

THE USE OF CREATIVE TASKS IN MEDICAL CHEMISTRY**Safarova Nafisa Sulaymonovna** – Junior Researchersafarovan41982@gmail.comScientific Center for Immunology, Allergology, and Human Genomics
at Samarkand State Medical University**TIBBIY KIMYODA IJODIY TOPSHIRIQLARDAN FOYDALANISH****Safarova Nafisa Sulaymonovna** – kichik ilmiy xodimSamarqand davlat tibbiyot universiteti huzuridagi Immunologiya,
allergologiya va inson genomikasi ilmiy markazi**ИСПОЛЬЗОВАНИЕ ТВОРЧЕСКИХ ЗАДАНИЙ В МЕДИЦИНСКОЙ ХИМИИ****Сафарова Нафиса Сулаймоновна** – младший научный сотрудникНаучный центр иммунологии, аллергологии и геномики человека
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Tayanch soʻzlar: tibbiy kimyo, klinik tafakkurni rivojlantirish metodlari, kasbga yoʻnaltirilgan taʼlim, keys-metod, muammoli taʼlim, oʻqitish metodikasi.

Rezyume. Maqolada “Tibbiy kimyo” kursi doirasida tibbiyot talabalarida klinik fikrlashni rivojlantirish va mustahkamlashga qaratilgan uslubiy yondashuvlar koʻrib chiqilgan. Ushbu fanning boʻlajak sogʻliqni saqlash mutaxassislari taʼlim berish va ularning kasbiy tafakkurini shakllantirishda asosiy element sifatida ahamiyati taʼkidlangan. Tadqiqotda kimyoviy bilimlarni klinik amaliyot bilan integratsiyalash, analitik kompetensiyalarni rivojlantirish, laboratoriya natijalarini talqin qilishni takomillashtirish va asosli kasbiy qarorlar qabul qilishni qoʻllab-quvvatlashga qaratilgan faol oʻqitish usullari koʻrib chiqilgan va tizimlashtirilgan. Natijalar shuni koʻrsatadiki, muammoli taʼlim, keys-stadi, fanlararo hamkorlik va kontekstual yondashuvni joriy etish rivojlanishni sezilarli darajada yaxshilaydi.

Ключевые слова: медицинская химия, методы развития клинического мышления, профессионально-ориентированное обучение, кейс-метод, проблемно-ориентированное обучение, методика преподавания.

Резюме. В статье рассматриваются методологические подходы, направленные на развитие и укрепление клинического мышления у студентов-медиков в рамках курса «Медицинская химия». Подчеркивается значение этой дисциплины как основополагающего элемента в образовании будущих специалистов здравоохранения и формировании их профессионального мышления. В исследовании рассматриваются и систематизируются активные методы обучения, направленные на интеграцию химических знаний с клиническим применением, развитие аналитических компетенций, улучшение интерпретации лабораторных результатов и поддержку обоснованного профессионального принятия решений. Результаты показывают, что внедрение проблемно-ориентированного обучения, кейс-методов, междисциплинарного сотрудничества и контекстуального подхода существенно улучшает развитие навыков клинического мышления у студентов.

Key words: medical chemistry, the methods of increasing of clinical thinking, professionally oriented training, case method, problem-based learning, teaching methodology.

Summary. The article examines methodological approaches designed to foster and enhance clinical thinking among medical students within the framework of the “Medical Chemistry” course. It highlights the significance of this discipline as a foundational element in educating future healthcare professionals and shaping their professional mindset. The study reviews and organizes active teaching methods aimed at integrating chemical knowledge with clinical application, promoting analytical competencies, improving the interpretation of laboratory findings, and supporting well-grounded professional decision-making. The findings indicate that the implementation of problem-based learning, case-based methods, interdisciplinary collaboration, and a contextual approach substantially improves the development of students’ clinical thinking skills.

Introduction. The modern medical education system is focused on training specialists who can work effectively in the fast-changing world of clinical practice. Because of this, a key goal of professional training is to develop clinical thinking as an integrative quality in future medical professionals. Clinical thinking allows specialists to analyze the patient’s condition, interpret the results of laboratory and instrumental studies, identify causal relationships between symptoms and the pathogenetic mechanisms of diseases, and make informed decisions during treatment.

