MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION

PENZA STATE UNIVERSITY

Medical Institute

AGREED

The head of the medical institute

_____ A.N. Mitroshin

«__5__» ___03___ 2016

STUDY PROGRAM

C1.1.20 PHARMACOLOGY

Course 31.05.01 General medicine

Qualification (degree) graduate – General practitioner

Form of training - full-time

Penza 2016

1. Aims and goals

The aims and goals of the discipline (module) ____Pharmacology are as follows: formation of the competencies, aimed at protecting the health of the citizens by ensuring pharmaceutical care in accordance with the requirements and standards in the field of health care.

2. Links to other disciplines of the general curriculum

The discipline refers to the basic part of module №1.

Pharmacology is one of the basic disciplines, which interacts with: biology, chemistry, anatomy, normal and pathological physiology, biochemistry, microbiology, virology.

The fundamentals of Pharmacology are necessary for the disciplines of the basic part: clinical pharmacology, propaedeutics of internal diseases, faculty therapy, pediatrics, hospital therapy, infectious diseases, polyclinic therapy, general surgery, anesthesiology, reanimation and intensive therapy; faculty surgery, urology; hospital surgery, children's surgery.

3. Student competences, developed during learning

According to the state curriculum for the course, learning is oriented at developing of the following competences and their elements:

Competence code	Name of the competence	Structural elements of the competence (knowledge, skill, application as a final learner outcome)
OPC-8	preparedness for medical use of medicines and other substances and their combinations at the solution of professional tasks	knowledge: Classification and the main characteristics of medicines, pharmacodynamics and pharmacokinetics, indications and contraindications to the use of medicine, side effects
		skill: To analyze the action of medicines on the basis of their pharmacological properties and possibility of their use for therapeutic treatment; 2. To use the main groups of medicines in nosology, with a glance to their pharmacokinetics, pharmacodynamics, indications, contraindications and side effects; 3. To estimate possible manifestations at overdose of medicines and ways of their elimination.
		application: skills of use of the medicines and other substances and their combinations at the solution of professional tasks
PC-8	ability to formulate the tactics of maintaining patients with various nosological forms	knowledge: a therapeutic approach to the patients with different nosological forms
		skill: to define therapeutic approach to the patients with different nosological forms
		application: ability to define a therapeutic approach to the patients with different nosological forms

4. Structure and content of the discipline « Pharmacology »

4.1. Structure of the discipline (module)

Overall workload equals __7___ ECTSs, ___252___ hours.

№	Names of parts and topics of the discipline	Semester	Week of the semester	Types of learner activities, including students' individual work and workload (in hours)									Forms of current assessment *(divided in weeks)*							
				Class study				Individual work												
				Total	Lectures	Practical classes	Laboratory classes	Total	Preparation for class study	Research paper, essay, etc.	Term paper (project)	Exam preparation	Discussion	Checking skills (prescription works)	Achievement tests assessment	Test paper grading	Research paper assessment	Essays and other creative work assessment	Term paper (project)	other
1.	Part 1. «Formula and general pharmacology»																			
1.1.	Introduction. Formula and its structure. Forms of prescriptions. Solid medicinal forms.	5	1	3		3		1	1				1	1						
1.2.	Liquid medicinal forms. Medicinal forms for injections.	5	2	3		3		1	1				2	2						
1.3	Soft medicinal forms	5	3	3		3		1	1				3	3						
1.4	General pharmacology	5	4	5	2	3		1	1				4							
1.5	A test study «Formula and general pharmacology»	5	5			3		4	4				5	5		5				
2.	Medicinal agents affecting peripheral nervous system																			
2.1.	Medication affecting afferent innervation	5	6	4	1	3		1	1				6	6						
2.2.	Introduction to vegetative nervous system pharmacology. Cholinergic receptors	5	7	5	2	3		1	1				7	7						

2.3	Cholinergic receptors antagonist	5	8	5	2	3		1	1				8	8						
2.4	Adrenomimetic agents	5	9	5	2	3		1	1				9	9						
2.5	Adrenonegative and sympatolytic medication.	5	10	5	2	3		1	1				10	10						
2.6	A test study «Medicinal agents affecting peripheral nervous system»	5	11	3		3		4	4				11	11		11				
3	Part 3. «Medication affecting central nervous system»																			
3.1	Medication for anaesthesia. Ethyl alcohol.	5	12	3		3		1	1				12	12						
3.2	Opioids analgesic	5	13	5	2	3		1	1				13	13						
3.3	NSAIDs AIDs	5	14	5	2	3		1	1				14	14						
3.4	Soporific medication. Antiepileptic and antiparkinsonian agents.	5	15	3		3		1	1				15	15						
3.5	Psychotropic agents. Psychoanaleptics.	5	16	5	2	3		1	1				16	16						
3.6	Psychotropic agents. Psycholeptics.	5	17	5	2	3		1	1				17	17						
3.7	Seminar «Medication affecting central nervous system»	5	18	3		3		4	4				18	18		18				
	A pass study	5	19	3		3		5	5				19	19		19				
4.	Part 4. «Pharmacology of the agents affecting the functions of the operating organs»																			
4.1.	Agents affecting breathing functions.	6	1	3		3		1	1				1	1						
4.2.	Antiatherosclerotic agents. Agents for a stroke treatment. Angioprotectors. Antianginous medicinal agents.	6	2	5	2	3		1	1				2	2						
4.3.	Antihypertensive and pressor agents.	6	3	5	2	3		1	1				3	3						
4.4.	Antiarhryhtmic and cardiotonic agents	6	4	3		3		1	1				4	4						
4.5	Diuretics. Myometrium agents.	6	5	5	2	3		1	1				5	5						

