# ПРОФЕСІЙНА ОСВІТА

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## CLINICAL THINKING AS A COMPONENT OF COGNITIVE ACTIVITY IN MEDICAL STUDENTS

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*Successful development of clinical reasoning requires a combination of theoretical knowledge with practical experience, allowing students to apply their knowledge in real clinical scenarios. The development of clinical reasoning involves the ability of a physician to make decisions based on available information to achieve the most favorable outcome. An important aspect is teaching students to recognize and avoid cognitive biases that can lead to inaccurate judgments and diagnostic errors. Clinical reasoning also involves the integration of critical thinking to identify the most appropriate medical interventions aimed at improving the physiological and psychological state of the patient. Systemic development of clinical reasoning contributes to the professional creative activity of the physician, which is the basis for effective diagnosis, prognosis, and treatment strategy selection.In addition, the implementation of simulation technologies and virtual reality in the educational process can significantly improve clinical reasoning skills, allowing students to practice decision-making in a safe and controlled environment. The importance of an interdisciplinary approach in education is emphasized, encouraging students to collaborate and share knowledge with specialists from various medical specialties for a comprehensive understanding of clinical cases. Also, special attention should be paid to developing effective communication skills with patients and their families, which is critical for collecting medical history, building trust, and making joint decisions about treatment. It is also necessary to emphasize the importance of continuous professional development and self-education, as medical science is constantly evolving, and physicians need to be aware of the latest research and clinical guidelines. The introduction of mentorship programs, where experienced physicians share their knowledge and experience with young professionals, also contributes to the development of clinical reasoning and the formation of professional identity. It is also important to integrate the assessment of clinical reasoning into the student certification system to ensure continuous improvement of these skills. This includes the use of standardized clinical exams, analysis of clinical cases, and evaluation of students' ability to reasonably justify their decisions.*

***Key words:*** *clinical thinking, medical education, analytical thinking, intuitive thinking, critical thinking.*

**Альона Антонів, Людмила Каньовська, Зоряна Коцюбійчук. Клінічне мислення як складник когнітивної діяльності студентів медичних університетів**

*Успішне формування клінічного мислення вимагає поєднання теоретичних знань з практичним досвідом, що дає змогу студентам застосовувати здобуті знання в реальних клінічних сценаріях. Розвиток клінічного мислення передбачає здатність лікаря ухвалювати рішення на основі наявної інформації для досягнення найбільш сприят-*

*ливого результату. Важливим аспектом є навчання студентів розпізнавати та уникати когнітивних упереджень, що можуть призводити до неточних суджень та діагностичних помилок. Клінічне мислення також передбачає інтеграцію критичного мислення для визначення найбільш доречних медичних втручань, спрямованих на покращення фізіологічного та психологічного стану пацієнта. Системний розвиток клінічного мислення сприяє професійній творчій діяльності лікаря, що є основою для ефективної діагностики, прогностики та вибору тактики лікування. Окрім того, впровадження симуляційних технологій та віртуальної реальності в навчальний процес може значно покращити навички клінічного мислення, даючи змогу студентам практикувати ухвалення рішень у безпечному та контрольованому середовищі. Підкреслюється важливість міждисциплінарного підходу в навчанні, що заохочує студентів до співпраці та обміну знаннями з фахівцями різних медичних спеціальностей для комплексного розуміння клінічних випадків. Також особливу увагу варто приділяти розвитку навичок ефективної комунікації з пацієнтами та їхніми родинами, що є критично важливим для збору анамнезу, встановлення довіри та спільного ухвалення рішень щодо лікування. Необхідно також наголошувати на важливості постійного професійного розвитку та самоосвіти, оскільки медична наука постійно розвивається, і лікарям потрібно бути в курсі останніх досліджень та клінічних рекомендацій. Упровадження менторських програм, де досвідчені лікарі діляться своїми знаннями та досвідом з молодими фахівцями, також сприяє розвитку клінічного мислення й формуванню професійної ідентичності. Важливо також інтегрувати оцінку клінічного мислення в систему атестації студентів, щоб забезпечити постійне вдосконалення цих навичок. Це передбачає використання стандартизованих клінічних іспитів, аналіз клінічних випадків та оцінку здатності студентів аргументовано обґрунтовувати свої рішення.*

***Ключові слова:*** *клінічне мислення, медична освіта, аналітичне мислення, інтуїтивне мислення, критичне мислення.*

**The urgency of the problem.** Modern medical education requires the training of specialists who are not only highly skilled in technical abilities but also possess strong competence in clinical reasoning. The development of clinical thinking is crucial for enhancing professionalism and improving patient outcomes [1–4]. As healthcare becomes increasingly complex, the ability to make informed decisions is paramount for future doctors. In Ukraine, the formation of clinical thinking among medical students is particularly significant due to the ongoing reforms in the healthcare system and medical education [1; 5–6].

