MINISTRY OF HEALTH OF THE REPUBLIC OF BELARUS
Educational Institution
«BELARUSIAN STATE MEDICAL UNIVERSITY»

Контрольный экземпляр

APPROVED
by Rector of the Educational Institution «Belarusian State Medical University»
_____S.P.Rubnikovich
25.06.2026
Reg. # UD-0912-01-38/2621/edu.

CLINICAL PHARMACOLOGY, PHARMACOTHERAPY

Curriculum of the educational institution in the academic discipline for the specialty

7-07-0912-01 «Pharmacy»

2026

Curriculum is based on the educational program «Clinical Pharmacology, Pharmacotherapy», approved 25.06.2026, registration # УД-0912-01-38/2627/уч.; on the educational plan in the specialty 7-07-0912-01«Pharmacy», approved 15.04.2026, registration # 7-07-0912-01/2627/mf

COMPILERS:

I.S.Romanova, Head of the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University», PhD, Associate Professor;

V.F.Kardash, Associate Professor of the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University», PhD, Associate Professor;

I.M.Kozhanova, Professor of the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University», DSc, Associate Professor;

T.A.Chak, Associate Professor of the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University», PhD, Associate Professor

RECOMMENDED FOR APPROVAL:

by the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University»
(protocol # 17 of 16.04.2026);

by the Scientific and Methodological Council of the Educational Institution «Belarusian State Medical University»
(protocol # 10 of 25.06.2026)

EXPLANATORY NOTE

«Clinical Pharmacology, Pharmacotherapy» is an academic discipline of the «Pharmacology and Pharmacotherapy» module, containing systematized scientific knowledge on the use of drugs for the treatment for diseases of the organs and systems of the human body, considering the individual characteristics of the person, the clinical course and prognosis of diseases, as well as the clinical and pharmacological characteristics of the drugs used.

The aim of the academic discipline «Clinical Pharmacology, Pharmacotherapy» is to develop basic professional competencies for selecting the most effective and safe medications or their combinations to organize modern drug therapy for various diseases.

The objectives of the academic discipline «Clinical Pharmacology, Pharmacotherapy» are to develop students' scientific knowledge of the principles of drug therapy for the most common diseases and their individual manifestations; the principles of selecting effective and safe medications, taking into account the characteristics of their pharmacokinetics and pharmacodynamics, possible adverse reactions and additional factors affecting treatment effectiveness; the skills and abilities necessary for the correct approach to treating diseases in each individual patient and monitoring the safety of drug therapy; skills and abilities necessary for pharmaceutical counseling of patients.

The knowledge, skills and abilities acquired in the academic discipline «Clinical Pharmacology, Pharmacotherapy» are necessary for successful mastering of the academic discipline «Pharmaceutical Care».

Studying the academic discipline «Clinical Pharmacology, Pharmacotherapy» should ensure the formation of students' extended professional competencies: choose proper over-the-counter medicines, taking into account the information provided by pharmacy visitors about the symptoms of the disease and the medications used.

As a result of studying the academic discipline «Clinical Pharmacology, Pharmacotherapy» the student should

know:

basic pharmacokinetic parameters and dosage considerations for medications for various diseases and in different patient categories;

principles of drug selection, types of drug interactions, methods for assessing efficacy and monitoring drug safety;

the main symptoms and syndromes of the most common internal organ diseases;

principles of emergency treatment in critical conditions;

be able to:

select groups of medications for the treatment of specific diseases, their optimal dosage regimen, route of administration and duration of use and predict possible adverse reactions;

master:

providing pharmaceutical counseling to patients on medication dosing and regimens;

providing first aid to patients in a pharmacy setting before the arrival of an ambulance;

methods of conducting search and information work to ensure high-quality and timely notification of healthcare workers and the public about the availability of new medications.

Total number of hours for the study of the discipline is 220 academic hours, of which 129 classroom hours and 91 hours of student independent work. Classroom hours according to the types of studies: lectures – 27 hours (including 6 hours of supervised student independent work (SSIW)), laboratory classes – 102 hours.

Form of higher education – full-time.

Intermediate assessment is carried out according to the syllabus of the specialty in the form of a credit (8th semester) and examination (9th semester).

ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

Code, name of the specialty	Semester	Total number of academic hours	Number of classroom hours				Out-of-class self-studies	Form of intermediate assessment
			Number of classroom hours	including				
				class lectures	SSIW	laboratory		
7-07-0912-01 «Pharmacy»	8	110	69	15	6	48	41	credit
	9	110	60	6	-	54	50	examination
		220	**129**	**21**	**6**	**102**	**91**	

THEMATIC PLAN

Section (topic) name	Number of class hours	
	lectures (incl. SSIW)	laboratory
1. Introduction to clinical pharmacology and pharmacotherapy. Pharmacokinetics and pharmacodynamics. Types and age-specific features of pharmacotherapy	**1,5**	**3**
2. Clinical pharmacology of drugs for the treatment of cardiovascular diseases	**3**	**12**
2.1. Clinical pharmacology of antihypertensive drugs. Pharmacotherapy of arterial hypertension	1,5	3
2.2. Clinical pharmacology of antianginal drugs	-	3
2.3. Clinical pharmacology of antiarrhythmic drugs	1,5	3
2.4. Pharmacotherapy of chronic heart failure	-	3
3. Clinical pharmacology of drugs for the treatment of gastrointestinal diseases	**3**	**9**
3.1. Clinical pharmacology of drugs for the treatment of ulcer diseases of the stomach and duodenum	1,5	3
3.2. Clinical pharmacology of drugs for the treatment of the intestine motility disorders	-	3
3.3. Pharmacotherapy of the liver, gallbladder and pancreas diseases	1,5	3
4. Clinical pharmacology of antimicrobial drugs. Pharmacotherapy of infectious and inflammatory diseases of the respiratory and urinary systems	**3**	**18**
4.1. Clinical pharmacology of antibacterial drugs affecting the synthesis of the bacterial wall	1,5	3
4.2. Clinical pharmacology of antibacterial drugs that disrupt microbial cell protein synthesis	-	3
4.3. Clinical pharmacology of antibacterial drugs that disrupt the synthesis of nucleic acids in microbial cells	-	3
4.4. Pharmacotherapy of infectious and inflammatory diseases of the respiratory and urinary systems	-	3
4.5. Clinical pharmacology of antiviral drugs. Pharmacotherapy of viral infections	1,5	3
4.6. Clinical pharmacology of antifungal and anthelmintic drugs	-	3
5. Clinical pharmacology of drugs for the treatment of **bronchial obstruction**	**3**	**6**
5.1. Clinical pharmacology of bronchodilators	1,5	3
5.2. Pharmacotherapy of broncho-obstructive syndrome	1,5	3
6. Clinical pharmacology of drugs for the treatment of the musculoskeletal system diseases	**3**	**9**
6.1. Clinical pharmacology of disease-modifying and nonsteroidal anti-inflammatory drugs	1,5	3
6.2. Clinical pharmacology of chondroprotectors. Pharmacotherapy of metabolic and age-related joint diseases	-	3

