on the longitudinal impact of CBME on clinical performance, the evolution of professional identity, and its applicability across diverse healthcare settings. Additionally, research should address the development and implementation of reliable, scalable assessment tools that are adaptable to various clinical contexts. Ultimately, the successful integration of CBME requires an inclusive, adaptive framework that takes into account both technical innovations and the cultural shifts needed within medical education institutions, fostering a more competency-driven approach to healthcare education globally.

REFERENCES:

1. Bhat M., Bhat A. Assessment in competency-based medical education: A systematic review. Cureus. 2020. Vol. 12(12). e12200. https://doi.org/10.7759/cureus.12200

2. Competency-Based Medical Education (CBME). Retrieved from https://www.aamc.org/about-us/mission-areas/medical-education/cbme

3. Dath D., Iobst W., Holmboe E. S. The importance of faculty development in the transition to competency-based medical education. *Medical Teacher.* 2010. Vol. 32(8). P. 683–686. https://doi.org/10.3109/0142159X.2010.500710

4. Frank J. R., Snell L., Ten Cate O., Holmboe E. S., Carraccio C., Swing S. R., ... & Harris K. A. Competency-based medical education: theory to practice. *Medical Teacher.* 2010. Vol. 32(8). P. 638–645. https://doi.org/10.3109/0142159X.2010.501190

5. Girish B. Assessment in Competency-Based Medical Education (CBME) [Slide presentation]. 2021. Retrieved from https://www.slideshare.net/slideshow/assessment-in-competency-based-medical-education-cbme-dr-girish-b-cisp-2-mci/238444753

6. Gummesson C., Alm S., Cederborg A., et al. Entrustable professional activities (EPAs) for undergraduate medical education – development and exploration of social validity. *BMC Med Educ.* 2023. Vol. 23. P. 635. https://doi.org/10.1186/s12909-023-04621-6

7. Ісаєва О. С., Шумило М. Ю. Оновлені стандарти освіти лікарів–фахівців нової генерації *Science and Education a New Dimension. Pedagogy and Psychology*. 2018. Vol. 6(174). P. 10–14. https://doi.org/10.31174/SEND-PP2018-174VI72-02

8. Laird-Fick H. S., DeMuth R., Gold J., Ferenchick G., Mavis B., Lipscomb W., Wagner D. An Exemplar Milestone Framework for Scaffolding a Competency-Based Medical School Curriculum. *Med Sci Educ*. 2022. Vol. 32(3). P. 611–614. https://doi.org/10.1007/s40670-022-01558-1

9. Möller R., Dittmar M., Ehlers J. P., Hege, I. Electronic portfolios to support competency-based learning and assessment in undergraduate medical education: A scoping review. *BMC Medical Education*. 2024. Vol. 24(1). P. 135. https://doi.org/10.1186/s12909-024-06553-1

10. Riesen E., Morley M., Clendinneng D., Ogilvie S., Murray J. Faculty development for competency-based education: A systematic review. *MedEdPublish*. 2022. Vol. 13. P. 220. https://doi.org/10.12688/mep.19748.2

11. Sheriff D. S. Competency-based Medical Education in India. *Annals of SBV*. 2020. Vol. 9(2). P. 39–41. https://doi.org/10.5005/jp-journals-10085-8125

12. Shanmathi K. A., Meena T. S., Vidhya Selvam, Revathy T. G. Assessing the Impact of Competency-Based Medical Education (CBME): Insights from Medical Students. *Texila International Journal of Public Health*. 2024. DOI: 10.21522/TIJPH.2013.12.04.Art023

13. Shumylo M., Isayeva O., Khmilyar I., Huziy I., Yaremko H., Drachuk M. Creativity as an essential aspect in medical education. *Creativity Studies*. 2022. Vol. 15(1). P. 182–198. DOI https://doi.org/10.3846/cs.2022.133320

14. The CanMEDS Framework. Retrieved from https://www.royalcollege.ca/en/standards-and-accreditation/canmeds.html

15. Williams K. N., Lazzara E. H., Sadighi M., Chandran N., Joshi K., Raj S., Shields I., Nichols B., Testa D., Hernandez J., Michael M., Rege R., Greilich P. Integrating behavioral assessment in instructional design for competency-based medical education. *Frontiers in Medicine*. 2024. Vol. 11. P. 1432319. https://doi.org/10.3389/fmed.2024.1432319