4.6	Agents affecting blood formation, blood coagulation, fibrinolysis and platelet aggregation	6	6	5	2	3		1	1				6	6						
4.7	Agents affecting digestive functions	6	7	3		3		1	1				7	7						
4.8	Seminar №5 "Pharmacology of the agents affecting the functions of the operating organs"	6	8	3		3		1	1				8	8		8				
5	Part 5. "Pharmacology of the agents affecting tissue metabolism»																			
5.1	Hormonal agents (I)	6	9	5	2	3		1	1				9	9						
5.2	Hormonal agents (II). Agents affecting immune processes.	6	10	5	2	3		1	1				10	10						
5.3	Vitamins. Potassium, sodium, magnesium and calcium agents.	6	11	5		3		1	1				11	11						
5.4	Seminar №6 "Pharmacology of the agents affecting tissue metabolism".	6	12	5		3		1	1				12	12		12				
6.	Part 6. Chemotherapeutical agents																			
6.1.	Antiseptic and desinfectant agents. Synthetic antimicrobial agents of different chemical structures. Sulfonamides.	6	13	3		3		1	1				13	13						
6.2.	Antibiotics.	6	14	5	2	3		1	1				14	14						
6.3.	Antituberculous, antispirochetal, antifungal agents.	6	15	5	2	3		1	1				15	15						
6.4.	Antiviral, antiprotozoal, antihelminthic agents.	6	16	3		3		1	1				16	16						
6.5.	Antitumoral agents.	6	17	5	2	3		1	1				17	17						
6.6.	Seminar №7 «Chemotherapeutical agents»	6	18			3		1	1				18	18		18				
	Term paper (project)	6						18			18									
	Exam preparation	6						36				36								
	Overall workload, in hours			148	37	111		104	50		18	36	Interim assessment							
													Type			Semester				
													Pass-fail exam			5				
													Exam			6				

4.2. Content of the discipline

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4.2.1. Part 1. «Formula and general pharmacology»

4.2.1.1. Formula and its structure. Forms of prescriptions. General rules of making prescriptions. Forms of prescriptions. Solid medicinal forms.

4.2.1.2. Soft medicinal forms. Rules of making prescriptions. Characteristics in application. Indication and contraindication of such medicinal forms.

4.2.1.3. Liquid medicinal forms. Rules of making prescriptions. Characteristics in application. Indication and contraindication of such medicinal forms.

4.2.1.4. «General pharmacology»

Definition of pharmacology, its place among other medical and biological sciences. The main stages of pharmacological development. Principles of new medicines prospecting. Synthesis of new medicinal substances on the basis of dependence between chemical structure and substances operation. Synthesis of medicines from vegetable and animal materials. Basic principles and test methods of new medicinal substances. Placebo concept, "blind" control. Pharmacological committee and its function. Pharmacokinetics of medicines.

Pharmacodynamics of medicines. The major principles of medicinal substances operation. Specific receptors, agonists and antagonists concepts . Pharmacological effects. Types of medicines effect.

The factors influencing pharmacokinetics and pharmacodynamics of medicinal substances. Chemical structure and physical and chemical properties of medicinal substances.

Types of doses: average and the highest therapeutic, single, daily, course. Toxic doses. Therapeutic application in action. Importance of sex and age for pharmacological effect.

Change of action of medicinal substances at their repeated use. Drug habituation, material and functional cumulation. Drug habituation (mental, physical). Medical and social aspects of drug addiction compaigns.

The combined use of medicines. Principles of interaction of the medicinal agents. Synergism (summation, exponentiation). Antagonism.

Side and toxic effect of medicinal agents. Side effects of the allergic and not allergic nature. Toxic effect of medicines. Teratogenicity, embryotoxicity. Idiosyncrasy.