Section (topic) name	Number of class hours	
	lectures (incl. SSIW)	laboratory
6.3. Clinical pharmacology of analgesics. Pharmacotherapy of chronic pain syndrome	1,5	3
7. Clinical pharmacology of antiallergic and immunotropic drugs	**1,5**	**3**
8. Clinical pharmacology of drugs for the treatment of vascular diseases	**-**	**9**
8.1. Clinical pharmacology of drugs that improve cerebral blood flow and stimulate neurometabolic processes	-	3
8.2. Clinical pharmacology of drugs for the migraine treatment	-	3
8.3. Pharmacotherapy of chronic venous insufficiency	-	3
9. Clinical pharmacology of drugs for the treatment of blood diseases and correction of hemostatic disorders	**1,5**	**9**
9.1. Clinical pharmacology of drugs for the anemia treatment	-	3
9.2. Clinical pharmacology of drugs for the correction of hemostatic system disorders	1,5	6
10. Clinical pharmacology of drugs for the treatment of endocrine diseases	**3**	**9**
10.1. Clinical pharmacology of drugs for the treatment of diabetes mellitus	1,5	3
10.2. Pharmacotherapy of diabetes mellitus	1,5	3
10.3. Clinical pharmacology of drugs for the treatment of thyroid and adrenal diseases	-	3
11. Clinical pharmacology of lipid-lowering drugs. Pharmacotherapy of obesity	**1,5**	**3**
12. Clinical pharmacology of sedative and hypnotic drugs	**-**	**3**
13. Evidence-based medicine. Features of drug use across different age groups	**3**	**9**
13.1. Features of pharmacotherapy in pediatrics and geriatrics	-	3
13.2. Features of the drug use for somatic diseases in pregnant women	1,5	3
13.3. Fundamentals of evidence-based medicine. A formulary system. Information and advisory activities of a specialist pharmacist when dispensing medications	1,5	3
Total hours	**27**	**102**

CONTENT OF THE ACADEMIC DISCIPLINE

1. Introduction to clinical pharmacology and pharmacotherapy. Pharmacokinetics and pharmacodynamics. Types and age-specific features of pharmacotherapy

Definition of the concepts «clinical pharmacology» and «pharmacotherapy» Key parameters of pharmacokinetics. Absorption, bioavailability, distribution and biotransformation of drugs and factors influencing these processes; elimination pathways of drugs or their metabolites. Selection of dosage forms and routes of

administration to achieve pharmacotherapy goals.

Mechanism of action and types of drug action, effects with repeated administration and drug selectivity. Concept of dose and dosage regimen and breadth of therapeutic action. Drug interactions.

Goals and objectives of pharmacological therapy, its importance in implementing disease treatment and prevention programs. Key types of pharmacological therapy and their characteristics.

Specifics of pharmacotherapy in the neonatal period, childhood and old age and in women during pregnancy and breastfeeding. Characteristics of possible adverse reactions with the use of moderate and high doses of drugs, as well as the effect of drugs on the fetus.

Achievements of the Republic of Belarus in the development and production of domestically produced pharmaceuticals. Quality and accessibility of pharmaceuticals for the population of the Republic of Belarus. The contribution of domestic scientists to the development of pharmacology and clinical pharmacology in the Republic of Belarus.

2. Clinical pharmacology of drugs for the treatment of cardiovascular diseases

2.1. Clinical pharmacology of antihypertensive drugs. Pharmacotherapy of arterial hypertension

General concepts of the etiology and pathogenesis of arterial hypertension. Systems involved in the formation of blood pressure. The primary action of drugs used to control arterial hypertension. Classification of antihypertensive drugs.

Clinical pharmacology of β-blockers, calcium channel blockers, angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers: pharmacological effects, dosage regimen and pharmacokinetic parameters determining the choice of individual agents from each group. Absolute and relative contraindications, possible adverse reactions when prescribing antihypertensive drugs and the clinical significance of interactions between individual agents from each group.

Clinical pharmacology of central α2- and I1-imidazoline receptor agonists, selective I1-imidazoline receptor agonists and α1-adrenergic blockers, pharmacokinetic differences and major pharmacodynamic effects; adverse reactions and contraindications.

Clinical and pharmacological characteristics of diuretics used in the treatment of arterial hypertension. Mechanism of the hypotensive effect of diuretics. Factors determining the choice of diuretic drugs for arterial hypertension. Adverse reactions and contraindications to diuretic use.

Modern strategy for pharmacotherapy of arterial hypertension from an evidence-based perspective. Selection of a group of drugs to lower blood pressure in a specific clinical situation. Rational combination antihypertensive therapy. Emergency medical care for complicated and uncomplicated hypertensive crises (rationale for drug choice).

2.2. Clinical pharmacology of antianginal drugs

The concept of ischemic heart disease: etiologic factors, pathogenesis, clinical manifestations and outcomes. Classification of antianginal drugs.

Clinical and pharmacological characteristics of organic nitrates, indications and contraindications, dosage forms and dosage regimens, efficacy and safety and possible

adverse reactions. The concept of tolerance to organic nitrates and ways to overcome it.

The mechanism of antianginal action of β-blockers, calcium channel blockers, ivabradine, molsidomine, ranolazine and nicorandil, their role in the pharmacotherapy of ischemic heart disease, adverse reactions and contraindications.

The use of angiotensin converting enzyme inhibitors and angiotensin receptor blockers in patients with coronary heart disease. Anti-ischemic properties of trimetazidine and thiotriazoline, clinical efficacy and safety.

Combination antianginal therapy. Use of antianginal and metabolic drugs with different mechanisms of action.

Emergency medical care for an attack of angina pectoris (choice of medications and features of use).

2.3. Clinical pharmacology of antiarrhythmic drugs

Fundamentals of cardiac electrophysiology. Types of cardiac rhythm and conduction disorders and their causes. Classification of antiarrhythmic drugs (according to Vaughan-Williams).

Clinical and pharmacological characteristics of antiarrhythmic drugs of classes I-IV, their effects on conduction, contractility and refractory period. Efficacy and safety of antiarrhythmic drugs, their adverse reactions (cardiac and non-cardiac), proarrhythmic properties, contraindications and drug interactions.

Clinical and pharmacological characteristics of antiarrhythmic drugs with a different mechanism of action (digoxin, adenosine, potassium and magnesium salts). Drugs used for bradyarrhythmias, mechanism of action, effects on cardiac conduction, contraindications and adverse reactions.

Emergency medical care for patients with palpitations (diagnosis, drug selection).

2.4. Pharmacotherapy of chronic heart failure

Pathophysiological mechanisms of heart failure development. Key areas and principles of pharmacotherapy for chronic heart failure.

Classification of drugs used to treat heart failure. Clinical pharmacology of angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers and beta-blockers: their role in the treatment of chronic heart failure, individual dose selection based on baseline blood pressure and their combined use. Antagonists of neprilysin receptors (sacubitril). Possible adverse reactions with simultaneous administration of sacubitril with valsartan.

Dehydration therapy for chronic heart failure: thiazide diuretics, aldosterone antagonists and loop diuretics. Comparison of pharmacodynamic characteristics of torasemide and furosemide. The doses of diuretics most commonly used in the treatment of patients with chronic heart failure. Safety monitoring of diuretic use.

Use of cardiac glycosides (digoxin) in chronic heart failure: mechanism of action and main pharmacodynamic effects. Cardiac glycoside intoxication and factors contributing to its development. Prevention of cardiac glycoside intoxication.

Use of antiplatelet agents, oral anticoagulants and statins in the treatment of patients with chronic heart failure.

Emergency medical care for cardiac asthma (drug selection).

3. Clinical pharmacology of drugs for the treatment of gastrointestinal diseases

3.1. Clinical pharmacology of drugs for the treatment of ulcer diseases of the stomach and duodenum

The main links in the etiology and pathogenesis of gastric and duodenal ulcers, gastroesophageal reflux disease and their leading clinical symptoms.

