The experience of implementing a logical-functional model of a health-developmental environment in secondary schools of the Poltava Region from 2017 to now has been analyzed, which provides for the creation of an educational environment that corresponds to the humanistic-competence paradigm and the principles of the New Ukrainian School. The periodicity of changes in the model is evaluated: from 2017 to 2021, when ZROS was focused on creating a health-developing environment in primary classes, and from 2021 to now, when new challenges are taken into account, in particular, the state of war, which affected the safety of the educational environment and the creation such an environment in primary school.

The article emphasizes the autonomy of educational institutions in the formation of reference conditions for personality development. The organizational and functional aspects of the modeling of social security, in particular, changes in the regulatory and legal framework, the creation of methodological communities with the participation of scientists, and the development of comprehensive educational programs are considered. Emphasis is placed on management teams aimed at supporting healthy lifestyles and a safe environment for students and staff.

The newest tasks for the period 2021-2026 are considered separately, in particular, the formation of a psychologically comfortable environment, motivation for physical activity, the introduction of an inclusive educational space and support for ecological behavior. The results of the simulation of integrated courses for students of 5-6 grades, focused on the development of competencies in the field of health, safety and well-being, are presented. The importance of adapting educational processes to new realities and the needs of further development of the health-developmental environment model to ensure high-quality education and support the health of students is emphasized.

***Key words**: humanistic-competency paradigm of education, institution of general secondary education, technological bases of modeling, health-developmental environment, education seekers, logical-functional model, health-preserving competence.*

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CHANGES IN PHARMACOLOGICAL TRAINING OF FUTURE DOCTORS IN UKRAINE IN THE CONTEXT OF MODERNIZATION OF MEDICAL HIGHER EDUCATION INSTITUTIONS

World integration processes and globalization trends have set the tasks of modernization and involvement in the European and world educational space for higher medical education in Ukraine. The periods of changes in the total number of hours and the emergence of independent work in the curricula of pharmacological training of future doctors, which corresponded to Ukraine's accession to the Bologna Process and subsequently to the European Education Area (EEA), are highlighted. The curricula for the study of pharmacology over the past 55 years have been analyzed. The problems that arose in the context of changes in the curriculum, which led to a redistribution of the number of hours in the study of disciplines, are revealed. The directions of resolving the discrepancies between the amount of material and the features of the curricula are characterized.

Key words: *pharmacological training, modernization of higher medical education, European educational area (EEA), work programs, curricula, classroom, independent work*

Problem statement. Ukraine's independence promotes democratization and the rise of national traditions in society, which is reflected in the higher medical education environment. World integration processes and trends of globalization and technologization put forward the tasks of modernization and involvement in the European and world educational space for medical education (Guest, Chandrakanthan, Bascombe, Watkins, 2021, p. 582). Integration processes began with the Bologna Declaration, adopted in 1999. The Bologna Process was preceded by the signing of the Magna Carta of European Universities in 1988 by the leading European universities. In 2005, the Ukrainian higher education institutions officially joined the Bologna Process (Димань, Боньковський, Вовкогон, 2017). The Bologna Process defined the immediate and most significant goals of European integration in the field of education. Along with this, there is a change in the working programs in the main disciplines and curricula.

The abovementioned points become the basis for further improvement, detailing and expansion of the Bologna Process content, which took place until 2010. At the conference of European ministers in London (2007), the next stage and transition to the European Higher Education Area was launched. In 2009, the Leuven Communiqué was adopted, which emphasized, firstly, the need for equal opportunities for education, and secondly, the guidelines for expanding universal access to higher education and increasing access to those groups that are underrepresented and should be represented by the end of the 20s of the XXI century. Thirdly, it emphasized the student-centered nature of education (The Bologna Process, 2020).

Then, on March 11-12, 2010, the Budapest-Vienna Declaration was adopted and the creation of the European Higher Education Area was officially proclaimed. In Romania, in 2012, ministers of 47 countries of the European Higher Education Area in Bucharest adopted a communiqué that defined new tasks and directions. An important trend is democratization and expanding access to education, which has been successfully implemented in Ukraine. The communiqué explained the concept of quality of education, stating that graduates should combine cross-cutting, multidisciplinary and innovative skills and competencies

with up-to-date specialized professional knowledge, which enables them to meet the greater needs of society and the labor market.