4.2.3. Part 3 - «Medicinal agents affecting peripheral nervous system»

4.2.3.1. Classification of anesthetics. Localization and mechanism of the action. A comparative assessment of modern anesthetics and their application at different types of anesthesia. Toxic action of the anesthetizing substances and preventive measures.

4.2.3.2 The agents operating on cholinergic synapses. Division of cholinergic receptors into (M-and H- cholinergic receptors). Classification of the agents influencing stimulation in cholinergic synapses.

M-cholinomimetic agents (pilocarpine hydrochloride). Application. Toxic action of muscarine. Treatment of poisonings.

M - H-cholinomimetic. The main effects of acetylcholine and carbaholine. Indications to carbaholine application. Side effects.

4.2.3.3 Anticholinergic agents (proserpine, galantamine hydrobromide, fisostigmie salicylate, phosphacole. Character of interaction with acetylcholinergic.

The main effects. Comparative characteristic of the agents. Indications to application. Character of organophosphorous compound action. Side effects and toxic action. Treatment of poisonings. The use of cholinesterase reactivators (dipiroxim) at organophosphorous poisoning.

M-cholinoblocking agents (atropine sulfate, scopolamine hydrochloride, platyphyllin, methacin). Basic effects. Application. Atropine poisoning and help. Characteristic properties of action and application of atropine sulphate, scopolamine hydrochloride platyphyllin, methacin.

M-cholinoblocking agents. Ganglioblocking agents (benzohexamethonium, pentamine, hygronium). Localization and mechanism of the action. The main effects. Indications to application. Side effect.

The agents blocking a neuromuscular transmission (a tubocurarin chloride, dithylinum). Classification. The mechanism of the action of the depolarizing and anti-depolarizing agents. Application.

Possible complications. Antagonists of the anti-depolarizing agents. Preparations for enteral introduction (mellictinum)

4.2.3.4. Medications for adrenergic synapses

Adrenomimetic agents (adrenaline hydrochloride, noradrenaline tartrate, mesatone, naphthizin, izadrini, fenoterol, salbutamoli, ephedrine hydrochloride). Classification of adrenomimetics of direct action (their impact on cardiovascular system nonstriated muscles, metabolism). The main properties of adrenaline (effects on the cardiovascular system, smooth muscles, metabolism). Application. Character of action of noradrenaline. Effects on the heart, vascular tone. Application.

α-Adrenomimetics. The main effects and the use of mesatone. Features and application of naphthizin.

β-Adrenomimetics. Pharmacodynamics of izadrini. Application. β2- Adrenomimetics (fenoterol, salbutamoli).

Adrenomimetics of mostly indirect (sympathomimetic) action. The mechanism of action of ephedrine. The main effects. Application. Side effects of adrenomimetics, measures for their prevention and elimination.

4.2.3.5. Adrenoblocking agents (phentolamine hydrochloride, thropaphen, prazosin, propranolol) Pharmacodynamics of α-blockers. Application. Possible complications. Basic properties and application of β-blockers. Side effects.

Selectively acting β1-blockers (tylenol, metoprolol), α, β- Adrenoblockers (labetalol).

Sympatholytic agents (octadini, reserpine). Localization, mechanisms of action and effects of octadini and reserpine. Therapeutic applications. Side effect.

4.2.4. Part 4 - «Medication affecting central nervous system»

4.2.4.1. Medication for anaesthesia (halothane, ether for anaesthesia, nitrous oxide, hexenal, Thiopental sodium, ketamine, propanidid, sodium oxybutirate). Stages of anaesthesia.

Physicochemical characteristics of narcosis. The concept of the breadth of the drug action. Comparative characteristics of the agents for inhalation anesthesia. Characteristics of the agents of noninhalation anesthesia. Side effects of narcosis.

Ethyl alcohol. The influence of ethyl alcohol on the central nervous system. Acute poisoning and its treatment. The principles of alcoholism pharmacotherapy. Teturam.

4.2.4.2. Analgesic agents. Narcotic analgesics (morphine hydrochloride, omnoponum, promedol, fentanyl, pentazocine). Effects due to the influence on the central nervous system. Peculiarities of the analgesic effect. Possible mechanisms of analgesia. The idea of opioid receptors and their endogenous ligands. Impact on the internal organs (the cardiovascular system, bronchi, gastrointestinal tract). Comparative characteristics of separate drugs. Indications for use. The concept of neuroleptanalgesia. Side effects. Acute poisoning with narcotic analgesics and the basic principles of its pharmacotherapy. Addiction, drug addiction. The antagonists of narcotic analgesics (naloxone, nalorphine). The principles of action.

4.2.4.3. Analgesic agents. Non-narcotic analgesics (acetylsalicylic acid, amidopyrine, analgin, paracetamol). Features of the analgesic effect. Effects on peripheral mechanisms of the pain sensation. Mechanisms of the pain-relieving and anti-fever effect. Indications for use. The major side effects.