Classification of drugs used to treat ulcer-forming gastrointestinal diseases (anticholinergics, H2 blockers, proton pump inhibitors, potassium-competitive inhibitors of hydrochloric acid secretion (vonoprazan), antacid drugs, gastrocytoprotectors, prokinetics), mechanism of action, adverse reactions and contraindications.

Clinical pharmacology of all groups of drugs for Helicobacter pylori eradication. Indications for anti-Helicobacter therapy. Recommended regimens for eradication therapy. Methods for monitoring the efficacy and safety of anti-Helicobacter therapy.

Emergency medical care for heartburn, nausea and vomiting (selection of drugs).

3.2. Clinical pharmacology of drugs for the treatment of the intestine motility disorders

Causes and diagnostic criteria for constipation and diarrhea. Etiopathogenesis of irritable bowel syndrome, Rome criteria for diagnosing the disease.

Classification and mechanism of action of laxative medications, contraindications and adverse reactions. Use of medications to normalize intestinal motility (trimebutine) in the complex treatment of chronic constipation.

Clinical and pharmacological characteristics of loperamide, diphenoxylate and smecta, administration features and adverse reactions. Clinical pharmacology of medications for normalizing intestinal motility and relieving pain: anticholinergic medications (metacin, hyoscine butylbromide), myotropic antispasmodics (papaverine, drotaverine, mebeverine hydrochloride, pinaverium bromide, otilonium bromide). Use of prebiotics, probiotics and postbiotics (metabiotics) in patients with intestinal motility disorders.

Modern principles of pharmacotherapy for irritable bowel syndrome. Selection of medications for the relief of irritable bowel syndrome symptoms depending on the predominant symptomatology. Complications of pharmacotherapy for irritable bowel syndrome.

3.3. Pharmacotherapy of the liver, gallbladder and pancreas diseases

The etiology and pathogenesis of hepatitis, alcoholic and non-alcoholic fatty liver disease, liver cirrhosis and chronic pancreatitis, their main clinical manifestations and outcomes.

Classification of drugs used to treat liver, gallbladder and pancreatic diseases, indications and contraindications, dosage guidelines and adverse reactions.

Ademetionine, L-ornithine aspartate, ursodeoxycholic acid, silymarin and essential phospholipids from an evidence-based medicine perspective.

Drug-induced hepatopathies. Drugs with direct and mitochondrial cytotoxicity. Prevention of drug-induced liver injury.

Clinical pharmacology of choleretics, cholecystokinetics and cholespasmolytics. Mechanism of action, administration and adverse reactions of

drugs containing bile or bile acids, as well as synthetic drugs. Use of myotropic antispasmodics and anticholinergic drugs.

Clinical pharmacology of enzyme preparations of animal, plant and fungal origin. Treatment strategies with enzyme preparations for exocrine pancreatic insufficiency. Problems with the ineffectiveness of replacement therapy. Use and adverse reactions to enzyme preparations containing bile components.

Emergency medical care for biliary colic (choice of medications).

4. Clinical pharmacology of antimicrobial drugs. Pharmacotherapy of infectious and inflammatory diseases of the respiratory and urinary systems

4.1. Clinical pharmacology of antibacterial drugs affecting the synthesis of the bacterial wall

Definition of the term «antimicrobial chemotherapy». Principles of rational antimicrobial therapy. Resistance to antimicrobial drugs, mechanisms of development and the role of pharmacists in preventing the emergence of resistance. Classification of antimicrobial drugs.

Clinical and pharmacological characteristics of penicillin antibiotics (natural and semisynthetic, inhibitor-protected penicillins), drugs for enteral and parenteral use, antimicrobial spectrum, indications for use, adverse reactions.

Classification of cephalosporin antimicrobial drugs (generations I-V), drugs for enteral and parenteral use. Clinical and pharmacological characteristics and features of the antimicrobial spectrum of different generations of cephalosporins. Inhibitor-protected cephalosporins.

Clinical and pharmacological characteristics of carbapenems. Antimicrobial spectrum characteristics of carbapenems, indications for use and adverse reactions.

Clinical and pharmacological characteristics of monobactams, glycopeptides and polymyxins: antimicrobial spectrum characteristics, use and adverse reactions.

4.2. Clinical pharmacology of antibacterial drugs that disrupt microbial cell protein synthesis

Classification and general properties of macrolide antibacterial drugs. Clinical and pharmacological characteristics and antimicrobial spectrum of natural and semi-synthetic macrolides. Use of macrolides during pregnancy and lactation; in childhood. Adverse reactions to macrolide drugs.

Classification and general properties of aminoglycoside antibacterial drugs. Clinical and pharmacological characteristics of first- to third-generation aminoglycosides. Pharmacokinetic characteristics and antimicrobial spectrum, adverse reactions to aminoglycosides and their prevention. Indications for use and drug interactions of aminoglycosides.

Classification and clinical and pharmacological characteristics of tetracyclines. Pharmacokinetic differences between natural and semi-synthetic tetracyclines. Use and adverse reactions to tetracyclines. The problem of resistance to tetracycline drugs. Glycylcyclines (tigecycline): indications for use.

Clinical and pharmacological characteristics of chloramphenicol and lincosamides, indications for use and adverse reactions.

Oxazolidinones: mechanism of action, antimicrobial spectrum and use.

4.3. Clinical pharmacology of antibacterial drugs that disrupt the synthesis of nucleic acids in microbial cells

Classification of sulfonamide drugs and their mechanism of antibacterial action. Use of sulfonamide drugs: silver sulfadiazine and sulfacetamide. Combination drugs (sulfamethoxazole/trimethoprim, sulfadiazine/pyrimethamine, sulfadoxine/pyrimethamine): clinical and pharmacological characteristics and use. Adverse reactions to sulfonamide drugs.

Classification of quinolones/fluoroquinolones, characteristics of the antimicrobial spectrum of each generation of fluoroquinolones. Mechanism of antimicrobial action of fluoroquinolones, clinical use, adverse reactions and drug interactions.

Classification, clinical and pharmacological characteristics of antimicrobial drugs of the nitroimidazole group. Indications for the use of various dosage forms of nitroimidazoles, adverse reactions.

Features of the use of nitrofurans and 8-oxyquinolones, their clinical and pharmacological characteristics.

4.4. Pharmacotherapy of infectious and inflammatory diseases of the respiratory and urinary systems

The main links in the etiology and pathogenesis of bronchitis, pneumonia, sinusitis, cystitis and pyelonephritis, their clinical manifestations, complications and outcomes.

Pharmacotherapy for bronchitis and community-acquired pneumonia in accordance with current clinical guidelines and the principles of evidence-based medicine. Principles for selecting and administering antibacterial therapy for pneumonia based on individual patient characteristics and the severity of the patient's condition, including step-down therapy.

Clinical and pharmacological approaches to prescribing expectorants with resorptive and reflexive effects for pneumonia and bronchitis. Principles for prescribing mucolytics, mucoregulators and antitussives in the treatment of infectious and inflammatory respiratory diseases.

Pharmacotherapy for sinusitis in accordance with current clinical guidelines and the principles of evidence-based medicine.

Clinical pharmacology of drugs used to treat cystitis: fosfomycin trometamol, β-lactam antibiotics, nitrofurans, fluoroquinolones. Principles of treatment for recurrent cystitis.

Antimicrobial therapy for pyelonephritis: drug selection depending on the suspected pathogen and its sensitivity to the antibiotic, treatment duration and symptomatic treatment.

Herbal remedies used in nephrology and urology (possible mechanisms of action, pharmacological effects).

