National Pirogov Memorial Medical University, Vinnytsya

APPROVE
Higher Educational Institution
Vice-Rector for Scientific and
Academic Work and International Links

_____ Inna ANDRUSHKO
"30" 08 2024

AGREED
Head of clinical pharmacy and
clinical pharmacology department

_____ Sviatoslav SEMENENKO
"30" 08 2024

SYLLABUS
of academic discipline

CLINICAL PHARMACOLOGY IN CARDIOLOGY

Specialty	222 Medicine
Educational level	the second (master's) level
Educational programme	EPP Medicine, 2023
Academic year	2024-2025
Department	*Clinical pharmacy and clinical pharmacology*
Contact information	*clinpharm@vnmu.edu.ua, Pyrogov's str. 56*
Syllabus compiler	Ass-prof. Nina Konovalova

1. Status and structure of the discipline

Discipline status	Compulsory
Discipline code in EPP/discipline place in EPP	OC6.2, discspline of professional training
Course / semester	*6-th year (XII semesters)*
The amount o fdiscipline (the total number of hours /number of credits ECTS)	60 hours / 2,0 credit ECTS
Number of content modules	1 module
The structure of the discipline	Practical classes 25 hours Independent work 35 hours In general: auditory classes – 41,7%, independent work - 58,3%
Language of study	English
Form of study	Full-time (*or remote full-time by order*)

2. Description of the discipline

Short annotation of the course, relevance.

The program of study of the discipline "Clinical Pharmacology in cardiology" is made according to the order of preparation of applicants of the second (master) level of education in higher medical educational institutions of Ukraine according to requirements of the credit transfer system of the organization of educational process ECTS, the approximate curriculum of training of specialists higher education in the field of knowledge 22 "Health care" specialty "Medicine".

The discipline is an optional component of the educational and professional program " Medicine", the cycle of professional training of the Master of Medicine, designed for 2.0 credits, which students learn during the XII semesters in the 6th year of study.

The main focus of the program is to study the group affiliation of drugs, their main mechanisms of action, features of their pharmacokinetics, pharmacodynamics, manifestations of side effects and symptoms of overdose, the main indications for use and interaction with other drugs.

Knowledge of clinical pharmacology is based on both experimental data and theoretical positions of pharmacology and other medical and biological sciences and on the actual material of clinical disciplines. The student must be able to develop strategies and tactics for the treatment of the disease in a particular patient and to exercise dynamic control over the effectiveness and safety of drug therapy.

The teaching of clinical pharmacology is the most optimal on clinical therapeutic bases, taking into the account the etiology of the disease, the main pathogenetic mechanisms of its formation, the clinical picture, the relevant drugs with their comparative analysis and selection.

The main task in teaching the subject should be to train a specialist with sufficient theoretical knowledge and practical skills to conduct the most rational drug therapy in a particular patient who has a methodology for individual selection of effective and safe drugs based on pharmacokinetics, pharmacodynamics, possible side effects, features, age of the patient, optimal dosage forms, compilation of rational combinations of drugs.

Prerequisites. For successful mastering of discipline, the student needs the knowledge received in the course of studying of the following disciplines of the general preparation:

Latin, ethics, philosophy, ecology, medical biology, medical chemistry, biological and bioorganic chemistry, biophysics, human anatomy, pathological anatomy, physiology, pathological physiology, microbiology, pharmacology.

The purpose of teaching the discipline "Clinical Pharmacology in cardiology" is to train specialists who have sufficient theoretical knowledge and practical skills to conduct the most rational drug therapy in a particular patient, have a methodology for selecting the most effective and safe drugs and their combinations, taking into the account individual characteristics, the course and form of the disease, the presence of concomitant pathology, based on evidence-based medicine.

Postrequisites. As a training discipline "Clinical Pharmacology in cardiology" lays the foundations for the formation of ideas and skills to apply the general principles of drug therapy of major diseases, syndromes and their individual manifestations in therapy, surgery, obstetrics, gynecology and anesthesiology.