4.2.4.4. Hypnotics (nitrazepam, sodium etaminali). Classification. Anxiolytics with vivid hypnotic properties. Hypnotics of the narcotic type of the action (barbiturates, aliphatic compounds). Possible mechanisms of hypnotic action. The effect on sleep structure. Comparative characteristics of the hypnotics. The possibility of drug dependence. Acute hypnotics poisoning and principles of pharmacotherapy.

Antiepileptic agents (phenobarbital, phenytoin, sodium valproate, carbamazepine, clonazepam, ethosuximide). Possible mechanisms of action of antiepileptic agents. Comparative evaluation of the effectiveness of separate drugs in various forms of epilepsy. The agents blocking epileptic status. Side effects of antiepileptic drugs.

Antiparkinsonian agents (levodopa, amantadine, cyclodol. The basic principles of pharmacological correction of extrapyramidal disorders. Mechanisms of action of antiparkinsonian agents. Comparative evaluation of the effectiveness of separate drugs. The major side effects. The use of dioxyphe-

nylalanine decarboxylase inhibitors (carbidopa, etc.) for reduction of side effects and increase of levodopa efficiency.

4.2.4.5. Psychotropic drugs

Anxiolytics (tranquilizers) (diazepam, phenazepam, mesapam). Anxiolytic effect. Hypnotic, anticonvulsant, muscle-relaxing effect. Possible mechanisms of action. The idea of benzodiazepine receptors. The effect on GABAergic processes. Indications. Side effects. The possibility of drug dependency.

Sedatives (sodium bromide, valerian tincture and infusion). Their effect on the central nervous system. Indications for use. Side effects.

Antipsychotic drugs (neuroleptics) (chlorpromazine, triftazine, haloperidol, clozapine, chlorprothixene). Antipsychotic activity. Sedation. Impact on dioxyphenylalanine and adrenergic processes in the central nervous system. Potentiation of anesthetic drugs, hypnotics and analgesics.

Antiemetic effect. Comparative characteristics of antipsychotics. The application in medical practice. Side effects of antipsychotics, their pharmacological correction.

Mania treatment agents. Lithium salts (lithium carbonate). Possible mechanisms of action. Application. Side effects. The use of other psychotic agents at mania treatment.

4.2.4.6. Antidepressants (imipramine, amitriptyline, nialamide). General characteristics. Three- and tetracyclic antidepressants, MAO inhibitors. The effect on adrenergic serotinine and dopaminergic processes in the central nervous system. Comparative evaluation of certain drugs (antidepressant, awareness-inducing, sedative effect). Side effects.

Psychoactive drugs (caffeine, merydile, sydnocarb). Characteristics of psychoactive agents. Effect on cardiovascular system. Indications for use. Side effects. The possibility of drug dependence. Nootrophic agents (pyracetam). Effect on the nervous activity. Indications for use.

Analeptics (caffeine-sodium benzoate, cordiamin, bemegride, camphor oil solution)

The mechanisms stimulating effect on the central nervous system. Influence on

breathing and circulation. Application. Side effects.

4.2.5. Part 5 - «Medication affecting organ functioning»

4.2.5.1. "Agents affecting breathing functions".

Respiratory stimulants (cordiamin, bemegride, caffeine sodium benzoate). Basic mechanisms stimulating influence of substances on the breath. Comparative characteristics of respiratory stimulants from the analeptic and n-cholinomimetic groups. Indications for use.

Antitussives (codeine phosphate, libexini). Substances of central and peripheryfric action. The use of antitussives. Possibility of addiction to substances of central action.

Expectorants (infusion of thermopsis herb, potassium iodide). Localization and mechanisms of action of various drugs expectorant. Expectorants of reflexive and direct action. Indications for use.

Drugs used in bronchial asthma (fenoterol, salbutamol, isadrini, adrenalin hydrochloride, ephedrine hydrochloride, atropine sulfate, aminophylline, cromolyn sodium, ketotifen). Broncholytic agents. Differences in the mechanism of action. Indication., ways of introduction , side effects. Application for asthma allergy and anti-inflammatory agents (cromolyn sodium, ketotifen, glucocorticoids).

4.2.5.2. Cardiotonic agents

Cardiac glycosides (digoxin, digitoxin, strophanthine k). Pharmacodyinamics of cardiac glycosides: the impact on the power and heart rate, conductivity, automatism, metabolism in the myocardium. Cardiotropic mechanism of cardiac glycosides. Comparative characteristics of various drugs. Clinical manifestations of intoxication of cardiac glycosides, treatment and prevention. The use of cardiac glycosides in tachyarrhythmias.

Cardiac nonglycosidoses (dopamine, dobutamine). Properties and application.