4.5. Clinical pharmacology of antiviral drugs. Pharmacotherapy of viral infections

Main symptoms and syndromes of acute respiratory tract infections and influenza.

Clinical pharmacology of anti-influenza drugs (M2 channel blockers,

neuraminidase inhibitors, umifenovir, endonuclease inhibitors), administration, dosage and adverse reactions.

Use of interferons and interferon inducers in the treatment of acute respiratory tract infections and influenza.

Clinical pharmacology of drugs for the symptomatic treatment of acute respiratory tract infections and influenza (analgesics/antipyretics, topical decongestants, mucoactive and antitussive drugs). Non-specific and specific prophylaxis of acute respiratory tract infections and influenza. Clinical and pharmacological characteristics of drugs in the prevention and treatment of COVID-19.

Classification and clinical and pharmacological characteristics of antiherpetic drugs. Features of the use of various dosage forms of antiherpetic drugs, adverse reactions.

Antiretroviral drugs: classification, mechanism of action of nucleoside and non-nucleoside reverse transcriptase inhibitors, protease inhibitors, integrase inhibitors, CCR5 co-receptor inhibitors, adverse reactions and principles of use.

4.6. Clinical pharmacology of antifungal and anthelmintic drugs

Main clinical forms of fungal infections, pathogens of superficial and deep (systemic) mycoses. Risk factors for mycoses.

Classification of antifungal drugs.

Antifungal drugs for topical use: polyene antibiotics, imidazoles, allylamines and other drug groups.

Antifungal drugs for systemic use: polyene antibiotics, imidazoles, triazoles, allylamines, pyrimidine derivatives, semisynthetic drugs (echinocandins).

Indications and contraindications for the use of antifungal drugs, adverse reactions and their prevention.

Epidemiology of helminthiasis. Concepts of the life cycles of nematodes, cestodes and trematodes. Main clinical symptoms arising from helminthic infestation.

Modern classification of anthelmintic drugs. Clinical and pharmacological characteristics of anthelmintic drugs. Indications, contraindications and specific use in children. Duration of treatment for various helminthiases. Adverse reactions.

Clinical pharmacology of piperazine adipinate, pyrantel, spectrum of anthelmintic activity, adverse reactions.

Clinical pharmacology of niclosamide, praziquantel, indications for use, contraindications, adverse reactions.

5. Clinical pharmacology of drugs for the treatment of bronchial obstruction

5.1. Clinical pharmacology of bronchodilators

Classification of bronchodilators drugs: drugs for the relief of bronchial obstruction and for basic pharmacotherapy.

Clinical pharmacology of β2-adrenergic agonists. Rationale for the use of individual drugs for the relief of asthma attacks and for basic pharmacotherapy of bronchial asthma and chronic obstructive pulmonary disease. Adverse reactions and drug interactions of β2-adrenergic agonists.

Clinical and pharmacological characteristics of M-anticholinergics used for bronchial obstruction. The use of M-anticholinergics for the relief of asthma attacks

and for basic pharmacotherapy of bronchial asthma and chronic obstructive pulmonary disease, adverse reactions. Combination drugs of β2-adrenergic agonists and M-anticholinergics, their role in the treatment of broncho-obstructive diseases. Clinical pharmacology of methylxanthines: mechanism of action, dosage and adverse reactions. Drug interactions of methylxanthines with other drug groups.

Clinical pharmacology of phosphodiesterase type IV inhibitors (roflumilast), administration features and adverse reactions.

Clinical and pharmacological characteristics of inhaled glucocorticoids. Features of the use of fluticasone, beclomethasone, budesonide, mometasone, cyclesonide, prevention of adverse drug reactions.

Combination drugs (inhaled glucocorticoids and long-acting β2-adrenergic agonists), their role in the treatment of broncho-obstructive diseases.

Clinical pharmacology of antileukotriene drugs, mast cell membrane stabilizers (cromones) and monoclonal antibodies, current approaches to their use and adverse reactions.

5.2. Pharmacotherapy of broncho-obstructive syndrome

Principles of asthma treatment in accordance with current clinical guidelines and evidence-based medicine principles. Groups of drugs used in asthma pharmacotherapy. Step therapy for bronchial asthma. Rational use of drug combinations, possible interactions with combined use and with other drug groups. Methods for monitoring the efficacy and safety of treatment in patients with bronchial asthma.

Principles of chronic obstructive pulmonary disease pharmacotherapy in accordance with current clinical guidelines and evidence-based medicine principles. Groups of drugs used in chronic obstructive pulmonary disease pharmacotherapy. Rational use of drug combinations and their drug interactions. Diagnosis, management and prevention of adverse reactions when using drugs for the treatment of chronic obstructive pulmonary disease. Methods of drug delivery to the respiratory tract (metered-dose inhaler-MAI (MAI, MAI + spacer, breath-activated MAI), metered-dose liquid inhaler, metered-dose powder inhaler (capsule, blister, reservoir), nebulizer, advantages and disadvantages of individual systems. Emergency medical care for an asthma attack (choice of medications).

6. Clinical pharmacology of drugs for the treatment of the musculoskeletal system diseases

6.1. Clinical pharmacology of disease-modifying and nonsteroidal anti-inflammatory drugs

The concept of disease-modifying antirheumatic drugs, their general properties and classification. Clinical pharmacology of methotrexate, leflunomide and sulfasalazine, including their mechanism of action, specific uses and adverse reactions.

The role of cyclosporine, cyclophosphamide, D-penicillamine and hydroxychloroquine in the treatment of autoimmune rheumatic diseases, specific uses and adverse reactions.

The use of glucocorticoids for the treatment of rheumatic diseases, their mechanism of action, regimens and routes of administration and adverse reactions.

Biologically engineered disease-modifying drugs, their definition and

classification. Clinical and pharmacological characteristics of TNF-α inhibitors, anticytokines and anti-B-cell drugs. Efficacy and safety of immunobiological drugs. The concept of original genetically engineered drugs and biosimilars.

Classification of nonsteroidal anti-inflammatory drugs (NSAIDs) (by chemical structure, anti-inflammatory activity, duration of action and cyclooxygenase selectivity), pharmacokinetics and primary pharmacological effects.

Clinical and pharmacological characteristics of individual drugs (acetylsalicylic acid, indomethacin, etodolac, piroxicam, meloxicam, phenylbutazone, diclofenac, nabumetone, ibuprofen, naproxen, ketoprofen). Clinical and pharmacological characteristics of drugs with moderate anti-inflammatory activity (acetaminophen, metamizole, ketorolac, nimesulide).

Adverse reactions to NSAIDs (gastrotoxicity, nephrotoxicity, cardiotoxicity, hematotoxicity, hepatotoxicity, ototoxicity, etc.), risk factors and prevention. Drug interactions with other medications (antihypertensives, antiplatelet agents and anticoagulants, oral hypoglycemic agents, glucocorticoids, etc.).

Emergency medical care for a patient with fever.

6.2. Clinical pharmacology of chondroprotectors. Pharmacotherapy of metabolic and age-related joint diseases

Causes and main clinical manifestations of osteoarthritis.

Modern classification of chondroprotectors. Clinical pharmacology of glucosamine, chondroitin and hyaluronic acid derivatives.

Use of combination drugs in the treatment of osteoarthritis. Clinical and pharmacological characteristics of chondroprotectors of other groups (diacerein, piascledine, aflutop, rumalon), contraindications for drug use.

The role of glucocorticoids and nonsteroidal anti-inflammatory drugs in the pharmacotherapy of osteoarthritis.

