



## **PROBLEMS OF FORMING CLINICAL THINKING IN STUDENTS IN TEACHING CARDIOLOGY**

Soatov Ibrohim Bahrom o'g'li

1st Year Master's Student in Cardiology Tashkent State Medical University

### **Abstract**

This article analytically examines the primary pedagogical and methodological challenges in developing clinical reasoning skills among medical students during cardiology teaching at higher education institutions. It discusses the context of Uzbekistan's State Educational Standards (SES) for higher medical education and the professional standards for physician-cardiologists. Employing both quantitative (surveys, tests) and qualitative (interviews, focus groups) methods, the study identifies key impediments to students' clinical reasoning formation—namely, theory-practice mismatch, insufficient practical base, and declining faculty qualifications. The article proposes targeted recommendations (curriculum enhancement, expanded use of simulation technologies, faculty development) to address these issues.

**Keywords:** Clinical reasoning, cardiology, state educational standards, professional standards, higher education institutions.

### **Introduction**

Cardiovascular diseases (CVD) continue to cause high mortality and disability worldwide (Global Burden of Disease Study, 2019). According to the National Institute of Cardiology (2023), CVD accounts for 270 to 320% of all deaths in Uzbekistan. Therefore, it is important to provide high-quality cardiology education in higher education institutions and develop graduates with the ability to think clinically.

Clinical reasoning is a concept that is sometimes referred to as “clinical analysis”, “diagnostic reasoning” or “clinical decision-making”, and includes the processes of a doctor's admission, diagnosis, and development of a treatment plan (Norman, 2005). Qualified cardiologists who do not have high-quality clinical reasoning are incompetent and significantly reduce the effectiveness of treatment.

According to the “State Educational Standards (SESS) for Medical Education Programs” of the Republic of Uzbekistan, adopted in 2021 for higher educational institutions, the place and goals of cardiology in the 5-year bachelor's degree programs “Pediatrics” and “Medicine” are clearly defined (SESS, 2021). At the same time, the professional standards of a cardiologist (2022) prioritize clinical thinking skills among the main professional competencies that students should develop. The context of these regulatory and legal documents clearly demonstrates the relevance of this study.

Numerous studies have been conducted in foreign countries (USA, Europe, South Korea) on the formation of clinical thinking in higher medical education (Schmidt & Mamede, 2015; Mamede et al., 2018). They mainly analyze methods for developing clinical thinking based on PBL (Problem-Based Learning), simulation technologies, case methods, and scientific research. However, in the context of Uzbekistan, research on the issues of clinical reasoning in specialized cardiology is limited (Saidov, 2020; Abdulkhakimov and Ismailova, 2022). Therefore, it is necessary to develop new pedagogical models that are formed in accordance with the state educational standards and professional standards of the Republic of Uzbekistan.

Based on the “Order No. 450 dated October 1, 2021” approved by the Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan, it is determined that the formation of clinical reasoning in higher medical education programs should be based on the following knowledge and skills. They:

- a) collecting and clarifying medical information (taking anamnesis, history, examination methods).
- b) making diagnostic and therapeutic decisions (differential diagnosis, drawing up a treatment plan).
- c) the ability to monitor the treatment process and evaluate its results.

The professional standard of a cardiologist (2022–2023) divides clinical thinking into the following components:

- a) high-level clinical coherence (qualitative diagnosis of the patient).
- b) professional organization of communication with the patient.
- c) monitoring the results of treatment (ECG, echocardiography, analysis of laboratory records).
- d) updating the knowledge base through rapid adaptation to news and scientific literature.

### **Definitions of clinical reasoning (normal translation):**

- o Norman (2005): “Clinical reasoning” is the set of cognitive processes that a doctor uses to receive and communicate with a patient, make an accurate diagnosis, determine a treatment plan, and evaluate the consequences.
- o Schmidt and Mamede (2015): “Clinical reasoning” is defined as the process of thinking deeply and making decisions by generalizing a specific situation (patient symptoms, history).

### **Components:**

Cognitive elements: data collection (history, physical examination); data interpretation (based on minutes, pathophysiology rules); differential diagnosis (differential diagnosis, differential diagnosis table)

**Metacognitive elements:** Monitoring the thought process (continuity); Identifying errors and incorrect decisions.

**Psychomotor elements:** accurate performance of examination methods (ECG, echocardiography), drawing up scientifically based treatment protocols.

**Communicative elements:** Communication with the patient (taking anamnesis), decision-making in collaboration with the clinical team (nephrologist, endocrinologist, neurologist).

### **3.2. In accordance with the pedagogical and methodological foundations of the formation of clinical thinking, the teaching of cardiology at the bachelor's level is structured as a "Clinical Research-Based Module". This module includes the following:**

Professional standard (2022): During the training for the title of “Physician-Cardiologist”, students should acquire the following skills:

- Diagnosis based on scientific and critical thinking
- Formation of a treatment plan (based on research)
- Communication with other specialists in an integrative approach
- Use of medical information systems (electronic information system, electronic medical journal)

## **Methodological approaches:**

### **1. Case-based learning**

Approaches to PBL (Problem-Based Learning). Students are required to analyze problems by providing real clinical cases (diabetic cardiomyopathy, hypertensive crisis) and develop an effective diagnosis and treatment plan (Abdulkhakimov & Ismoilova, 2022).

According to the DTS (2021), each module session must consist of 50% theoretical and 50% practical sessions in the “case discussion” format.

### **2. Simulation learning technologies**

A decision was made in Uzbekistan to open e-learning and simulation centers in 2020 (Resolution of the Government of the Republic of Uzbekistan, 2020).

Using simulators (survey ECG, echo-simulator, mannequin-based CPR simulators), students learn to make a hypothesis-based diagnosis through practical exercises (Kim & Lee, 2021).