Antiarrhythmics (quinidine sulfate, procainamide, lidocaine, propranolol, verapamil, amiodarone) Agents used at tachyarrhythmia and arrhythmia. The basic agents for sodium channel blockers (membrane stabilizing agents) influence on automatism, conductivity, effective refractory period. Features of antiarrhythmic action of β-blockers, calcium antagonists. Amiodarone. Preparations of potassium. Application. Side effects. Agents used at blockades of the conductive system of the heart (β- adrenomimetics, M-cholinoblockers).

4.2.5.3. Agents used at coronary heart disease (nitroglycerin, propranolol, verapamil). The principles of eliminating the oxygen-insufficient at angina (reduction of the need of heart in oxygen, increase of the delivery of oxygen to the heart). Agents used for the relief and prevention of angina attacks (antianginal drugs). Principles of nitroglycerin action. Organic long-acting nitrates. Antianginal agents of β-blockers, calcium channel blockers.
The basic principles of drug therapy of myocardial infarction. The use of painkillers and antiarrhythmic agents, agents normalizing hemodynamics, antiplatelet agents, anticoagulants, fibrinolytic agents.
Antiatherosclerotic agents. Classification. Mechanisms of influence on lipid metabolism. Application of different types of hyperlipoproteinemia. Side effects.
4.2.5.4. Antihypertensives (clonidine, methyldopa, propranolol, captopril, dichlothiazide). Classification. Localization and mechanisms of neurotropic agents. Myotropic funds. Activators of potassium channels. Calcium channel blockers. Drugs affecting the renin-angiotensin system. The antihypertensive effect of diuretics. Comparative features of the hypotensive activity, speed of response and its duration. The combined use of antihypertensive drugs with different mechanisms of action and localization. Side effects of antihypertensive drugs, their prevention and elimination.
4.2.5.5. Diuretics (dichlothiazide, furosemide, triamterene, spironolactone, mannitol). Diuretics action mechanism inhibiting the function of the epithelium of the renal tubules. Their comparative evaluation (speed of the action, efficacy, effect on the ion balance). Aldosterone antagonists, the effect of the ionic balance. Principles of osmotic diuretics. The use of diuretics. Magnesium and potassium saving diuretics. The principles of combining drugs. Side effects.
Agents influencing the tone and contractile activity of the myometrium (oxytocin, pytaitrini). Drugs used to enhance childbirth. oxytocin effect on myometrium. The pharmacology of prostaglandins. Application. Application of β2-adrenomimetics as tocolytic agents.
4.2.5.6. “Agents affecting digestive functions”
Agents affecting appetite. The mechanism of the stimulating effect of bitter stuffs on appetite and gastric secretion. Indications.
Agent decreasing appetite (anorectic agents). Mechanisms of action. Use at obesity treatment. Side effects. Contraindications.
Agents used at gastric glands disfunction.
Agents decreasing the secretion of gastric glands. The principles of substance action decreasing the secretory function of gastric glands (PPIs: Inhibitors of the H+/K+-ATPase proton pump; antihistamines blocking H2 receptors, M-cholinoblokers).
Antacids (magnesium oxide, aluminum hydroxide, almagelum, sodium hydrogen carbonate). Comparative characteristics of preparations. Indications for use. Side effects.
Gastroprotectives (sucralfate, bismuth citrate). The principles of operation. Application for peptic ulcer disease.
Drugs affecting gastric motility (atropine sulfate). Application of M- cholinoblockers with ulcers. The possibility of stimulating effect on gastric motility of cholinomimetic agents.
Emetic and anti-emetics (apomorphine hydrochloride, aethaperazinum, metoclopramide, scopolamine hydrobromide). The mechanism of emetics action. Indications for use of some drugs.
Cholagogic agents (acid dehydrocholic, oksafenamid, atropine sulfate, papaverine hydrochloride, magnesium sulphate). Classification. The principle of cholagogic agents action. Use of cholagogic and herbal drugs (allochol, cholosas). Agents affecting the bile discharge.
Agents used for the excretory pancreas disfunction (pancreatine, contrycal). Indications for pancreatine use. Proteolytic enzyme inhibitors and atropine type agents for acute pancreatitis treatment.
Drugs affecting intestinal motility. Drugs suppressing intestinal motility (atropine sulfate, papaverine hydrochloride, no-spa). The differences in the mechanism of agents oppressing intestinal motility. Application. Side effects.
Agents enhancing intestinal motility (aceclidine, proserpine). The differences in the mechanism of action of the substances increasing intestinal motility. Application. Purgatives (magnesium sulfate,