Despite advancements, many medical universities in Ukraine still rely on traditional teaching methods that emphasize rote memorization over critical analysis and decision-making. This approach can hinder students' ability to apply theoretical knowledge in practical situations [4–6]. The rapid evolution of medical knowledge and technology demands that future physicians be adaptable and capable of lifelong learning. Moreover, the integration of modern diagnostic tools and treatment protocols requires a solid foundation in clinical reasoning [10–11].

The implications of inadequate clinical thinking extend beyond individual practitioners to affect overall patient care quality. Errors in diagnosis or treatment stemming from poor clinical reasoning can lead to adverse outcomes, increased healthcare costs, and diminished patient trust [6–7]. Therefore, enhancing clinical thinking is not merely an educational goal; it is a moral imperative that directly influences patient safety and quality of care. To address these challenges, several Ukrainian medical universities have begun implementing innovative teaching strategies aimed at fostering clinical thinking. These include problem-based learning (PBL), simulation-based training, and interdisciplinary collaboration, which encourage active engagement and critical evaluation among students [8–9]. Research indicates that students exposed to these methods demonstrate improved clinical reasoning skills and greater confidence in their decision-making abilities [11–12].

Furthermore, practical experience gained through internships and clinical rotations is vital for reinforcing theoretical knowledge and developing clinical thinking [6–9]. Exposure to real-life cases allows students to practice their analytical skills in a supportive environment while receiving feedback from experienced practitioners.

In conclusion, the formation of clinical thinking among medical students in Ukraine is essential not only for their professional development but also for improving healthcare outcomes across the country. By prioritizing innovative educational approaches and practical experience, Ukrainian medical institutions can better prepare their graduates for the complexities of modern medicine.

**The purpose:** The primary objective of this research is to identify the potential for gradual development and enhancement of clinical thinking among future doctors through problem-based learning methods.

**Research materials and methods:** This study employs a qualitative approach, analyzing existing literature on clinical thinking and educational strategies. It explores the cognitive processes involved in clinical reasoning and the role of educators in facilitating these skills through active learning environments, clinical discussions, and technology integration. The research involved a comprehensive review of peer-reviewed articles, textbooks, and case studies focusing on medical education and clinical reasoning. Additionally, interviews with educators from

various medical schools provided insights into current teaching practices and challenges faced in developing clinical thinking among students. An analytical framework was established to categorize different components of clinical thinking. This framework served as a basis for evaluating existing educational methods and identifying areas for improvement.

**Research results and their discussion.** Modern medical education aims to train specialists who can perform technical aspects of medical work while also making informed clinical decisions. This requires not just specialized knowledge but the ability to assess situations holistically, draw accurate conclusions, and plan appropriate actions, forming the foundation of effective medical practice. Consequently, developing clinical thinking in medical students is crucial for enhancing professionalism and improving treatment outcomes [1–2].

Clinical thinking is a multifaceted cognitive process that encompasses the ability to analyze symptoms, make differential diagnoses, and predict disease progression [3]. It involves accurately assessing medical situations to choose the most effective treatment strategies. A key aspect of clinical thinking is the capacity to respond swiftly to changes in a patient's condition and provide precise recommendations based on thorough symptom analysis. Critical thinking plays a vital role in clinical problem-solving, as it entails evaluating various treatment options and selecting the most suitable one [4]. Therefore, nurturing this type of thinking in students necessitates not only theoretical knowledge but also practical skills and adaptability to diverse medical situations [2]. A successful combination of theoretical understanding, practical abilities, and critical evaluation is essential for achieving high standards in medical practice [1].

Modern medical education should prioritize the development of clinical thinking as a fundamental component of students' training. Mastery of clinical thinking enables future doctors to diagnose and treat effectively while being prepared for challenging situations that may arise in their practice [5]. The ability to make informed clinical decisions is critical for the success of treatment processes. The process of clinical thinking involves several cognitive levels. Analytical thinking is paramount, allowing doctors to systematically analyze patient information and formulate logical conclusions based on symptoms and examination data. This analytical approach underpins sound clinical decision-making and treatment planning, enabling practitioners to comprehend facts and their interrelationships [6]. Intuitive thinking is another essential component, enabling quick decision-making based on prior experiences when faced with ambiguous situations or uncertainty. This intuitive ability is crucial in emergencies where immediate action is necessary [7].