Further modernization of medical institutions of higher education is reflected in the strategy for reforming the health care system of Ukraine 2015-2020, adopted in 2014 (Національна стратегія реформування системи охорони здоров'я в Україні на період 2015 – 2020 роки). The section "Education and training" predicts a reduction in medical specialties and the dependence of medical services on market conditions and requirements. To improve the management of healthcare institutions, master's programs at universities and advanced training courses are offered, as well as the development of distance learning (Національна стратегія реформування системи охорони здоров'я в Україні на період 2015 – 2020 роки, с). 32. The latter leads to an increase in hours for independent work and the development of electronic platforms for their implementation by universities.

Analysis of current research. The problems of professional training of specialists in the field of "Health Care" in Ukraine at the beginning of the XXI century are constantly under the scrutiny of K. Amosov, R. Volosovets, V. Zhdan, V. Zaporozhan, B. Ziimenkovsky, I. Zupants, T. Kiryan, E. Milerian, J. Tsekhmistra, V. Chernykh.

The process of pharmacological training of future doctors and the problems of studying general pharmacology are covered in the works of N. Voloshchuk, O. Denysiuk, V. Danylchuk, S. Bigovshchyts, O. Bobrovska, S. Serhiiiev, I. Chekman, S. Chechotina, etc.; the use of the latest technologies and modern achievements in teaching pharmacology are described by T. Yermolenko, O. Kryvoshapka, N. Ruda, O. Pautina, T. Hnatenko, etc.

The purpose of the article. To compare and analyze the pharmacology curricula for students of medical faculties of Ukrainian higher education institutions and, based on the comparative analysis, to determine the most optimal directions for modernizing the modern educational activities of domestic medical institutions in accordance with current trends in the European educational area.

Research methods. The main methods used for a comprehensive consideration of the problem under study were the bibliosemantic approach and the analysis of scientific literature, which considered certain aspects of the modernization of medical education in independent Ukraine. Archival data, curricula available on the websites of medical universities in Ukraine, and pharmacology work programs were also analyzed.

Presentation of the main material. Since the first years of Ukraine's independence, the vector of educational policy has changed towards European integration, which involved reforming the system of higher medical education, health care and training of competitive domestic doctors. According to V. Moskalenko, in order to achieve changes in the system of higher medical education, it is necessary to combine the following important factors: first, the system of training doctors with the system of providing primary, secondary specialized and tertiary highly specialized medical care to the population; second, the availability of sufficient human, financial and material resources for training doctors and support staff; third, the availability of modern effective models of medical education (Москаленко, 2013, с. 23). This implies modernization of higher medical education by changing educational standards and curricula and implementing effective learning models that can be realized only if future doctors acquire a high level of professional competence. The professional competence of healthcare professionals is a systemic characteristic of a person (a set of abilities, knowledge, skills, business and personal qualities) (П’ятниця-Глопинченко, 2020) which are formed by all disciplines, including pharmacology.

The modernization and nationalization of higher medical education in Ukraine was reflected in the content of the regulatory framework of educational activities (Корильчук, Руда, Боровик, 2023), in which four groups of documents can be distinguished: first, international documents (agreements, communiqués, declarations) related to Ukraine's integration into the world and, first of all, the European educational area; second, legislative and other regulatory documents that regulate higher education in Ukraine in general; thirdly, we can distinguish the regulatory documents of the Ministry of Health that are directly applicable to higher medical education, i.e., those that determine the direction and content of development of medical HEIs in Ukraine; fourthly, documents that are directly developed by medical HEIs (orders, resolutions, instructions, etc.).

The presented documents indicate certain trends in the modernization of the educational process in medical HEIs in the late twentieth and early twenty-first centuries. First, it is the practical orientation of the education of future doctors, which brings the application of acquired knowledge in future professional activities closer. Secondly, there was the introduction of a credit-modular modern system

of education in medical universities and approximation to the standards of European and world educational practice.