sodium sulfate, lactulose, macrogol, rhubarb root powder). Classification. The mechanism of action and application. Side effects.
4.2.5.7. “Agents affecting the system of blood”
Agents stimulating erythropoiesis (iron lactate, cyanocobalamin, folic acid). Drugs used in the treatment of hypochromic anemia. Absorption, distribution, division and allocation of iron supplementation. Effects on blood formation. Side effect. The mechanism of the pharmaceutical effect of cyanocobalamin, folic acid at hyperchromic anemia.
Agents stimulating leukopoiesis (pentoxyl, sodium nuclein, methyluracil). Indication. Side effects.
Agents inhibiting platelet aggregation (acetylsalicylic acid)
Agents inhibiting the biosynthesis of thromboxane. The use of substances inhibiting platelet aggregation.
Substances promoting coagulation (vikasol, fibrinogen, thrombin).
The mechanism of action of vitamin K, vikasol. Application. The drugs usedy to stop bleeding.
Substances preventing blood coagulation (anticoagulants) (heparin, neodikumarin, sinkumarin, warfarin). Mechanisms of heparin and indirect anticoagulants action. Application. Complications. Antagonists of anticoagulants of direct and indirect action (protamine sulfate, vitamin K). Fibrinolytic agents (streptokinase, urokinase, alteplase). The mechanism of fibrinolytic activity. Indications for use. Antifibrinolytic agents (contrycal, aminocaproic acid).
4.2.6. Part 6- Pharmacology of the agents affecting tissue metabolism”.
4.2.6.1. Preparations of hormones and their synthetic substitutes and antagonists. Classificationtion. Sources of receipt. General principles of biological standardization.
Hormonal agents of polypeptide structure amino acid derivatives.
Preparations of hormones of the hypothalamus and pituitary (corticotropin, oxytocin, pituitrin, adiurecrine). Properties and application of corticotropin, growth hormone, prolactin, thyrotropin and gonadotropic hormone drugs. Agents of hypothalamic hormones. Bromocriptine; its effect on the production of prolactin and growth hormone; application. Hormones of the posterior lobe of the pituitary gland. Use of oxytocin in obstetric practice. Antidiuretic properties of the vasopressin its effect on the tone of the intestines and blood vessels.
Preparations of thyroid hormones (thyroxine, triiodothyronine hydrochloride). Thyroxine and triiodothyronine affect on metabolism. Therapeutic applications. The physiological significance and practical application of calcitonin.
Antithyroid drugs. Pharmacodynamics of merkasolil. The mechanism of antithyroid iodine action. Application. Side effects.
The drug parathyroid hormone (parathyroidin). Influence of exchange of phosphorus and calcium. Application.
Preparations of insulin and synthetic hypoglycemic agents (insulin, glibenclamid, butamide).
Human insulin preparations. Effect of insulin on the metabolism. Principles of its dosage in the treatment of diabetes. The mechanism of action of synthetic hypoglycemic agents for oral introduction (sulfonylureas, biguanides). Comparative assessment of insulin and synthetic hypoglycemic agents. Indications for use. Side effects.
4.2.6.2. “Steroid structure hormones”
Preparations of ovarian hormones (estrogen and progestogen drugs) (estradiol, ethinylestradiol, sinestrol, progesterone). Preparations for enteral and parenternal application. A long-acting progestin (oksiprogesterone). Therapeutic use of estrogen and progestogen. Antiestrogens (komifeni citrate) and antigestagenic drugs. Application. Contraceptives. Operating principle. Application.
Preparations of male hormones (testosterone propionate). Indications for use. Side effects.
Antiandrogen agents (flutamide). Application. Anabolic steroids (fenobolin, retabolil). The effect on protein metabolism. Indications and contraindications. Side effects.
Preparations of hormones of the adrenal cortex (deoxycorticosterone acetate, hydrocortisone acetate, prednisolone, dexamethasone, triamcinolone, sinaflan, flumethasone pivalate). Classification. The main effect of mineralocorticoid. Glucocorticoid effects on the metabolism of carbohydrates,

proteins, salts, water, pigments. Anti-inflammatory and anti-allergic properties of the glucocorticoids. Therapeutic applications. Complications. Synthetic corticosteroids for a local application.

4.2.6.3. Vitamins

Preparations of water-soluble vitamins (thiamine chloride, riboflavin, calcium pantothenate, folic acid, nicotinic acid, pyridoxine hydrochloride, cyanocobalamin, calcium permanganate, ascorbic acid, rutin). Source. The role of vitamins in metabolism. The effect on the nervous and cardiovascular systems, gastrointestinal tract, hematopoiesis, state epithelium, regeneration processes. Indications for use of some drugs.

Alkali and alkaline metals (sodium chloride, potassium chloride, calcium chlorite, chloride, calcium gluconate, magnesium sulfate).

Sodium salts. Isotonic, hypertonic and hypotonic solutions of sodium chloride. Application.

Potassium salts. The value of potassium ions for the function of the nervous and muscular systems. Participation in the transmission of nervous excitement. The regulation of the exchange of potassium. The use of potassium agents.