Critical thinking further enhances clinical reasoning by allowing practitioners to evaluate all potential options and make informed decisions while considering the associated risks and benefits [8]. This skill helps prevent errors due to superficial assessments and facilitates accurate determination of treatment tactics, especially in complex cases requiring attention to detail [3]. Structurally, clinical thinking comprises various stages that provide a systematic approach to solving medical problems: gathering information through patient history and examinations, analyzing symptoms to formulate diagnostic hypotheses, conducting differential diagnoses to exclude other conditions, and selecting optimal treatment strategies based on comprehensive data analysis [6].

Teachers play a pivotal role in shaping future medical professionals' clinical thinking [9]. Their primary function is to stimulate analytical and critical thinking among students by actively involving them in solving clinical problems. Educators guide students in analyzing symptoms, determining possible diagnoses, and selecting the best treatment methods based on scientific principles and clinical practice [4]. Engaging students in clinical discussions and conferences is an effective method for developing clinical thinking. These events allow students to explore complex cases collaboratively with peers and faculty, broadening their perspectives and encouraging innovative problem-solving approaches [7]. Faculty members facilitate these discussions by posing insightful questions that emphasize careful analysis of various diagnostic and treatment options [8].

Demonstrating clinical thinking through real-life examples enhances the educational experience. Observing teachers as they analyze patients, formulate diagnoses, and choose treatment strategies provides students with practical insights into integrating theoretical knowledge with real-world applications [9].

Modern technologies significantly impact teaching methods and facilitate the development of clinical thinking. Telemedicine offers innovative opportunities for remote consultations and diagnostics, enabling students to gain experience with diverse patient interactions while learning about cutting-edge technology in healthcare [4]. Artificial intelligence (AI) serves as another valuable tool for shaping clinical reasoning skills. AI systems can analyze clinical cases against extensive medical databases, providing recommendations that support students' deci-

sion-making processes while enhancing their interaction with intelligent systems [5].

Interactive platforms for simulating clinical decisions play an important role in training future doctors. These platforms allow students to recreate real-life scenarios virtually, solve medical problems, receive feedback, and learn from their mistakes - promoting effective learning outcomes [10].

To foster clinical thinking effectively, it is essential to increase the number of practical classes within clinics so that students can gain hands-on experience with real patients [3]. This exposure allows them to better understand the nuances of medical situations while developing necessary analytical skills [7]. Simulation technologies also enhance the learning process by providing safe environments for practicing various scenarios [5]. Such training prepares students for real-world situations by improving their practical skills while teaching them how to act decisively under pressure [10].

The teacher's role as a mentor is crucial in developing clinical thinking. Educators should engage students actively in solving complex problems, fostering critical analysis while providing support during practical training sessions [6]. This mentorship deepens students' understanding of the decision-making process within a clinical context [9].

In conclusion, developing clinical thinking among medical students is vital for training competent healthcare professionals capable of making effective clinical decisions that influence patient outcomes. The quality of medical services relies heavily on a student's ability to analyze symptoms accurately, conduct differential diagnoses, and select appropriate treatment methods. Thus, fostering clinical thinking is an indispensable aspect of professional training for healthcare providers [1–2; 8].

Continuous advancement in pedagogical methods combined with innovative teaching approaches can significantly enhance the cultivation of clinical reasoning skills [4–5]. By integrating modern technologies, interactive learning platforms, and new instructional techniques into curricula, educational institutions can equip students with both theoretical knowledge and practical skills necessary for effectively addressing real-world clinical challenges [9]. Ultimately, adopting progressive teaching methods will prepare future medical specialists for rapid changes within healthcare practices while enabling them to respond adeptly to contemporary medicine's challenges [10].

**Conclusions.** Cultivating clinical thinking is essential for training competent healthcare professionals capable of delivering high-quality medical care. By integrating innovative pedagogical methods and practical experiences into medical education, institutions can better prepare students for the complexities of modern medicine. Continuous improvement in teaching strategies will ensure that future doctors are equipped to navigate the evolving healthcare landscape effectively. In conclusion, addressing the gaps in current medical education by prioritizing the development of clinical thinking will not only enhance individual competencies but also contribute significantly to improved patient outcomes across healthcare systems globally. As we move forward, educators must remain committed to evolving their teaching methodologies to meet these pressing needs effectively.

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