Causes and main manifestations of osteoporosis. Risk factors for osteoporosis. Clinical pharmacology of bisphosphonates, calcitonin, teriparatide, denosumab, raloxifene, indications and contraindications for use, adverse reactions.

Clinical pharmacology of active vitamin D metabolites, calcium-containing drugs, strontium ranelate and hydroxyapatite complex (osteogenon).

Causes and main manifestations of gout. Clinical and pharmacological characteristics of uricostatic (allopurinol, febuxostat) and uricosuric drugs.

Medications for the relief of acute gout attacks.

6.3. Clinical pharmacology of analgesics. Pharmacotherapy of chronic pain syndrome

Classification of analgesic drugs.

Clinical pharmacology, indications and contraindications for the use of opioid analgesics, adverse reactions.

Clinical and pharmacological characteristics of non-narcotic analgesics (metamizole sodium, paracetamol, ketorolac). Pharmacokinetics and pharmacodynamics of nonsteroidal anti-inflammatory drugs, clinical effects and adverse drug reactions.

Clinical pharmacology of drugs for adjuvant pain therapy (glucocorticoids, muscle relaxants, antipsychotics, tranquilizers, sedatives, antidepressants, etc.).

Main mechanisms of pain. Tactics for rational drug selection for various types of pain. Fundamental approaches to pain therapy in various patient groups (acute and chronic pain syndrome). Selection of drugs for step therapy of chronic pain syndrome. Monitoring the effectiveness and safety of pharmacotherapy for pain syndrome.

7. Clinical pharmacology of antiallergic and immunotropic drugs

The main links in the etiology and pathogenesis of allergic reactions. The main clinical forms of allergic reactions. Classification of antihistamines.

Pharmacokinetics and pharmacodynamics of antihistamine drugs of the 1st and 2nd generation. Indications for use, adverse reactions and drug interactions of antihistamine drugs of the 1st and 2nd generation.

The possibility of using antihistamines in children, pregnant women and breastfeeding women.

Mast cell membrane stabilizers: classification, mechanism of action and specific use.

The role of topical and systemic glucocorticoids in the treatment of allergic diseases.

Emergency medical care for anaphylactic shock and angioedema.

Primary and secondary immunodeficiencies. The main clinical forms and manifestations of secondary induced immunodeficiencies. Classification of immunomodulators by origin. Contraindications to the use of immunomodulators.

Clinical pharmacology of bacterial and plant immunomodulators, taktivin and thymogen, their mechanism of action and clinical application.

Clinical and pharmacological characteristics of cytokines (interleukins, natural and recombinant interferons). Use of interferon inducers. Synthetic immunomodulators, their mechanism of action and clinical application.

8. Clinical pharmacology of drugs used to treat vascular diseases

8.1. Clinical pharmacology of drugs that improve cerebral blood flow and stimulate neurometabolic processes

Classification of drugs used in pharmacotherapy for cerebrovascular disorders.

Clinical and pharmacological characteristics of drugs affecting cerebral blood flow – calcium channel blockers, vinca alkaloids, ergot alkaloids, nicotinic acid derivatives.

Clinical pharmacology of drugs stimulating neurometabolic processes (piracetam, phenotropil, instenon, glycine, citicoline, cerebrolysin, etc.). Mechanism of action of choline alfoscerate, pyritinol, ipidacrine, GABA and its derivatives (aminalon, picamilon), indications and contraindications for use. Potential adverse reactions to drugs used to treat chronic cerebral ischemia.

8.2. Clinical pharmacology of drugs for migraine treatment

Main links in the etiology and pathogenesis of migraine. Clinical manifestations of a migraine attack. Classification of drugs used for migraine pharmacotherapy.

Clinical pharmacology of drug groups for migraine relief (nonsteroidal anti-inflammatory drugs, 5-HT receptor agonists - triptans, analgesics).

Emergency medical care for headaches.

Clinical and pharmacological characteristics of drug groups for migraine attack prophylaxis (beta-blockers, calcium channel blockers, anti-epileptic drugs, antidepressants). Indications for prophylactic therapy in patients with migraine.

Methods for monitoring the efficacy and safety of migraine therapy.

8.3. Pharmacotherapy of chronic venous insufficiency

Etiology, pathogenesis and leading symptoms of chronic venous insufficiency and varicose veins of the lower extremities. Goals and objectives of pharmacotherapy for chronic venous insufficiency in accordance with current clinical guidelines and principles of evidence-based medicine.

Classification of venoactive drugs and their sources. The main pharmacodynamic effects of venoactive drugs include venotonic, microcirculatory, anti-inflammatory and antiplatelet effects.

Clinical and pharmacological characteristics of diosmin-containing drugs, administration guidelines and adverse reactions.

Clinical and pharmacological characteristics of drugs from other groups (troxerutin, escin, cyclo-3-fort, ginkgo-fort, endotelon, calcium dobesilate), administration guidelines and adverse reactions.

Use of topical drugs in the treatment of chronic venous insufficiency.

9. Clinical pharmacology of drugs for the treatment of blood diseases and correction of hemostatic disorders

9.1. Clinical pharmacology of drugs for the anemia treatment

Understanding anemia: causes, main pathogenetic variants and leading clinical symptoms.

Principles of pharmacotherapy for anemia in accordance with current clinical guidelines and evidence-based medicine principles.

Classification of antianemic medications.

Clinical pharmacology of iron salts and iron-containing complexes, indications and contraindications for oral and parenteral dosage forms. Dosage guidelines for iron-containing medications. Adverse reactions to iron-containing medications.

Clinical and pharmacological characteristics of cyanocobalamin and folic acid, indications and contraindications for use.

Rational use of drug combinations for the treatment of anemia, their drug interactions.

9.2. Clinical pharmacology of drugs for the correction of hemostatic system disorders

The concept of the hemostatic system, vascular-platelet (primary) and coagulation (secondary) hemostasis. Classification of drugs that affect hemostasis.

Drugs that increase blood clotting (etamsylate, terlipressin, vicasol, protamine sulfate, plasma products): mechanism of action, indications for use, adverse reactions.

Clinical pharmacology of fibrinolysis inhibitors, proteolytic enzyme inhibitors, indications for use, routes of administration. Hemostatic drugs for topical use. Adverse reactions to hemostatic drugs and their prevention.

Clinical and pharmacological characteristics of antiplatelet agents: pharmacokinetics, dosing, indications for use, adverse reactions.

Clinical and pharmacological characteristics of direct and indirect anticoagulants. Features of the use of unfractionated heparin, low molecular weight heparins and fondaparinux. The mechanism of anticoagulant action of warfarin, pharmacokinetics and dosing principles and adverse reactions.

Clinical and pharmacological characteristics of direct thrombin inhibitors

(bivalirudin, dabigatran). The mechanism of action and indications for the use of rivaroxaban, apixaban.

Clinical and pharmacological characteristics of fibrinolytics of the first (streptokinase, urokinase), second (recombinant tissue plasminogen activator- t-PA) and third (alteplase) generations. Indications and contraindications for the use of fibrinolytics.

Methods for monitoring the efficacy and safety of antithrombotic drugs.

10. Clinical pharmacology of drugs for the treatment of endocrine diseases

10.1. Clinical pharmacology of drugs for the treatment of diabetes mellitus

Classification of drugs (insulins) used to treat type 1 diabetes mellitus.

Indications and contraindications for insulin use, recommended insulin therapy regimens and adverse reactions. Methods for monitoring the efficacy and safety of insulin therapy.