Calcium salts. Effect on central nervous system, cardiovascular system, cell permeability. The regulation of calcium metabolism. Use of calcium drugs.

Magnesium salts. Resorptive effect of magnesium sulfate. The mechanism of the antihypertensive action. Narcotic effect. Therapeutic applications. The antagonism of calcium and magnesium ions.

4.2.6.4. Drugs affecting the immune processes (hydrocortisone, prednisone, triamtcinolone, dexamethasone, cromolyn sodium, ketotifen diphenhydramine, promethazine, diazolin, suprastin, fencarolum). Glucocorticoids. The mechanisms of antiallergic action. Principles and application of cromolyn sodium and ketotifen.

Antihistamines. Mechanism of action. Agents affecting N1--receptors. Their comparative evaluation. Application. Side effects. Immunosuppressive properties of cytostatic agents (azathioprine). Cyclosporine. Application of antiallergic agents in delayed and immediate type reactions.

Immunomodulators (taktivin, levamisole).

Antipodagric agents (etamid, allopurinol). Mechanisms of action. Indications and contraindications. Side effects. Agents used for acute attacks of gout (colchicine, indomethacin).

4.2.7. Part 7 – “Antimicrobial and antihelminthic agents”

4.2.7.1. Antiseptic and disinfecting medication.

The concept of antisepsis and disinfection. Basic mechanisms of action of antiseptics on microorganisms. Detergents. The concept of anionic and cationic detergents. Their antimicrobial and detergent properties. Application.

Biguanid (chlorhexidine). Features of action and application. Nitrofurantoin derivatives (furacilin).

Compounds of metals (silver nitrate, copper sulfate, zinc sulfate). Antimicrobial properties. The conditions determining antimicrobial activity. Local action (astringent, irritating and cauterizing effects). Application of some drugs. General characteristics of the resorptive action. Metal salts poisoning. Assistance at poisoning.

Halogen compounds (chloramine B, iodine alcoholic solution of 5%, 10%). Action and use of chlorine and iodine. Oxidants (hydrogen peroxide, potassium permanganate). Principle. Application.

Antiseptics aliphatic (ethyl alcohol 70%, 90%, 95% formaldehyde solution). Antimicrobial properties, mechanisms of action. Application. Acids and alkalis (boric acid, ammonia). Antiseptic activity. Application. The dyes (brilliant green, ethacridine lactate). Features of action and application.

4.2.7.2 “Antibiotic chemotherapeutical agents”

The basic principles of chemotherapy. Antibiotics (benzylpenicillin sodium, benzylpenicillin novocaine salt, bicillini 1, 5, oxacillini sodium, ampicillin trihydrate, cephaloridine, zephotaxini, erythromycin, tetracycline, methacycline, doxycycline, chloramphenicol, streptomycin sulfate, neomycin sulfate). The main mechanisms of action of antibiotics. Principles of classification. The concept of primary and backup antibiotics. Antibiotics penicillin. The ways of introduction, distribution, duration and dosage of biosynthetic penicillin. Features and application of semi-synthetic penicillin. B-lactamase inhibitors (clavulanic acid, etc.). Pharmacology of cephalosporin, carbapenems, macrolides, tetracycline, chloramphenicol, aminoglycosides, etc. Complications of antibiotic treatment,

prevention and treatment. Sulfonamides agents. Mechanism and spectrum of antibacterial action. The duration of action and dosage. Possible complications in the application of sulfonamides, prevention and treatment. Combined use of sulfonamides with trimethoprim (Bactrim). The synthetic antimicrobial agents of different chemical structure (nalidixic acid, nitroxoline, furasolidone, ofloxacin, etc.) Spectrum of antibacterial action of the drugs with different chemical structure. Indications for use. Side effects.

4.2.7.3. Antituberculous agents (isoniazid, rifampicin, streptomycin sulphate, ethambutol). General characteristics. The spectrum and antibacterial mechanism of action. Side effect. Features of the application of antituberculous drugs (duration of treatment, the principles of combined therapy).

Antisyphillitic agents (benzylpenicillin sodium, bitsilliny1,5). Antispirochetic agents of penicillin drugs. The mechanism of action of drugs bismuth, their use in the treatment of syphilis. Side effect. Reserved Antispirochetic antibiotics. Antimalarials (chingamin, chloridine, quinine, primaquine). Principles of treatment of individual and social chemoprophylaxis of malaria. Side effects.

Antiamebic agents (metronidazole, emetine hydrochloride, chingamin). Indication. Side effect. The use of tetracyclines at amebiasis. Agents used for lambliasis (metronidozal, furazolidone, quinacrine). Comparative efficacy of drugs for giardiasis. Agents used for trihomoniasis (metranidazol, furazolidone, quinacrine). Principles of trihomoniasis chemotherapy.