This orientation is reflected in the Pharmacology program (2018), developed by the Ministry of Health of Ukraine by the State Institution "Central Methodological Cabinet for Higher Medical Education of Ukraine" for the training of specialists of the second (master's) level of higher education with the educational qualification "Master of Medicine", qualification profession "Doctor", field of knowledge 22 "Healthcare", specialty 222 "Medicine". This program was developed in accordance with the Standard of Higher Education of Ukraine for the second master's level of higher education. The program emphasized that, according to WHO, medicines account for 80-85% of all types of medical care and that training a qualified doctor is impossible without an in-depth and at the same time specific study of pharmacology. This program is the basis for the work program, which is updated every year. Due to the constant changes in the range of medicines on the world market, the program includes new groups of drugs in accordance with the anatomical, chemical and therapeutic classification (last revision 2024). The nomenclature of medicines is presented both by them international non-proprietary name (INN) of active pharmaceutical substances recommended or proposed by the WHO and by trade names. For the first time, the objective of the discipline is presented, which provides for the acquisition by each student of theoretical knowledge and practical skills on the basic principles of justifying the rational and safe use of medicines for the treatment and prevention of diseases. Achievement of this goal will allow to prepare students for practical activities, high-quality performance of functional duties related to the rational choice of medicines, independent preparation of pharmacotherapy regimens and subsequent monitoring of the efficacy and safety of pharmacotherapy, prevention of adverse reactions (Робоча програма навчальної дисципліни: ОК «Фармакологія», галузі знань 22 «Охорона здоров’я», освітньо-професійна програма «Медицина» для підготовки фахівців другого (магістерського) рівня вищої освіти (3 курс, 5-6 семестр), с. 4-5).

The ultimate goals of the discipline are defined: firstly, to determine the group affiliation of medicines according to modern classifications, secondly, to determine the pharmacodynamics and pharmacokinetics of drugs and their mechanism of action, thirdly, to determine the manifestations of possible adverse reactions and symptoms of overdose,

methods of their prevention and treatment, and fourthly, to justify the main indications for prescription, adequate dosage form, routes of administration and interaction with other medicines.

In recent years, there has been a decrease in the number of hours for studying the discipline of pharmacology. This is happening along with the deterioration of pharmacological training of future doctors, which is a cause for concern not only in Ukraine, but also in the United States and Europe. The General Medical Council of the United Kingdom states that insufficient knowledge of pharmacology is the basis for erroneous prescription of medicines and, as a result, incorrect treatment. When surveying students at European universities, they note that more attention should be paid to the study of pharmacology (Engels, 2018).

When analyzing the pharmacology curricula over the past 55 years at Poltava State Medical University, there has been a general decrease in the number of hours by 1.2 times (from 244 hours to 210) (Table). The number of classroom hours decreased from 162 to 94 hours, i.e. by 1.7 times compared to the 1997 program. At the same time, the amount of independent work increased by 1.4 times, i.e. to 116 hours. A similar situation is observed in the vast majority of medical universities in Ukraine.

The number of lecture classes decreased from 72 hours to 24 hours, i.e. 3.0 times. Under these conditions, the number of practical classroom hours has also decreased from 90 to 70 hours, by 1.3 times compared to 1997.

When comparing curricula in medical higher education institutions of Ukraine over the past 55 years, two periods can be distinguished: the first period was characterized by a steady increase in the number of total hours from 1969 to 1997, before Ukraine joined the Bologna Process, from 122 hours to 244 hours, i.e. 2.0 times. Starting in 1997, there was a gradual decrease in the total number of hours allocated for the study of pharmacology to 210 hours, i.e. 1.2 times.

Table

A Comparative Analysis of the Curricula of Medical Higher Education Institutions in Ukraine (1969-2023)

Years of approval of pharmacology curricula	ECTS credits number	Number of hours					
		total amount	classroom				students' independent work
			total	lecture	seminars	practical	
1969		122	122	52	-	70	0
1979		162	162	74	-	88	0

1983		166	148	72	-	76	18
1997		244	162	72	-	90	82
2004		216	144	48	-	96	72
2009	7,0	210	130	40	-	90	80
2016	7,0	210	94	24		70	116
2022/2023	7,0	210	94	24	-	70	116

A similar trend was observed in the total number of classroom hours, which increased by 1.3 times in the period up to 1997 compared to 1969. This is obviously due to the constant increase in the number of medicines appearing on the pharmaceutical market of Ukraine and the world.

Subsequently, the total number of classroom hours decreased by 1.2 times in 2004, by 1.3 times in 2009-2016, and by 1.7 times in 2022 compared to the peak in 1997.