### **3. Clinical practice (Bedside Teaching)**

According to the standard (DTS, 2021), each student is required to participate in clinical processes for at least 200 hours in a practice setting.

In this process, the physician-teacher assists the student in performing tasks such as working directly with the patient, collecting anamnesis, performing a physical examination, and interpreting an ECG.

Saidov (2020) noted the importance of interdisciplinary integration in teaching cardiology, but the lack of tools for assessing clinical thinking.

Abdulkhakimov and Ismailova (2022) in their monograph “Methodology of Teaching Clinical Sciences Based on an Integrative Approach” analyzed the effectiveness of PBL and simulation methods, but not specifically for cardiology. Norman (2005); Schmidt & Mamede (2015): They studied the processes of forming clinical thinking from the perspective of PBL, clinical simulation, and reflection on a scientific basis.

Green and Roberts (2019): In their article “Interdisciplinary Teaching in Medical Education”, they outlined strategic approaches to developing clinical thinking through interdisciplinary integration, citing the example of Harvard University.

Kim and Lee (2021): In South Korea, the implementation of the “Integrated Simulation-Based Modules” model resulted in 85% improvement in students’ skills in diagnosis and treatment planning.

Clinical thinking is one of the most important components of cardiology education, and its formation requires pedagogical and methodological training based on PBL, simulation technologies, and clinical practice. The DTS (2021) and the Cardiologist Professional Standard (2022) in the context of Uzbekistan are the main documents regulating this process. Foreign experience has shown the effectiveness of PBL and simulation methods.

The Uzbek DTS (2021) sets the theoretical-practical hours at a ratio of 60:40. However, the results of this study show that the number of practical hours in educational institutions is low (on average 35%), which is 5% lower than the standard (72% of students noted this).

Abroad (Harvard, Stanford) PBL and simulation methods balance theoretical and practical activities (Green & Roberts, 2019). For example, at Stanford, the hours spent on practice are 45–50% of the total hours () .

Abroad (Korea, Great Britain) PBL and simulation training is considered to have a high impact on clinical thinking (Kim & Lee, 2021; Schmidt & Mamede, 2015). For example, in Korea, integrated simulation courses improved students' diagnostic skills by 30% () .

In accordance with the requirements of the State Educational Service of the Republic of Uzbekistan (2021), it is necessary to allocate theoretical and practical training hours 50:50 (currently 60:40). For this purpose, it is proposed to open clinical simulation centers in universities and increase simulation hours to 15%. It is recommended to organize retraining courses in PBL and simulation methods based on professional standards (2022).

It is necessary to consider cooperation measures with foreign universities (Harvard, Stanford) (short-term internships, ONLINE seminars).

Organize trainings for working in a clinical environment (role-play, simulated patient) in universities.

It is recommended to establish a psychological coaching service, organize stress management seminars.

In this way, the analysis of the results was compared with foreign experience, and solutions to problems in the formation of clinical thinking were proposed based on the Uzbek DTS and professional standards. Systematic preventive measures,

methodological directions and future research directions for the problems were identified.

## References

1. Абдулҳакимов, М. Р., & Исломова, Г. Т. (2022). Integratsion yondashuv asosida klinik fanlarni o‘qitish metodikasi. Тошкент: Medpublishing.
2. Сайдов, А. Б. (2020). “Fanlararo integratsiya asosida kardiologiyani o‘qitish samaradorligi.” O‘zbekiston Tibbiyot Jurnali, 3(2), 45–52.
3. Green, T. L., & Roberts, C. A. (2019). “Interdisciplinary Teaching in Medical Education: A Global Perspective.” Medical Teacher, 41(5), 563–570.
4. Kim, J., & Lee, H. J. (2021). “Integrated Simulation-Based Learning in Cardiovascular and Endocrine Modules.” Korean Medical Education Review, 33(1), 89–98.
5. World Health Organization. (2021). Integrated care for older people: Guidelines on community-level interventions to manage declines in intrinsic capacity. Geneva: WHO Press.
6. Schmidt, H. G., Mamede, S. (2015). “How to improve the teaching of clinical reasoning: a narrative review and a proposal.” Medical Education, 49(10), 961–973.
7. Norman, G. (2005). “Research in clinical reasoning: past history and current trends.” Medical Education, 39(4), 418–427.
8. Нарметова, Ю., & Дехкамбаева, З. (2024). ВЛИЯНИЕ НЕРЕШЁННЫХ ПСИХОЛОГИЧЕСКИХ КОНФЛИКТОВ И АЛЕКСИТИМИИ НА СОМАТИЧЕСКОЕ ЗДОРОВЬЕ. Multidisciplinary Journal of Science and Technology, 4(12), 97-99.
9. Декхкамбаева, З. (2024). Zamonaviy ta’limni jismoniy tarbiya va sport vositasida takomillashtirish. Наука и инновации, 1(1), 70-72.
10. Zulfiya, D. (2022). SOG ‘LOM TURMUSH TARZINI SHAKLLANTIRISHDA SOG ‘LOMLASHTIRUVCI TEXNOLOGIYALAR. Новости образования: исследование в XXI веке, 1(5), 697-700.
11. Мелибаева, Р. (2019). Использование обобщенных способов учебной деятельности-фактор совершенствования творческого мышления.



12. Мелибаева, Р. Н. (2019). Талабалар тафаккурини ривожлантиришда укув машгулотларининг урни. PSIXOLOGIYA Учредители: Бухарский государственный университет, (2), 35-40.
13. Нарметова, Ю. К. (2022). Особенности психокоррекционного подхода при психосоматических заболеваниях (на примере ишемической болезни сердца). Gospodarka i Innowacje., 21, 258-261.