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EXPERIENCE OF TEACHING PHARMACOLOGY IN TRAINING OF FUTURE DENTISTS IN DISTANCE LEARNING CONDITIONS WITH FORMATION OF HEALTHY LIFESTYLE**O.H. Kmet, N.D. Filipets, T.I. Kmet, I.Yu. Oliinyk, K.V. Slobodian, G.M. Prodanchuk***Bukovinian State Medical University, Chernivtsi, Ukraine***Key words:** pharmacology, analgesics, methodological material.*Bukovinian Medical Herald.*
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Abstract. Ensuring quality higher education in Ukraine is a key moment for further existence of national educational space. Continuous social, economic, and political changes occurring in contemporary life of Ukrainians stipulate the development of socially dangerous phenomena in our society. Pandemics caused by COVID-19 in the world and Ukraine as well promoted a number of changes in the system of educational services in general and in medical education in particular. Unfortunately, more serious problem contributes to the situation – the beginning of full-scale military aggression by the Russian Federation against Ukraine in February 2022. The need to create safe learning conditions for participants of the educational process has become of great priority. All the above facts stipulated transition to distance learning at educational institutions.

In distance learning conditions, it is important to use various methods of teaching in order to involve students effectively. It can include virtual lectures, interactive online modules, discussion forums and practical thematic research. Involvement of practical examples and scenarios from real life can help students better understand value of Pharmacology for their further dental practice.

Objective of the research is to demonstrate our own experience of teaching Pharmacology in training future dentists in distance learning conditions with formation of a healthy lifestyle on the example of learning the topic “Analgesics”.

Results. When it concerns promoting a healthy lifestyle among future dentists, awareness of students in the issues of Pharmacodynamics and Pharmacokinetics of analgesics and their side effects will help in the formation of healthy lifestyle among young people, which is an essential part of the future of any country. Understanding the value of “old medicines” as prototypes of modern mono- and poly-component medical agents, explaining the results of one’s own scientific studies on establishing pharmacotherapeutic effects of new compounds, or extending the spectrum of action of known medicine, make up the basis for acquiring knowledge in Pharmacology and formation further clinical thinking at the present stage of education.

Conclusions. The article presents our own experience of teaching Pharmacology in training dentists in distance learning conditions with the formation of their healthy lifestyle. Current distance learning technologies using up-to-date digital platforms, high quality contents of educational resources, implementation of an effective system in testing the knowledge obtained enable to adapt to modern realities of the educational process.

ДОСВІД ВИКЛАДАННЯ «ФАРМАКОЛОГІЇ» ПРИ ПІДГОТОВЦІ МАЙБУТНІХ СТОМАТОЛОГІВ В УМОВАХ ДИСТАНЦІЙНОГО НАВЧАННЯ З ФОРМУВАННЯМ ЗДОРОВОГО СПОСОБУ ЖИТТЯ**О.Г. Кметь, Н.Д. Філіпєць, Т.І. Кметь, І.Ю. Олійник, К.В. Слободян, Г.М. Проданчук****Ключові слова:**
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Анотація. Забезпечення якісної вищої освіти в Україні є ключовим моментом для подальшого існування національного освітнього простору. Соціальні, економічні та політичні зміни, які постійно відбуваються в сучасному житті українців, зумовлюють розвиток соціально-небезпечних явищ у нашому суспільстві. Пандемія, викликана COVID-19 у світі та Україні, зумовила низку змін у системі надання освітніх послуг загалом і в медичній освіті зокрема. На жаль, до цієї проблеми доєдналась ще серйозніша – початок повномасштабної військової агресії російської федерації проти України 24 лютого 2022 р. Передусім постала необхідність створення безпечних умов навчання учасників освітнього процесу. Вище вказані факти зумовили перехід на дистанційну

форму навчання в закладах освіти.

В умовах дистанційного навчання важливо використовувати різноманітні методи навчання, щоб ефективно залучати студентів. Це може включати віртуальні лекції, інтерактивні онлайн-модулі, дискусійні форуми та практичні тематичні дослідження. Включення практичних прикладів і сценаріїв з реального життя може допомогти студентам краще зрозуміти актуальність фармакології для їхньої майбутньої стоматологічної практики.