In 1969, there were 52 hours, i.e. 26 lectures, and then by 1997 the number of lecture hours increased to 72 hours, i.e. 1.4 times. However, further changes in the strategy of pharmacology training led to a significant reduction in the number of lecture hours in 2004 by 1.5 times to 48 hours. Subsequently, according to the recommendations of the education reform, there was a further reduction in the number of lecture hours to 24, which is 3.0 less compared to the 1997 program. It should be noted that the study of pharmacology does not include seminars (Table). During this period of analysis, the number of classroom practical hours changed. The highest number of hours allocated for pharmacology study was 96 hours in 2004. At the same time, in 1969 and 2022 their number was the same, i.e. 70 hours.

As we can see, against the background of a reduction in the total hours of the main educational component pharmacology, a significant decrease was noted mainly due to classroom hours. At the same time, the total number of practical hours fluctuated to a lesser extent compared to changes in the number of lecture hours. That is, the reduction of the total amount and, in particular, classroom hours was mainly due to lecture hours and to a lesser extent practical classes.

Changes in the number of hours allocated for independent study of pharmacology should be analyzed separately. The first hours for self-study were allocated in the program in 1983, which amounted to 18 hours. They were usually used to consider new groups of drugs that appeared on the pharmaceutical market, for example: contraceptives, antioxidants, immunotropic drugs, etc. A significant increase in the hours of independent work of students was observed in 1997 to 82 hours. This was due to an increase in the total number of hours for studying the discipline

to 244. In the future, there is an increase in hours for independent work to 116 hours in 2022, but this was against the background of a decrease in the total number of hours. As we can see, the most balanced pharmacology study program was in 1997, when there were enough classroom (lecture and practical) hours and hours for independent study.

Such changes in the curricula after 1997 were caused by Ukraine's integration into the European Health Education Area, which primarily considered the harmonization of curricula for future doctors, which were identified in the international accreditation of educational programs as the main factors of medical education reform. To this end, in 1989, the European Credit Transfer and Accumulation System (ECTS) was introduced - a student-centered system designed to unify the evaluation of curricula for students studying at different medical institutions of higher education.

The established changes in the curricula took place against the background of a significant increase in the number of drugs on the pharmaceutical market. With the emergence of new technologies and research methods, pharmaceutical companies have begun to actively develop new pharmacological groups of drugs and significantly expand them to treat various diseases. Thus, the number of medicines on the market has increased significantly over the past 50 years, allowing doctors to choose the most effective and safe drugs to treat their patients.

The study of pharmacology is based on the WHO Essential Medicines List, which was first created in 1977, with 208 medicines (Wirtz, Hogerzeil, Gray, Bigdeli, De Joncheere, Ewen, 2017, c. 470). It contained medicines that were considered the most effective and safe to meet the most important needs in the health care system. This list is used by countries, including Ukraine, to develop their own local lists of essential medicines. The WHO Essential Medicines List is updated every 2 years. The 22nd list, which was updated in 2021, included 479 medicines (Executive summary: the selection and use of essential medicines 2021). The pharmacology curriculum is based on this list. With each update, the list of medicines recommended for study increases. The list of essential medicines was last updated in July 2023 to its 23rd edition. This list contains 1200 recommendations for 591 drugs and 103 therapeutic equivalents (WHO Model Lists of Essential Medicines).

As we can see, the balanced traditional curricula, which gave preference to lecture material, i.e. almost every lecture was preceded by a practical lesson, were gradually replaced by curricula that gave preference to

independent work of students with a student-centered vision of learning strategies, in which students choose what they will study and, to some extent, how they will study (Achike, 2010, p. 14). Since the European Education Area is primarily focused on students, not teachers (Wright, 2011, p. 95).

It should be noted that in the United States, traditional pharmacology curricula, which included 2 years of study and then 2 years of clinical pharmacology, were replaced by integrated basic science programs in the clinic, which led to a blurring of the barrier between basic and clinical disciplines, which, according to scientists, should affect the formation of clinical thinking (Brauer, Ferguson, 2015, p. 316).

Thus, in recent academic years, there has been a decrease in the classroom load on students along with the study of pharmacology and other disciplines, in particular pathological physiology, biological physics, and the same trend is observed in the European Union (Хоменко К., Хоменко О., 2019, с. 73). Therefore, to improve pharmacological training, one approach is to increase the number of classroom hours, but this cannot be a complete guarantee of achieving results (Guillaume, Khachikian, 2011, p. 258).