Classification of oral hypoglycemic agents. Clinical and pharmacological characteristics of sulfonylurea and biguanide derivatives, α-glucosidase inhibitors, methyglitinides and thiazolidinediones and gliflozins.

Concept of incretin-mediated drugs and their mechanisms of action. Indications and contraindications for the use of oral hypoglycemic agents and adverse reactions.

Emergency medical care for hypoglycemia and hypoglycemic coma.

10.2. Pharmacotherapy of diabetes mellitus

Basic concepts of the etiology, pathogenesis, clinical forms, manifestations, diagnostic methods, complications and outcomes of diabetes mellitus.

Principles, goals and objectives of pharmacotherapy for type 1 and type 2 diabetes mellitus in accordance with current clinical guidelines and principles of evidence-based medicine.

Rational use of drug combinations (insulins, oral sugar-lowering drugs) for the treatment of diabetes mellitus. Drug interactions of drugs used to treat diabetes mellitus with other medications.

10.3. Clinical pharmacology of drugs for the treatment of thyroid and adrenal diseases

Etiology and pathogenesis of thyroid diseases. Key definitions: hypothyroidism, diffuse toxic goiter, diffuse endemic goiter, thyrotoxic crisis. Clinical manifestations of the main thyroid diseases.

Classification of drugs used in thyroid diseases. Clinical pharmacology of thyroid hormone analogs and antithyroid drugs, indications and contraindications for their use and adverse reactions.

Clinical and pharmacological approaches to the treatment of diseases associated with hypothyroidism and hyperthyroidism.

The role of the adrenal glands in human life. Clinical manifestations of chronic adrenal insufficiency.

Classification of drugs used for chronic adrenal insufficiency. Clinical and pharmacological characteristics of glucocorticoids and mineralocorticoids, indications and contraindications for their use, adverse reactions.

11. Clinical pharmacology of lipid-lowering drugs. Pharmacotherapy of obesity

The main pathogenesis of dyslipidemia and its types. Classification of lipid-

lowering medications.

Clinical and pharmacological characteristics of statins, fibrates, cholesterol absorption inhibitors, omega-3 polyunsaturated fatty acids and inclisiran and their role in the pharmacotherapy of dyslipidemia. Clinical pharmacology of ion-exchange resins and nicotinic acid derivatives, indications and contraindications for their use. Drug interactions of lipid-lowering medications.

Adverse reactions to lipid-lowering medications, methods of their correction and prevention.

Classification of medications used to treat obesity: serotonin and norepinephrine reuptake inhibitors, gastrointestinal lipase inhibitors. Mechanism of action, indications and contraindications for use, adverse reactions, efficacy and safety of drugs for the treatment of obesity.

12. Clinical pharmacology of sedative and hypnotic drugs

Clinical and pharmacological approaches to selecting medications for various types of insomnia. Mechanism of action and adverse reactions of barbiturates, benzodiazepine receptor agonists and cyclopyrrolone derivatives and their impact on sleep structure. Use and drug interactions of hypnotics.

Clinical and pharmacological characteristics of sedative medications (bromides, herbal remedies and combination medications). Use, adverse reactions and drug interactions of sedative medications.

13. Evidence-based medicine. Features of drug use across different age groups

13.1. Features of pharmacotherapy in pediatrics and geriatrics

Dosage principles and prescribing regimens for children based on pharmacokinetics and pharmacodynamics. The main drug groups used in pediatrics include antibacterial and antiviral drugs, expectorants and antitussives, antihistamines, nonsteroidal anti-inflammatory drugs, etc. Potential complications of drug use in childhood, their prediction, prevention and correction.

Dosage principles and prescribing regimens for elderly patients based on pharmacokinetics and pharmacodynamics. The main drug groups used in geriatrics include antihypertensive drugs, drugs for the treatment of cardiovascular diseases, hypnotics, laxatives, analgesics, etc. The concept of polypharmacy. Potential complications of drug use in the elderly, their prediction, prevention and correction.

13.2. Features of the drug use for somatic diseases in pregnant women

Dosage principles and prescribing regimens for drugs used to treat somatic diseases in women during pregnancy, based on pharmacokinetics and pharmacodynamics.

The use of antibacterial, antifungal drugs, antidiabetic, antihypertensive, nonsteroidal anti-inflammatory drugs, etc. during pregnancy.

The safety of prescribing medications and their classification according to possible effects on the fetus.

13.3. Fundamentals of evidence-based medicine. A formulary system. Information and advisory activities of a specialist pharmacist when dispensing medications

Basic principles of evidence-based medicine and their practical implementation in healthcare. Classes of recommendations and levels of evidence in clinical

recommendations and guidelines. The concept of a formulary system. Legislation in the field of medicines.

Researching new medications and conducting clinical trials. Principles of medical ethics and deontology in the work of a pharmacist.

Ensuring epidemiological safety in the provision of medical care. The concept of pharmacovigilance. Monitoring of adverse reactions and side effects of medications. The concept of pharmacoepidemiology. The study of the prevalence and risk factors of diseases associated with the use of medicines. Assessment of the risks and benefits of using medications in large groups of patients.

Providing advisory services to the public on the use of medications from the most commonly used pharmacological groups: antihypertensive and diuretic drugs, cardiac glycosides, nonsteroidal anti-inflammatory drugs, antacids, bronchodilators, hormonal drugs, antiviral and antimicrobial drugs, etc. Informing patients about the main manifestations of adverse drug reactions and methods for preventing them. Medical ethics and deontology in the work of a pharmacist.

Advisory services on the correct use of blood pressure monitors, glucometers and nebulizers.

EDUCATIONAL DISCIPLINE «CLINICAL PHARMACOLOGY, PHARMACOTHERAPY» CURRICULAR CHART

№ п/п	Section title, topic	Number of classroom hours		Supervised independent student work	Literature	Practical skill	Forms of control	
		lectures	laboratory				of practical skill	of current/ intermediate certification
		8 semester						
	Lectures	**15**	**-**	**6**	-			
1.	Introduction to Clinical Pharmacology and Pharmacotherapy. Pharmacokinetics and Pharmacodynamics. Types and Age-Specific Features of Pharmacotherapy	1,5	-	-	1, 2, 6			
2.1.	Clinical pharmacology of antihypertensive drugs. Pharmacotherapy of arterial hypertension	1,5	-	-	1-3, 6			
2.3.	Clinical pharmacology of antiarrhythmic drugs	-	-	1,5	1, 2, 6			Test, abstract defense
3.1.	Clinical pharmacology of drugs for the treatment of ulcer diseases of the stomach and duodenum	1,5	-	-	1, 2, 6			
3.3.	Pharmacotherapy of the liver, gallbladder and pancreas diseases	-	-	1,5	1, 2, 6			Tests, abstract defense
4.1.	Clinical pharmacology of antibacterial drugs affecting the synthesis of the bacterial wall	1,5	-	-	1, 2, 6			
4.5.	Clinical pharmacology of antiviral drugs. Pharmacotherapy of viral infections	1,5	-	-	1, 2, 6			
5.1.	Clinical pharmacology of bronchodilators	1,5	-	-	1, 2, 6			