3. Learning outcomes.

After successful study of the discipline the applicant will be able to:

- Prescribe and analyze prescriptions for drugs in various dosage forms in accordance with modern legislation of Ukraine;
- To determine the group affiliation of drugs according to modern classifications;
- Provide pharmacological and pharmacotherapeutic characteristics of drugs, logically link the mechanism of action with pharmacodynamics, pharmacodynamics with indications, and side effects with contraindications to their use;
- Calculate a single dose of the drug depending on age, body weight or body surface area of the patient;
- Determine, depending on the pharmacokinetics of drugs, the frequency of drug administration, its daily, course dose in patients of different ages in accordance with comorbidities and the use of other drugs;
- Justify the adequate dosage form in accordance with the routes of administration
- Predict the consequences of the interaction of drugs in their combined administration, drugs and food components, drugs and alcohol;
- Assess the benefit / risk ratio of drugs;
- Make judgments about the possibility of adverse reactions to drugs in order to prevent them;
- To determine the manifestations of possible side effects of drugs, symptoms of overdose of potent and poisonous drugs, methods of their prevention and principles of treatment;
- To create an algorithm to help patients with acute drug poisoning with the use of antidotes in each case;
- Analyze pharmacological information in modern directories, scientific and professional periodicals;
- Provide a comparative description of drugs in terms of efficacy, safety, mechanism of action, indications for use, etc.;
- Provide rational pharmacotherapeutic care for the most common emergencies found in the clinic of internal medicine.

4. Content and logistic of the discipline

Content module 1 **Clinical pharmacology in cardiology**	XII semester 60 hours	Practical classes № 1-5

The course includes 4 topics, which are divided into 1 thematic module.

Module 1. Clinical pharmacology in cardiology

Topic 1. Clinical pharmacology of drugs for the treatment of coronary heart disease. General principles of pharmacotherapy of stable angina pectoris. Clinical pharmacology of antianginal drugs: nitrates (short and long-acting), beta-blockers, calcium channel blockers. Clinical pharmacology of drugs of other groups (ivabradine, nicorandil, ranolazine, trimetazidine) and their role in the treatment of CAD. Modern approaches to pharmacotherapy of hyperlipidemias. Clinical pharmacology of lipid-lowering agents: statins, ezetimibe, fibrates, ion exchange resins, PCSK9 inhibitors.

Topic2. Clinical pharmacology of drugs for treatment of hypertension and secondary arterial hypertension. General principles of pharmacotherapy of hypertension disease and secondary arterial hypertension. Strategy of antihypertensive therapy. Clinical pharmacology of basic antihypertensive drugs (ACE inhibitors and ARBs, diuretics, blockers calcium channels, beta blockers) and second-line drugs (alpha-blockers, direct renin inhibitors, imidazoline blockers receptors, centrally acting drugs). Clinical pharmacology of antihypertensive agents for emergency treatment of hypertensive crises.

Topic3-4. Clinical pharmacology of drugs for the treatment of arrhythmia. General principles of pharmacotherapy of atrial fibrillation, supraventricular and ventricular tachycardia, extrasystolic arrhythmia. AAP classification according to Vaughan Williams. Clinical pharmacology of APP classes I-IV, cardiac glycosides, adenosine, ivabradine, potassium and magnesium preparations. The role of AAP in the treatment of heart rhythm disorders according to clinical studies and modern recommendations. Clinical pharmacology of anticoagulants and antiplatelets, fibrinolytics in cardiology

Topic5. Clinical pharmacology of drugs for the treatment of heart failure General principles of pharmacotherapy of chronic heart failure. Clinical pharmacology of ACE inhibitors, angiotensin receptor blockers, cardiac glycosides, diuretics of various groups in the treatment of CHF. New drugs in the treatment of CHF: sodium-dependent glucose co-transporter type 2 inhibitors, angiotensin/neprilysin receptor inhibitors. Control of the effectiveness and safety of drug use.