Мета роботи – показати свій досвід викладання «Фармакології» при підготовці майбутніх стоматологів в умовах дистанційного навчання з формуванням здорового способу життя на прикладі вивчення студентами теми «Анальгетики».

Результати. Коли йдеться про пропаганду здорового способу життя серед майбутніх стоматологів, обізнаність студентів у питаннях фармакодинаміки та фармакокінетики анальгетиків, їхніх побічних дій, сприятиме формуванню здорового способу життя серед молоді, що є необхідною складовою майбутнього нашої держави. Оскільки розуміння значення «старих препаратів» як прототипів сучасних моно- та полікомпонентних лікарських засобів, висвітлення результатів власних наукових досліджень, щодо встановлення фармакотерапевтичних ефектів нових сполук чи розширення спектра дії відомих препаратів, є підґрунтям для набуття знань із фармакології та формування подальшого клінічного мислення на сучасному етапі навчання.

Висновки. У статті висвітлено досвід викладання «Фармакології» при підготовці студентів-стоматологів в умовах дистанційного навчання з формуванням здорового способу життя. Існуючі на сьогоднішній день технології дистанційного навчання з використанням сучасних цифрових платформ, якісного контентного наповнення освітніх ресурсів, запровадження ефективної системи контролю якості отриманих знань дають можливість адаптуватися до сучасних реалій освітнього процесу.

Introduction. Continuous social, economic, and political changes occurring in contemporary life of Ukrainians stipulate the development of socially dangerous phenomena in our society. These changes predetermine the necessity to speed up reform in the sphere of medical education. Ensuring quality higher education in Ukraine is a key moment for further existence of national educational space [1]. At the same time, the lack of highly qualified specialists including medical ones in Ukraine and other European countries promotes the growth in popularity of the profession. On the other hand, effective training and improvement of professional knowledge will ensure timely qualified aid in today's realities, which will save the life of many people and high compatibility in modern labor market [2]. Pandemics caused by COVID-19 in the world and Ukraine as well promoted a number of changes in the system of educational services in general and in medical education in particular. Unfortunately, more serious problem contributes to the situation – the beginning of full-scale military aggression by the Russian Federation against Ukraine in February 2022 [3, 4]. The need to create safe learning conditions for participants of the educational process has become of great priority. All the above facts stipulated transition to distance learning at educational institutions.

As reported by information and analytical portal, distance learning is a form of study using computer and telecommunication technologies providing interaction between teachers and students at various levels of teaching/learning and self-study of the materials taken

from the information network without personal contacts between teachers and learners. On the one hand, this is quite positive, but there are certain negative aspects. Strong motivation is required first. Second, practical skills and abilities are lacking. One more downside of distance learning is decreased development of communication skills, lack of personal contact between students and teachers, lowered self-confidence and insufficient physical activity.

Therefore, **objective** of our research is to demonstrate our own experience of teaching Pharmacology in training future dentists in distance learning conditions with formation of a healthy lifestyle on the example of learning the topic "Analgesics".

The main part. In the conditions of martial law in Ukraine, the need to determine the optimal combination of safety and quality of educational service provided has become relevant. Today, Bukovinian State Medical University provides the possibility to continue educational process based on certain previous achievements and experience and a general idea as to organize educational process under martial law. Nevertheless, a tendency of deterioration of the population health, especially among young people, remains unfavorable both in peacetime and especially in wartime. The future of the state depends on the health of a young generation and students in particular.

Unfortunately, statistics estimates 170 drug addicts for every 100,000 inhabitants of our country; 70% of drug users are young people aged 15 to 27 [5]. Factors that influence the initiation of drug use among young people are

diverse. They can be divided into the three groups: biological (genes, sex, ethnic background, concomitant diseases available, etc.); social (surroundings, family relations, friends, economic status, general level of well-being), and evolutionary. Since interrelations between genetic and environmental factors are of a certain role but they are not 100% start to addiction development. Interaction with critical stages in human life is a key moment and a risk factor initiating drug addiction. Unfortunately, drug use can result in addiction at any age. Teenagers and young people remain especially susceptible.