Clinical thinking is a substantively specified process of dialectical thinking that gives medical knowledge integrity and completeness [1].

This definition of clinical thinking rightly assumes that it is not some special, exceptional type of human thinking, but that human thinking is generally uniform in any form of

intellectual activity, in any profession, and in any field of knowledge. At the same time, the definition emphasizes the specificity of clinical thinking, the importance of which must be taken into account when considering the problem of its formation and development.

The specificity of clinical thinking, which distinguishes it from others, consists of the following:

1. The subject of research in medicine is extremely complex, including all types of processes from mechanical to molecular, all spheres of human life, including those that are not yet accessible to scientific understanding, although obvious, for example, extrasensory perception and bioenergy. Human individuality cannot yet be specifically expressed in a clinical diagnosis, although all clinicians – thinkers since time immemorial – talk about the importance of this component of diagnosis.

2. In the process of diagnosis in medicine, nonspecific symptoms and syndromes are discussed. This means that in clinical medicine, there are no symptoms that are indicative of only one disease. Any symptom may or may not be present in a patient with a particular disease. Ultimately, this explains why a clinical diagnosis is always, to a greater or lesser extent, a hypothesis. S.P. Botkin pointed this out at the time [2].

To avoid alarming readers with the fact that all medical diagnoses are essentially hypotheses, let us explain. A medical diagnosis can only be accurate in relation to the criteria currently accepted by the scientific community [3].

3. In clinical practice, it is not possible to use all the methods of investigation from the vast arsenal available for various reasons. These may include allergies to diagnostic procedures, and the fact that diagnostic measures must not cause harm to the patient. Medical institutions may not have certain diagnostic methods at their disposal, certain diagnostic criteria may not be sufficiently developed, etc.

4. Not everything in medicine can be understood theoretically. For example, the mechanism of many symptoms remains unknown. General pathology is increasingly in a state of crisis. Any pathological conditions are associated with the damaging effects of free radicals. Mechanisms previously considered classic compensatory are now considered predominantly pathological. There are many examples.

5. Clinical medicine came to be called clinical from Burgava [4]. Its defining feature is that clinical thinking is cultivated in the process of communication between the student, the teaching physician, and the patient at his bedside (at the patient's bed).

Traditionally, the development of clinical thinking has been associated with clinical disciplines such as therapy, surgery, pharmacology, and pathophysiology. However, in recent years, increasing attention has been paid to the role of fundamental disciplines, including medical chemistry, in shaping students' professional thinking. Medical chemistry is a basic academic discipline that shapes students' understanding of the chemical nature of biological processes, the mechanisms of action of drugs, the properties of biologically active compounds, and the chemical basis of pathological conditions.

Despite this, the teaching of medical chemistry often retains an academically abstract approach, in which the material is presented in isolation from the students' future professional activities. As a result, students acquire formal knowledge that does not translate into clinical thinking. This necessitates the search for and implementation of effective teaching methods that ensure the professional orientation of education and the development of clinical thinking already at the stage of studying chemical disciplines.

The purpose of this article is to analyze and justify methods for developing students' clinical thinking in medical chemistry classes.

Materials and methods. The methodological basis of the study consists of the provisions of competency-based, systemic-activity, and contextual approaches in education. The following methods were used in the course of the work:

- theoretical analysis of pedagogical, psychological, and methodological literature on the problem of clinical thinking;

- analysis of work programs and the content of the discipline "Medical Chemistry";

- generalization of pedagogical experience in teaching medical chemistry in medical colleges and universities;

- modeling of educational situations and methodological techniques aimed at developing students' clinical thinking.

The object of the study is the educational process in the discipline "Medical Chemistry," and the subject is the methods and techniques of teaching that contribute to the formation of clinical thinking in students.

How does the study of chemical disciplines at medical university contribute to the development of clinical thinking? First of all, the study of general and organic chemistry can be considered a necessary foundation for understanding such medical and biological disciplines as biochemistry, physiology, pathophysiology, hygiene, and all clinical disciplines. Let us briefly illustrate this using sections of the medical chemistry program.

Studying the basics of chemical thermodynamics gives future doctors a clear understanding of the body's energy balance, the peculiarities of the conversion of different types of energy in life processes, and the objective criteria for the feasibility of various chemical reactions in the body.