Practical classes provide a theoretical justification of the main issues of the topic and the acquisition of the following practical skills:

1) analysis of prescriptions for drugs in various dosage forms in accordance with modern legislation of Ukraine;
2) determination of group of drugs according to modern classifications;
3) providing pharmacological and pharmacotherapeutic characteristics of drugs, logically link the mechanism of action with pharmacodynamics, pharmacodynamics with indications, and side effects with contraindications to their use;
4) independently calculate a single dose of the drug depending on age, body weight or body surface area of the patient;
5) determination, depending on the pharmacokinetics of drugs, the frequency of drug intake, its daily, course dose in patients of different ages in accordance with comorbidities and the use of other drugs;

6) forecasting the consequences of the interaction of drugs in their combined administration, drugs and food components, drugs and alcohol;
7) determination of manifestations of possible side effects of drugs, symptoms of overdose of potent and poisonous drugs, methods of their prevention and principles of treatment;
8) creation of an algorithm to help patients with acute drug poisoning with the use of antidotes in each case;
9) independently decide on the appointment of drugs, taking into the account the pharmacokinetics, pharmacodynamics and interaction of drugs.
In practical classes, students solve clinically-oriented situational problems and test tasks.
Independent work of students involves preparation for practical classes and final control. The control of students' independent work is carried out during the current control of the topic in the relevant classroom.
Thematic plans of lectures, calendar plans of practical classes, volume and directions of individual work are published on the website of the department.
The route for obtaining materials: Department of Clinical Pharmacy and Clinical Pharmacology / Student / Full-time / Medicine / 6th year / Educational and methodical materials / or by the link https://www.vnmu.edu.ua/ Department of Clinical Pharmacy and Clinical Pharmacology #. Access to materials is provided from the student's corporate account s000XXX@vnmu.edu.ua.

5. Forms and methods of monitoring academic performance

Currentcontrol in practical studies	Methods: oral or written survey, testing, electronic survey, solving situational problems.
Final control of the discipline - credit	Methods: testing, oral questioning (according to the Regulation of the Academic processin VNMU named after M.I. Pirogov (linkhttps://www.vnmu.edu.ua/General information)
Learning success diagnostic tools	Theoretical questions, tests, clinically-oriented situational tasks.

6. Assessment criteria

Knowledge assessment is carried out in accordance with the Regulations of the Academic processinVNMU named after M.I. Pirogov (linkhttps://www.vnmu.edu.ua/General information)

Continuous assessment	On a four point system of traditional assessments: 5 «excellent», 4 «good»,3 «satisfactory», 2 «unsatisfactory»
Discipline assessments:	Current academi cassessment - from 72 to 122 points (conversion of the average traditional assessment of practical class on a 120-point scale): 60% of the grade for the discipline Final control - from 50 to 80 points: 40% of the grade for the discipline Individual work - from 1 to 12 points From 122 to 200 points in total.

Discipline Score Scale: National and ECTS

The sum of grades for all types of educational activities	ScoreECTS	Score on a national scale	
		For exam, course project (work), practice	for credit test
180-200	**A**	excellent	credited
170-179,9	**B**	good	
160-169,9	**C**		
141-159,9	**D**	satisfactory	
122-140,99	**E**	satisfactory	credited
121-61	**FX**	unsatisfactory with the possibility of reassembly	is not credited with the possibility of reassembling
1-60	**F**	unsatisfactory with a mandatory reexamination of discipline	is not credited with mandatory reexamination of discipline

Criteria for student knowledge assessment

Evaluation of the oral / written answer during the current control

The grade **"excellent"** is given to a student who knowsthe features of the mechanism of action, classification, pharmacokinetics, pharmacodynamics, side effects, interaction of different groups of drugs. Methods of their appointment, methods for assessing the effectiveness of action, duration of action of drugs. The choice of drugs taking into account the above criteria and the functional state of the body, sex, age of the patient. Rational combinations of therapy. Prevention and measures of immediate therapy in case of complications from treatment. The answers must be deep, meaningful and specific. The student correctly, clearly, logically and fully answers all standardized questions of the current topic, is able to summarize the material.