In this respect, the teachers of the Department of Pharmacology, Bukovinian State Medical University, during practical classes and lectures in addition to the topic of the lesson try to pay attention on the formation of a healthy lifestyle of students. Teaching at the Department of Pharmacology is carried out within the framework of an approved curriculum at Bukovinian State Medical University on specialty 221 «Dentistry», area of knowledge 22 «Health Care». It is presented in a working program and syllabus of a compulsory subject “Pharmacology” considering the principles of academic mobility of learners as subjects of the educational process and meeting their needs of learning in the Ukrainian language. Thus, while studying the topic “Analgesics”, students learn about opiate and non-opiate agents, their pharmacokinetic and pharmacodynamics properties.

The preparatory stage of a practical class, the teacher informs about relevance of the topic. For example, anatomical and functional features of the jaws and face in dentistry create preconditions for occurrence of severe pain when injured. In surgical dentistry, pain syndromes are provoked by injuries and inflammation of teeth, bones and facial soft tissues, as well as neoplasms, surgery etc. Ache occurring after planned or urgent surgery is rather severe. Significant pain sensations in the jaws accompany acute odontogenic osteomyelitis, periostitis, a complicated tooth extraction, injuries of the soft tissues, abscess, and phlegmon. Ache complicates the course of the disease, increases functional load on all the vital body systems, deteriorates general patient's condition, and is able to promote the development of depression.

Non-narcotic analgesics are undoubtedly the first-line drugs in the treatment of pain in dental practice. However, in critical situations a dentist has to administer narcotic painkillers. At the same time, the teachers of Pharmacology admit that unfortunately these medicines often may be used as substances resulting in special condition – euphoria, bliss (a state of false joy, rosy but unfounded dreams accompanied by a muffled sense of responsibility). They cause increased, excessive activity, mental and motor excitement. Attention of the students is focused on the fact that drug addiction is a mental disease of people who were not able “to stop” in time.

When the topic “Analgesics” is studied offline, the teachers demonstrate visual aids, medicines in original packages with instructions to them containing warnings, indications and contraindications for use. In distance learning, the students may prepare information about pharmacodynamics and pharmacokinetic properties of

medicines, possible forms of drug release, their availability at Ukrainian pharmaceutical market, and international trade name. After presenting their reports, students are supposed to discuss the issue together. They take an active part in discussions, are encouraged to model situational tasks with virtual patients, their response to administration of different drugs. This format of the lesson contributes to the effective assimilation and extending of knowledge of new material.

During the main part of the lesson, the issues of classification, mechanisms of drug action, their pharmacokinetics, the indications for use, side effects and possible warnings are discussed. Attention is paid to the fact that non-narcotic analgesics eliminating painful sensations caused by an inflammatory process are less effective than opioids indicated in case of traumatic injuries. In comparison with opioids, non-narcotic analgesics possess relatively good tolerance, do not influence the respiratory center, and do not cause the development of pharmacological dependence.

Special emphasis is placed on the mechanism of action of non-narcotic analgesics, which is associated with the synthesis of prostaglandins. It is known that when tissues are damaged or irritated, arachidonic acid is released from the phospholipids of cell membranes under the influence of phospholipases, from which endoperoxides are formed with the participation of cyclooxygenases. The latter, in turn, form eicosanoids: prostaglandins, thromboxanes, leukotriene, etc. The synthesis of prostaglandins is catalyzed by prostaglandin synthetase enzymes. Accordingly, prostaglandins can act as mediators of the inflammatory reaction. In addition, they reduce the threshold of excitability of nerve endings to mechanical and chemical stimuli. The release of prostaglandins in the central nervous system can reduce the threshold of excitability in the pain conduction system.