5.2.	Pharmacotherapy of broncho-obstructive syndrome	-	-	1,5	1, 2, 6			Tests, abstract defense
6.1.	Clinical pharmacology of disease-modifying and nonsteroidal anti-inflammatory drugs	1,5	-	-	1, 2, 6			
6.3.	Clinical pharmacology of analgesics. Pharmacotherapy of chronic pain syndrome	-	-	1,5	1, 2, 6			Tests, abstract defense
7.	Clinical pharmacology of antiallergic and immunotropic drugs	1,5	-	-	1, 2, 6			
9.	Clinical pharmacology of drugs used to correct of the hemostatic disorders system	1,5	-	-	1, 2, 6			
10.1	Clinical pharmacology of drugs for the treatment of diabetes mellitus	1,5	-	-	1, 2, 6			
	Laboratory classes	-	**48**	-	-			
1.	Introduction to clinical pharmacology and pharmacotherapy. Pharmacokinetics and pharmacodynamics. Types and age-specific features of pharmacotherapy	-	3	-	1, 2, 6	Collection of pharmacological and allergological history	Performing practical skills at the patient's bedside / in an outpatient setting	Interviews, quizzes, abstract defense
2.1.	Clinical pharmacology of antihypertensive drugs. Pharmacotherapy of arterial hypertension	-	3	-	1-3, 6	Providing first aid to a patient with uncomplicated and complicated hypertensive crisis, angina attack or bronchial asthma attack	Solving situational problems	Interview, quizzes, test, abstract defense
2.2.	Clinical pharmacology of antianginal drugs	-	3	-	1, 2, 6	Selecting over-the-counter medications for the treatment of diseases based on knowledge of their properties and considering the basic principles of rational pharmacotherapy	Solving situational problems	Interviews, quizzes, abstract defense
2.3.	Clinical pharmacology of antiarrhythmic drugs	-	3	-	1, 2, 6	Informing the patient about the nature of the action of the drugs, the rules of administration and possible side effects	Solving situational problems	Interview*, quizzes, abstract defense, test

2.4.	Pharmacotherapy of chronic heart failure	-	3	-	1, 2, 4	Informing patients about the safety of using over-the-counter drugs	Solving situational problems	Interview, quizzes, tests
3.1.	Clinical pharmacology of drugs for the treatment of ulcer diseases of the stomach and duodenum	-	3	-	1, 2, 6	Informing the patient about taking medications depending on food intake, other medications and time of day	Solving situational problems	Interviews, quizzes, abstract defense
3.2.	Clinical pharmacology of drugs for the treatment of the intestine motility disorders	-	3	-	1, 2, 6	Assessment of the risk of drug interactions. Providing first aid to a patient with heartburn, nausea, vomiting	Solving situational problems	Interview, quizzes, test
3.3.	Pharmacotherapy of the liver, gallbladder and pancreas diseases	-	3	-	1, 2, 6	Providing first aid to a patient who has fainted	Solving situational problems	Interview, control surveys, test
4.1.	Clinical pharmacology of antibacterial drugs that disrupt microbial cell protein synthesis	-	3	-	1, 2, 6	Informing the patient about the nature of the action of the drugs, the rules of administration and possible side effects	Solving situational problems	Interview*, quizzes, abstract defense test
4.2.	Clinical pharmacology of antibacterial drugs that disrupt microbial cell protein synthesis	-	3	-	1, 2, 6	Assessment of the risk of drug interactions	Solving situational problems	Interview, quizzes, tests
4.3.	Clinical pharmacology of antibacterial drugs that disrupt the synthesis of nucleic acids in microbial cells	-	3	-	1, 2, 6	Informing the patient about the nature of the action of the drugs, the rules of administration and possible side effects	Solving situational problems	Interview, quizzes, tests, abstract defense
4.4.	Pharmacotherapy of infectious and inflammatory diseases of the respiratory and urinary systems	-	3	-	1, 2, 6	Providing first aid to a patient in anaphylactic shock	Solving situational problems	Interview, quizzes, tests, abstract defense
4.5.	Clinical pharmacology of antiviral drugs. Pharmacotherapy of viral infections	-	3	-	1, 2, 6	Providing first aid to a patient who has fainted	Solving situational problems	Interview, quizzes, tests
4.6.	Clinical pharmacology of antifungal and anthelmintic drugs	-	3	-	1, 2, 6	Informing the patient about taking medications depending on food intake, other medications and time of day	Solving situational problems	Interview, quizzes, tests

5.1.	Clinical pharmacology of bronchodilators	-	3	-	1, 2, 6	Analyze the action of drugs based on their pharmacological effects, mechanism of action and pharmacokinetics	Solving situational problems	Interview*, quizzes, abstract defense, test
5.2.	Pharmacotherapy of broncho-obstructive syndrome	-	3	-	1, 2, 6	Providing first aid to a patient during an asthma attack	Solving situational problems	Interview, quizzes, abstract defense, test. Credit
	9 semester							
	Lectures	**6**	-	-	-			
10.2.	Pharmacotherapy of diabetes mellitus	1,5	-	-	1, 2, 6			
11.	Clinical pharmacology of lipid-lowering drugs. Pharmacotherapy of obesity	1,5	-	-	1, 2, 6			
13.2.	Features of the drug use for somatic diseases in pregnant women	1,5	-	-	1, 2, 6			
13.3.	Fundamentals of Evidence-Based Medicine. A Formulary System	1,5	-	-	1, 2, 6			
	Laboratory classes	-	**54**	-	-			
6.1.	Clinical pharmacology of disease-modifying and nonsteroidal anti-inflammatory drugs	-	3	-	1, 2, 6	Assessment of the risk of drug interactions	Solving situational problems	Interview, quizzes, abstract defense, test
6.2.	Clinical pharmacology of chondroprotectors. Pharmacotherapy of metabolic and age-related joint diseases	-	3	-	1, 2, 6	Informing the patient about taking medications depending on food intake, other medications and time of day	Solving situational problems	Interview, quizzes, abstract defense, test
6.3.	Clinical pharmacology of analgesics. Pharmacotherapy of chronic pain syndrome	-	3	-	1, 2, 6	Providing first aid to a patient with headache	Solving situational problems	Interview, quizzes, abstract defense, test
7.	Clinical pharmacology of antiallergic and immunotropic drugs	-	3	-	1, 2, 6	Providing first aid to a patient in anaphylactic shock	Solving situational problems	Interview*, quizzes, abstract defense, test
8.1.	Clinical pharmacology of drugs that improve cerebral blood flow and stimulate neurometabolic processes	-	3	-	1, 2, 6	Informing the patient about the nature of the action of the drugs, the rules of administration and possible side effects	Solving situational problems	Interview, quizzes, abstract defense, test
8.2.	Clinical pharmacology of drugs for migraine treatment	-	3	-	1, 2, 6	Selecting over-the-counter medications for the treatment	Solving situational problems	Interview, quizzes, abstract defense, test

						of diseases based on knowledge of their properties and considering the basic principles of rational pharmacotherapy		
8.3.	Pharmacotherapy of chronic venous insufficiency	-	3	-	1, 2, 6	Analyze the action of drugs based on their pharmacological effects, mechanism of action and pharmacokinetics	Solving situational problems	Interview, quizzes, abstract defense, test
9.1.	Clinical pharmacology of drugs for the anemia treatment	-	3	-	1, 2, 6	Collection of pharmacological and allergological history	Performing the skill at the patient's bedside	Interview, quizzes, abstract defense, test
9.2.	Clinical pharmacology of drugs for the correction of hemostatic system disorders	-	3	-	1, 2, 6	Patient counseling on the over-the-counter use of medications in age and gender aspects, as well as in women during pregnancy and breastfeeding	Solving situational problems	Interview, quizzes, abstract defense, test
9.2.	Clinical pharmacology of drugs for the correction of hemostatic system disorders	-	3	-	1, 2, 6	Identify the symptoms of a disease that require a mandatory consultation with a doctor	Performing practical skills at the patient’s bedside / in an outpatient setting	Interview, quizzes, abstract defense, test
10.1.	Clinical pharmacology of drugs for the treatment of diabetes mellitus	-	3	-	1, 2, 6	Providing first aid to a patient in anaphylactic shock	Solving situational problems	Interview, quizzes, test
10.2.	Pharmacotherapy of diabetes mellitus	-	3	-	1, 2, 6	Providing first aid to a patient who has fainted	Solving situational problems	Interview*, quizzes, abstract defense, test
10.3.	Clinical pharmacology of drugs for the treatment of thyroid and adrenal diseases	-	3	-	1, 2, 6	Providing first aid to a patient with uncomplicated and complicated hypertensive crisis, angina attack or bronchial asthma attack	Solving situational problems	Interview, quizzes, test
11.	Clinical pharmacology of lipid-lowering drugs. Pharmacotherapy of obesity	-	3	-	1, 2, 6	Patient counseling on the over-the-counter use of medications in age and gender aspects, as well as in women	Performing the skill at the patient's bedside	Interview, quizzes, test