The grade **"good"** is given to a student who knows the features of the mechanism of action, classification, pharmacokinetics, pharmacodynamics, side effects, interaction of different groups of drugs. Methods of their appointment, methods of evaluating the effectiveness of action. The choice of drugs taking into account the above criteria and the functional state of the body, sex, age of the patient. Prevention and measures of immediate therapy in case of complications from treatment. The answers are quite meaningful and specific. The student correctly and essentially answers the standardized questions of the current topic. Has the necessary practical skills and abilities in excess of the required minimum.

A grade "**satisfactory"** is given to a student who knows a mandatory minimum of theoretical knowledge and practical skills - to know the representatives of groups of drugs, features of pharmacokinetics, pharmacodynamics, side effects of drugs, methods of administration. The answers are incomplete, the knowledge is superficial.

The grade **"unsatisfactory"** is given to a student who does not have minimum knowledge of drug toxicology, does not focus on pharmacokinetics, pharmacodynamics, side effects of drugs, the peculiarities of their interaction, methods of monitoring therapy and measures for immediate care in case of complications. The answers are vague, incorrect, or completely absent.

Evaluation of test tasks during the current control

The grade **"excellent"** is given to the student who at carrying out test control is allowed no more than 10% of incorrect answers (volume of correct answers 90-100%).

A grade of **"good"** is given to a student who makes no more than 20% of mistakes during the test (the amount of correct answers is 80-89%).

A grade of **"satisfactory"** is given to a student who makes mistakes in no more than 30% of test tasks (the amount of correct answers is 70.5-79%).

A grade of **"unsatisfactory"** is given to a student who correctly solves less than 70% of the test tasks in a test.

Evaluation of the implementation of situational tasks during the current control

The grade **"excellent"** is given to the student freely solves situational clinically-oriented problems of increased complexity, correctly, clearly, logically and fully answers all components of the problem.

A grade of **"good"** is given to the student who is able to solve light and medium situational clinically-oriented problems, while correctly and essentially answers most questions to the problem, correctly uses theoretical knowledge in solving practical problems.

A grade of **"satisfactory"** when solving situational problems, provides correct answers to only some questions to the problem, or the answers are incomplete.

A grade of **"unsatisfactory"** when solving situational problems, he cannot provide the correct answers to the questions to the problem. The answers are vague, incorrect, or completely absent.

Assessment of independent students work

The calculation of individual points is carried out on the basis of the Regulationofthe Academic processin VNMU named afterM.I. Pyrogov (linkhttps://www.vnmu.edu.ua/General information).

12 points are reserved for the ISW assessment, which are accrued as follows:

12 points - added to the assessment of the discipline for a student who won a prize at the interuniversity competitions in the discipline or a prize at the Ukrainian competition of student research reports or a prize at the interuniversity / international scientific conference with the published work;

11-10 points - are added for prizes at intra-university competitions and student scientific conferences with the published work.

10 points - are added to the assessment of the discipline for participation (if the student participated but did not receive a prize) in interuniversity competitions in the discipline and interuniversity and international scientific student conferences with the published work.

8 points - are added to the assessment of the discipline for participation (if the student participated but did not receive a prize) in intra-university competitions and student scientific conferences with the availability of printed work.

6 points - are added to the assessment of the discipline for the manufacture of drugs at the departments, schemes, tables of multimedia software and videos - taking into account the importance of the work performed.

If the sum of points for ISW exceeds 12, the remaining points by the decision of the cathedral meeting can be added as a bonus points to the score on the final modul control.

Students' independent work on a topic that is included in the thematic plan is assessed during the current control of the topic in the relevant lesson.

7.Policy of discipline / course

The student has the right to receive high-quality educational services, access to contemporary scientific and educational information, qualified tutoring during the study of discipline and mastering practical skills. The policy of the department during the providing of educational services is a student-centered, based on normative documents of the Ministry of Education and the Ministry of Health of Ukraine, the Statute of the University and the Procedure for the Providing of Educational Services regulated by the main principles of the organization of the educational process in VNMU named after M.I.Pirogov and the principles of academic integrity(linkhttps://www.vnmu.edu.ua/General information).

Adherence to the rules of VNMU, safety techniques in practical classes.