Studying the laws of chemical kinetics and chemical equilibrium helps to understand the mechanism of enzyme action and predict the direction of biochemical reactions. Studying the electronic structure of atoms, the nature of chemical bonds, and the structure of molecules.

The study of the physicochemical properties of biogenic elements and their compounds predetermines the further clarification of their biological role in ensuring the action of many enzymes, vitamins, and hormones, and in the development of a number of hereditary, endemic, and element-deficient diseases (goiter, caries, etc.). This also forms the basis for the consideration of environmental pollution and protection issues in hygiene courses.

The study of the physicochemical properties of solutions is of particular importance. The study of the processes of dissolution and dissociation of substances, diffusion, osmosis, pH changes, and the action of buffer systems is necessary for understanding the function of cell membranes, acid-base balance, the work of the cardiovascular system, lungs, kidneys, and the therapeutic effect of various methods of treatment. When studying organic chemistry, understanding the electronic and spatial structure of molecules of natural organic compounds in relation to their biological action makes it possible to subsequently understand their transformations in biochemical reactions and provides the ability to navigate the classification, structure, and properties of medicinal substances [1].

Results.

The concept and structure of clinical thinking in medical education. Clinical thinking is a complex, multi-level process that includes cognitive, analytical, and prognostic components. From a pedagogical perspective, clinical thinking can be viewed as a learner's ability to apply theoretical knowledge to analyze professionally significant situations and make decisions.

The following components can be identified in the structure of clinical thinking:

1. Analytical component, including the ability to analyze initial data (symptoms, test results, chemical properties of substances).
2. Logical-synthetic component, ensuring the establishment of cause-and-effect relationships.
3. Interpretative component, related to explaining the results obtained in terms of clinical significance.
4. Prognostic component, involving the assessment of the possible consequences of intervention.

Medical chemistry contributes to the formation of all these components by analyzing the chemical processes underlying the physiological and pathological states of the body.

Problem-based learning as a means of developing clinical thinking. Problem-based learning is based on creating learning situations that require active thinking on the part of students. In medical chemistry, this is achieved by posing problematic questions and tasks that have no obvious solution without reference to the clinical context.

For example, when studying acid-base balance, students are asked to explain the causes of metabolic acidosis in certain pathological conditions. Solving such a problem requires the integration of knowledge about blood buffer systems, organic acids, and physiological mechanisms of pH regulation.

Using the case method in teaching medical chemistry. The case method involves analyzing educational clinical situations that simulate real professional tasks. In medical chemistry, cases may include laboratory test data, information about medications, and descriptions of patient symptoms.

Working with case studies contributes to:

- developing skills in interpreting chemical indicators;
- developing clinical logic;
- understanding the practical significance of chemical knowledge.

Interdisciplinary integration as a prerequisite for developing clinical thinking. Interdisciplinary integration allows students to view medical chemistry not in isolation, but within the context of medical knowledge. Integration with physiology, biochemistry, pharmacology, and pathophysiology is particularly effective.

Thus, when studying solutions and osmotic pressure, it is advisable to consider the clinical aspects of infusion therapy, which contributes to the formation of holistic professional thinking.

Contextual and project-based learning. Contextual learning is focused on simulating professional activities in the learning process. Tasks are formulated in the form of professionally relevant situations, which increases student motivation and stimulates clinical thinking.

Project-based activities, in turn, contribute to the development of research skills, critical thinking, and independence in learners.

Discussion. The results of the analysis of pedagogical experience and methodological literature confirm that the development of clinical thinking is possible already at the stage of studying fundamental disciplines. Medical chemistry has significant potential for the formation of professional thinking, provided that active teaching methods are used in a targeted manner.

A comparative analysis of traditional and professionally oriented approaches shows that the inclusion of a clinical context increases the level of awareness of the material, contributes to the formation of stable interdisciplinary connections, and develops analytical skills.

Conclusion. Thus, the development of students' clinical thinking is one of the priority tasks of teaching medical chemistry. The use of problem-based learning, the case method, interdisciplinary integration, and a contextual approach allows chemical knowledge to be transformed into a tool for the professional activity of future medical workers. The implementation of these methods contributes to improving the quality of medical education and the formation of competent specialists who are ready to solve clinical problems.

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