In turn, non-narcotic analgesics, by inhibiting the activity of cyclooxygenases, reduce the synthesis of prostaglandins in peripheral tissues and in the central nervous system. At the same time, the sensitivity of nerve endings decreases and the processes of transmission of nociceptive impulses at the level of the structures of the central nervous system are inhibited. The analgesic effect of narcotic analgesics is partly associated with their anti-inflammatory activity, because, by reducing tissue swelling in the focus of inflammation, they weaken the mechanical compression of nociceptors in it.

Students are drawn to the fact that a decrease in body temperature under the influence of non-narcotic analgesics is observed only when it increases. By inhibiting the activity of cyclooxygenases, the drugs reduce the hyperproduction of prostaglandin, eliminating its stimulating effect on the hypothalamic centers of thermoregulation. As a result, body temperature decreases, mainly due to increased heat loss. At the same time, skin vessels dilate due to a decrease in the activity of the central structures that regulate their tone. At the same time, sweat secretion increases, the evaporation of which also contributes to heat loss. We emphasize that it is irrational to lower the temperature below 38 °C, since with fever the

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production of endogenous interferon (one of the factors of antiviral protection) increases, and the phagocytic activity of leukocytes increases.

Of course, it is necessary to remember about the possible side effects of non-narcotic analgesics. Among them, in the first place is the ulcerogenic effect - dyspepsia, erosions and ulcers of the stomach, intestinal damage. In addition, hepatotoxicity, nephrotoxicity, hemotoxicity and neurological disorders in the form of headache, dizziness are possible.

Special attention is paid to clinical signs and treatment of acute and chronic morphine poisoning, and development of morphinism. Numerous evidences are demonstrated during lectures and practical classes concerning side effects of analgesics. Special attention is paid to scientific facts indicating the necessity to get rid of a benevolent attitude towards taking narcotic substances. The teachers focus on a direct effect of narcotic substances on the child organism born to a drug addict woman. Unfortunately, a baby, born to such mother from the very first hours of life, manifests signs of drug addiction including cramps, cry or other signs specific for adult drug addicts in withdrawal state. Such babies are often born with physical defects of physical deviations, retarded mental development, and even pronounced dementia. Such newborns are often non-viable.

During distance learning, in order to master the material better and develop professional competence of students, distribution of them into different groups in so-called virtual rooms is an effective method of teaching. They can independently discuss group tasks and solve clinical situations concerning treatment of patients.

With the aim to regular control students' success and plan the events on improving their performance, methodological meetings are held at the Department of Pharmacology regularly. The teachers discuss results of the students' performance in academic groups, the presence of

students who are lagging behind and their reasons. To improve the results of study, at the Department of Pharmacology the educational process combines acquiring theoretical knowledge with ability to realize it in practice. For this purpose, in addition to oral asking theoretical material individual tests are widely used. They include questions on modern nomenclature (classification) of pharmacological agents; tests from the data base of the licensed exam "KROK 1"; situational tasks for choosing medicines of urgent aid and for a course treatment; writing prescriptions on officinal and magistral forms of medicines. When students' answers are discussed, attention is paid to possible interchangeability of drugs in clinical situations confirming the mechanisms of their action and side effects.

Comprehensive learning of pharmacokinetics, pharmacodynamics, understanding of the value of "old drugs" as prototypes of current mono- and poly-component pharmacological agents is important. Explaining the results of one's own scientific studies on establishing pharmacotherapeutic effects of new compounds, or extending the spectrum of action of known medicine make up the basis for acquiring knowledge in Pharmacology and formation further clinical thinking at the present stage of education.

Conclusions. Thus, quarantine and war are not obstacle to learning. On the contrary, it is one of the motivation aspects. Irrespective the situation, to give and to get knowledge by medical students is extremely important. Implementation of distance learning at Bukovinian State Medical University is effective and well organized. The experience and achievements of the University teachers and programmers have ensured ability to adapt to new conditions of giving educational services easily. It has created necessary conditions for the students in order to obtain quality and deep knowledge in the field of Pharmacology.

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