ALGORITHM OF ACTION for education applicants, scientific and pedagogical workers of National Pirogov Memorial Medical University, Vinnytsia throughout the operation of the «AIR ALARM» during working hours

Before the first class starts, teacher must explain extensively how to get to the shelter.

The shelters of the Department of Clinical Pharmacy and Clinical Pharmacology are located at the ground floor of morphological building of the VNMU, the cellar-shelter of the hostel №3, the basement-shelter of the University Clinic of the VNMU, the basement - shelters of VCCH №.3 in accordance with the base for conducting practical classes.

In case when the alarm signal sounds during the classes «AIR RAID! EVERYONE GOES TO THE NEAREST SHELTER» it is necessary to:

1. Stop the class immediately.
2. After the teacher announces: «Pack your things, quickly go to the shelter», quickly pack things and get ready to leave.
3. Make sure that there is no one left in the auditorium.
4. Turn off the light, close the door (mainly performed by the teacher).
5. Follow the last student to move to the shelter (performed by the teacher).
6. Stay at the shelter until the signal «CAUTION! ALL-CLEAR!» (two short sirens announcing same as for the sounding of the air alarm).
7. After the signal «CAUTION! ALL-CLEAR!» return to the classroom to continue the lesson.
8. If the signal «CAUTION! ALL-CLEAR!» do not occur before the end of the class, the education applicants should stay at the shelter until the signal «CAUTION! ALL-CLEAR!»
9. In case when the alarm signal « AIR RAID! EVERYONE GOES TO THE NEAREST SHELTER» sounds before the start of the class and the applicants arrive to the department base, the applicants must immediately go to the nearest shelter (QR code with a link to the map of the shelters of Vinnytsia city are sited at every public transport stop).

Requirements for preparation for practical classes.

The student must be prepared for a practical lesson, theoretically prepared for the topic.

Student should come to a class on time, without delay. A student who is more than 10 minutes late for class is not allowed to the last and must work it in the prescribed manner.

In practical classes, the student must be dressed in a medical gown.

When discussing theoretical issues, students should demonstrate tolerance, courtesy and respect for their colleagues and the teacher.

Usage of mobile phones and other electronic devices.
The use of mobile phones and other electronic devices in the classroom is allowed only during electronic testing or surveys.
Academic integrity. When studying the discipline, the student must be guided by the Code of Academic Integrity and Corporate Ethics of VNMU named after M.I. Pirogov (link :https://www.vnmu.edu.ua/General information)/ Code of Academic Integrity). In case of violation of the norms of academic integrity during the current and final controls student receives a grade of "2" and must work it out to his teacher in the prescribed manner within two weeks after receiving an unsatisfactory assessment).
Missed classes. Missed classes are working out in the manner prescribed by Regulationsofthe Academic processin VNMU named afterM.I. Pirogov (linkhttps://www.vnmu.edu.ua/General information) at the time of work out schedule (published on the website of the department https://www.vnmu.edu.ua/ Department of Microbiology #) to the teacher on duty. To work out missed lesson student must provide a completed workbook protocol on the relevant topic, take a test and answer questions in writing or orally to the topic of the lesson.The reworking of missed lectures is carried out after providing a thesis of lecture material, or writing an abstract, or preparing own presentation on the topic of missed lecture.
The procedure for admission to the discipline final control is given in the Regulationofthe Academic processin VNMU named afterM.I. Pyrogov (linkhttps://www.vnmu.edu.ua/General information). Students who do not have missed practical classes and lectures and received an average traditional grade of at least "3" are allowed to final control.
Additional points. Individual points in the discipline that student can receive for individual work, is determined by the results of his individual work according to Regulationofthe Academic processin VNMU named afterM.I. Pyrogov (linkhttps://www.vnmu.edu.ua/General information) and policy of the course.
Conflict resolution. In case of misunderstandings and complaints to the teacher because of the quality of educational services, knowledge assessment and other conflict situations,student should submit his / her claims to the teacher. If the issue is not resolved, the student has a right to apply to the head of the department according to Complaints Consideration Procedure (https://www.vnmu.edu.ua/ General information / Basic documents).
Politics in terms of remote learning. Distance learning regulated by the Regulations of the elements of remote learning in VNMU named after Pirogov M.I. (https://www.vnmu.edu.ua/ General information). The main training platforms for studying are Microsoft Team and Google Meets. Practical classes and lectures, exercises and consultations during distance learning is published on the website of the department (https://www.vnmu.edu.ua/ Department of Clinical Pharmacy and Clinical Pharmacology/Student or https://www.vnmu.edu.ua/Department of of Clinical Pharmacy and Clinical Pharmacology / News).
Feedback from teachers is via messengers (Viber, Telegram, WhatsApp) or e-mail (at the teacher's choice) during working hours.