						during pregnancy and breastfeeding		
12.	Clinical pharmacology of sedative and hypnotic drugs	-	3	-	1, 2, 6	Patient counseling on the over-the-counter use of medications in age and gender aspects, as well as in women during pregnancy and breastfeeding	Solving situational problems	Interview, quizzes, abstract defense, test
13.1.	Features of pharmacotherapy in pediatrics and geriatrics	-	3	-	1, 2, 6	Analysis of the action of drugs based on the totality of their pharmacological effects, mechanism of action and pharmacokinetics	Solving situational problems	Interview, quizzes, test
13.2.	Features of the drug use for somatic diseases in pregnant women	-	3	-	1, 2, 6	Analysis of the action of drugs based on the totality of their pharmacological effects, mechanism of action and pharmacokinetics	Solving situational problems	Interview, quizzes, abstract defense, test
13.3.	Fundamentals of Evidence-Based Medicine. A Formulary System. Information and Advisory Activities of a Specialist Pharmacist When Dispensing Medications	-	3	-	1, 2, 5	Evaluation of scientific information on the effectiveness of drugs and other products, work with reference and other literature on drugs. Be able to complete a report of adverse reactions to medications	Solving situational problems. Completing an Adverse Reaction Report Form	Interview, quizzes, abstract defense, test
	Total hours	**21**	**102**	**6**				Examination

*This is a mandatory form of current certification.

INFORMATION AND INSTRUCTIONAL UNIT

LITERATURE

Basic (relevant):

1. Whittlesea, C. Clinical Pharmacy and Therapeutics / C. Whittlesea, K. Hodson. – 6th ed. – Elsevier, 2019. – 1112 p.

Additional:

2. Brunton, L., Hilal-Dandan, R., Knollmann, B. Goodman & Gilman's : The Pharmacological Basis of Therapeutics / L. Brunton, R. Hilal-Dandan, B. Knollmann. – 13 ed. – McGraw-Hill Education, 2018. – 1440 p.

Regulatory legal acts:

3. 2024 European Society of Hypertension clinical practice guidelines for the management of arterial hypertension Practice Guidelines // European Journal of Internal Medicine. – 2024. – Vol. 126. – P. 1-15.

4. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure : A Report of the American College of Cardiology / American Heart Association Joint Committee on Clinical Practice Guidelines // Circulation. – 2022. – Vol.145 – P. e895 - e1032.

5. ASHP Guidelines on the Pharmacist's Role in Providing Drug Information Medication Therapy and Patient Care // Specific Practice Areas Guidelines – P. 471 - 475.

Electronic courseware for the academic discipline «Clinical Pharmacology, Pharmacological Therapy»:

6. https://etest.bsmu.by/course/view.php?id=2164.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

The time allocated for independent work can be used by students for:

preparing for lectures and laboratory classes;

preparing for credit and exam in the academic discipline;

researching topics (questions) assigned for independent study;

solving problems;

completing research and creative assignments;

preparing thematic reports, essays and presentations;

completing practical assignments;

taking notes from academic literature;

preparing reports;

compiling a review of scientific literature on a given topic;

designing informational and demonstration materials (stands, posters, graphs, tables, newspapers, etc.);

compiling a thematic selection of literary sources and online sources;

creating tests for students to organize peer review.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF SUPERVISED STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

APPROXIMATE LIST OF TASKS FOR SUPERVISED STUDENT INDEPENDENT WORK:

preparing thematic reports, papers and presentations;
creating tests for review.

FORMS OF CONTROL OF SUPERVISED STUDENT INDEPENDENT WORK:

tests;
abstract defense.

LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms of ongoing assessment are used to assess competencies:
interview;
quizz;
test;
abstract defense.

LIST OF AVAILABLE TEACHING METHODS

Traditional method;
active (interactive) methods:
- Problem-Based Learning (PBL);
- Team-Based Learning (TBL);
- Case-Based Learning (CBL);
- Research-Based Learning (RBL).

LIST OF PRACTICAL SKILLS

Name of practical skills	Form of practical skills control
1. Collection of pharmacological and allergological history	Performing practical skills at the patient's bedside / in an outpatient setting
2. Analyze the action of drugs based on their pharmacological effects, mechanism of action and pharmacokinetics	Solving situational problems
3. Selecting over-the-counter medications for the treatment of diseases based on knowledge of their properties and considering the basic principles of rational pharmacotherapy	Solving situational problems
4. Informing the patient about the nature of the action of the drugs, the rules of administration and possible side effects	Solving situational problems
5. Informing patients about the safety of using over-the-counter drugs	Solving situational problems

Name of practical skills	Form of practical skills control
6. Informing the patient about taking medications depending on food intake, other medications and time of day	Solving situational problems
7. Assessment of the risk of drug interactions	Solving situational problems
8. Patient counseling on the over-the-counter use of medications in age and gender aspects, as well as in women during pregnancy and breastfeeding	Solving situational problems
9. Identify the symptoms of the diseases that require a mandatory consultation with a doctor	Performing practical skills at the patient's bedside / in an outpatient setting
10. Be able to complete a report of adverse reactions to medications	Completing an Adverse Reaction Report Form
11. Providing first aid to a patient in case of anaphylactic shock, uncomplicated and complicated hypertensive crisis, angina attack, bronchial asthma attack, hypoglycemia, fainting, heartburn, nausea, vomiting, headache	Solving situational problems
12. Evaluation of scientific information on the effectiveness of drugs and other products, work with reference and other literature on drugs	Solving situational problems

PROTOCOL OF THE CURRICULUM APPROVAL BY OTHER DEPARTMENTS

Title of the discipline requiring approval	Department	Amendments to the curriculum in the academic discipline	Decision of the department, which designed the curriculum (date, protocol #)
Pharmacology	Pharmacology	No	Recommended for use. Protocol # 3 of 29.09.2025

COMPILERS/AUTHORS:

Head of the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University», PhD, Associate Professor — I.S.Romanova

Associate Professor of the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University», PhD, Associate Professor — V.F.Kardash

Professor of the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University», DSc, Associate Professor — I.M.Kozhanova

Associate Professor of the Department of Clinical Pharmacology of the Educational Institution «Belarusian State Medical University», PhD, Associate Professor — T.A.Chak

Curriculum content, composition and the accompanying documents comply with the established requirements.

Head of the Office of Educational Activities of the Educational Institution «Belarusian State Medical University» — I.L.Kotovich

Methodologist of the Educational and Methodological Department of the Office of Educational Activities of the Educational Institution «Belarusian State Medical University» — S.V.Zaturanova