The very increase in the hourly load depends on the strategy of universities, as well as the ability of the departments to consider some pharmacological issues through selective educational components, for example: pharmacogenetics, molecular pharmacology, side effects of drugs, etc. (Стандарт вищої освіти другого (магістерського) рівня, галузь знань 22 Охорона здоров'я, спеціальність 222 Медицина). However, highly complex and narrowly focused disciplines are not always chosen by students, who prefer easier subjects to learn to the detriment of knowledge and practical learning outcomes.

Modern student-centered education focuses on skills and practical learning outcomes that enable lifelong learning and independent problem solving. Therefore, the key to effective learning of pharmacology should be the active implementation of effective teaching methods by teachers, including problem-based learning, case-based learning, and outcome-based learning based on collaborative and independent learning activities. This approach reorients the teacher from the traditional role of a source of information to a facilitator who helps and encourages the student.

To improve the independent work and involvement of higher education students in this process, Poltava State Medical University has created a separate educational platform E-Aristo, where teachers upload modern necessary materials for effective learning. These materials consist

of presentations, audio and video materials, and include materials for training and knowledge control.

Obviously, creating a situation of success at the end of the work is a powerful incentive for further independent cognitive and research activities, will help to increase its effectiveness, develop initiative, communication skills, creative and organizational abilities, and provide opportunities for self-improvement.

Conclusions.

1. Pharmacology teachers should be well prepared for this role, with a strong theoretical knowledge, understanding of the subject and practical and pedagogical experience, which should be combined with sound pedagogical knowledge and skills. This can make the pharmacology training of future doctors interesting and exciting.

2. Teachers should more actively introduce the latest teaching methods, including problem-based learning, case-based learning and outcome-based learning based on collaborative and independent learning activities, distance learning and various types of independent work.

Prospects for further research. In the future, it is planned to consider the improvement of methodological approaches that will improve the independent work of students.

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АНОТАЦІЯ

Луценко Ольга. Зміни фармакологічної підготовки майбутніх лікарів в Україні за умов модернізації медичних закладів вищої освіти.

Мета статті. *Порівняти та проаналізувати навчальні програми з фармакології для студентів медичних факультетів ЗВО України та на основі проведеного порівняльного аналізу визначити найоптимальніші напрямки модернізації сучасної освітньої діяльності вітчизняних медичних ЗВО згідно з сучасними трендами європейського освітнього простору.*

Методи дослідження. *Використовувалися бібліосемантичний підхід і аналіз наукової літератури, в якій розглядалися окремі аспекти модернізації медичної освіти в незалежній Україні. Також проаналізовані архівні дані, навчальні програми доступні на сайтах медичних університетів України та робочі програми з фармакологія.*

Результати дослідження. *З перших років незалежності вектор української освітньої політики спрямований у бік Європейської інтеграції, зокрема світового і Європейського освітнього простору, що призвело до модернізації стандарту вищої медичної освіти та робочих програм і навчальних планів, зокрема це стосується й фармакологічної підготовки майбутніх лікарів.*

Практичне значення дослідження. *В умовах зростання кількості матеріалу для вивчення та зменшення годин для аудиторної підготовки потрібно запроваджувати ефективні методи навчання, постійно підвищували педагогічну майстерність та активізувати самостійну роботу студентів через освітню платформу E-Aristo. Ці матеріали містять презентації, аудіо та відеоматеріали та включають матеріали для навчання та контролю знань.*

Висновки. *Викладачі з фармакології повинен мати глибокі теоретичні знання, розуміння предмета та мати практичний і педагогічний досвід, який повинен поєднуватись з ґрунтовними педагогічними знаннями та навичками. Це вочевидь зробить фармакологічну підготовку майбутніх лікарів цікавою та захоплюючою, за рахунок запровадження новітніх методів навчання.*

Перспективи подальших наукових розвідок. *У подальшому планується розглянути удосконалення методичних підходів, що забезпечать покращення самостійної роботи здобувачів освіти.*

Ключові слова*: фармакологічна підготовка, модернізація вищої медичної освіти, європейський освітній простір (ЄОП), робочі програми, навчальні програми, клас, незалежна робота.*