8. Educational resources.

Educationalandmethodologicalsupportofthedisciplineispublishedonthewebsiteofthedepartment (https://www.vnmu.edu.ua/Department of Clinical Pharmacy and Clinical Pharmacology/Tostudents).

Recommended base reading:

1. Bobyrov V. Pharmacology : textbook / V.Bobyrov, T.Devyatkina, O.Vazhnicha, V.Khristyuk. - 3rd ml ., updated - Vinnitsya : Nova Knyha, 2015. -520 p.: il.
2. Brunton L.L., Chabner B.A., Knollmann B.C. Goodman and Gilman's The Pharmacological Basis of Therapeutics (13-th Edition).-2017. 1423p.
3. Essentials of medical pharmacology / edited by Tripathi KD. - 6th edition. – New Delhi, 2010. – 940 p.
4. Katzung B.G. Basic & Clinical Pharmacology. Fourteenth Edition. 2018. 1247p.
5. H. Lüllmann, A. Ziegler et al. Color Atlas of Pharmacology.-2000.-662 p.
6. Pharmacology - Cito!: Textbook *II* Edited by S.M. Drogovoz. - Kharkiv, 2016. -192 p.

Recommended additional reading:

1. Pharmacology at your palms: reference book / Drogovoz S.M., Kutsenko T.A. - Kharkiv: Nphall, 2016 -80 p.

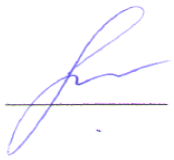
Electronic resources:

1. Deartment website – http://vnmu.edu.ua/
2. Libraire website - http://library.vsmu.edu.ua/
3. State Register of Medicines www.moz.gov.ua
4. Unified patient management protocols www.moz.gov.ua
5. Australian Bulletin of Adverse Reactions http://www.tga.health.gov.au/adr/aadrb.htm.
6. British Monthly Drug Safety Bulletin http://www.mhra.gov.uk/Publications/Safetyguidance/DrugSafetyUpdate/index.htm.
7. Lectures for postgraduate education "Principles of Clinical Pharmacology" of the Clinical Center of the National Institutes of Health. http://www.cc.nih.gov/researchers/training/principles.shtml.
8. Interregional Society of Evidence-Based Medicine: http://www.osdm.org/index.php
9. Bulletin of evidence-based medicine: http://www.evidence-update.ru
10. European Society of Clinical Pharmacologists and Pharmacotherapists: http://www.eacpt.org
11. Resource on pharmacogenetics http://www.pharmgkb.org/.
12. On-line registration of adverse drug reactions on the FDA website. https://www.accessdata.fda.gov/scripts/medwatch/medwatch-online.htm.
13. Resource for drug interaction: http://medicine.iupui.edu/flockart/
14. Working group on pharmacotherapy of the European Society of Cardiology https://www.escardio.org/.

Consultations are held onve a week according to the consultation schedule.

9. The timetable and distribution of groups with assigned teachers are published on the webpage of the department (https://www.vnmu.edu.ua/ Clinical pharmacy and clinical pharmacology department/ For students).

The syllabus of the discipline «Clinical pharmacology in cardiology» was discussed and approved at the meeting of the clinical pharmacy and clinical pharmacology department (record № 1, dated 28.08.2024)

Responsible for academic discipline  ass. prof. of HEI Nina KONOVALOVA

Head of the department  ass. prof. of HEI Sviatoslav SEMENENKO