Agents used for toxoplasmosis (chloridin). Properties of chloridin. Combined treatment of toxoplasmosis with chloridin and sulfanilamidi drugs. Agents used for leishmaniasis (solyusurmin). Properties of solyusurmia. Application for the treatment of visceral and cutaneous leishmaniasis. Application of monomycin in cutaneous leishmaniasis.

4.2.7.4 Antiviral agents (oxoline, remantadinum, oseltamivir, idoxuridine, acyclovir, vidarabine). Directions and mechanisms of action of antiviral agents. Application. The biological significance, properties and applications of interferons. Agents for the treatment of AIDS.

Antifungal drugs (nystatin, levorin, amphoterin B, miconazole, ketoconazole). The differences in the spectrum of action and indications of drugs. Agents for treatment of superficial and systemic fungal infections. Side effects. Anthelmintics (piperazine adipate, naftamon, levamisole, mebendazole). Classification. Mechanisms of action. Basic principles. Pharmacodynamics of substances used in intestinal nematodes. Side effects. Application. Agents used for intestinal cestodiasis. Properties, application features, side effects. General characteristics of the funds used in extra-intestinal helminths.

4.2.7.5. Antitumoral agents (cyclophosphan, chlorbutin, mielosan, methotrexate, mercaptopurine, fluorouracil, prospidinum, colhamine, vincristine, vinblastine). The principles of classification. Modern views on the mechanisms of action. Features of the spectrum of antitumor action of alkylating agents, antimetabolites, antibiotics, hormones and hormone antagonists (tamoxifen citrate, flutamide), enzymes (asparaginase), platinum drugs (cisplatin). Complications and their prevention and treatment. Immunosuppressive properties of cytostatics.

5. Teaching forms and techniques

• Multimedia lectures;
• Practical studies;
• Discussion of the complex and controversial issues (with the "brainstorming" and without it);
• Simulation games;
• Independent work in the form of making prescriptions;
• The solution of the situational tasks.

5.1. Active learning methods

1. Case study method (case method)
2. The decision of situational problems

5.2 When teaching students who carry out the educational process on their own trajectory within the framework of an individual work plan, the study of this discipline is based on the following possibilities: provision of out-of-class work with students including in the electronic educational environment with the use of appropriate software equipment, distance learning forms, resources, individual consultations, etc.

6. Teaching and learning materials for students' individual work. Forms of current and interim assessment.

6.1. Outline of students' individual work

№	Topic	Type of individual work (must match the types of the table 4.1)	Task	Suggested reading material	Hours (must match the numbers of the table 4.1)
1.1.	Introduction. Formula and its structure. Forms of prescriptions. Solid medicinal forms.	Preparing for the classroom	Preparation for a discussion, prescription work.	Pharmacology [Электронный ресурс] / Kharkevitch D.A. Kharkevitch D.A. - M. : ГЭОТАР-Медиа, 2008. - http://www.studmed-lib.ru/book/ISBN5970402648.html	1
1.2.	Liquid medicinal forms. Medicinal forms for injections.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
1.3	Soft medicinal forms	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
1.4	General pharmacology	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
1.5	A test study «Formula and general pharmacology»	Preparing for the classroom	Preparation for a discussion, prescription work, the tests.	The same	4
2.1.	Medication affecting afferent innervation	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
2.2.	Introduction to vegetative nervous system pharmacology. Cholinergic receptors agonist	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
2.3	Cholinergic receptors antagonist	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
2.4	Adrenomimetic agents	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
2.5	Adrenonegative and sympatolytic medication.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
2.6	A test study «Medicinal agents affecting peripheral nervous system»	Preparing for the classroom	Preparation for a discussion, a written work, the tests.	The same	4
3.1	Medication for anaesthesia. Ethyl alcohol.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
3.2	Opioids analgesic	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
3.3	Nonnarcotic analgesic	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1

3.4	Soporific medication. Antiepileptic and antiparkinsonian agents.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
3.5	Psychotropic agents. Psychoanaleptics.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
3.6	Psychotropic agents. Psycholeptics.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
3.7	Seminar «Medication affecting central nervous system»	Preparing for the classroom	Preparation for a discussion, a written work, the tests.	The same	4
	A pass study	Preparing for the pass-fail exam	Preparation for a discussion, prescription work.	The same	5
4.1.	Agents affecting breathing functions.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1,5
4.2.	Antiatherosclerotic agents. Agents for a stroke treatment. Angioprotectors. Antianginous medicinal agents.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
4.3.	Antihypertensive and pressor agents.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
4.4.	Antiarhryhtmic and cardiotonic agents	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
4.5	Diuretics. Myometrium agents.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
4.6	Agents affecting blood formation, blood coagulation, fibrinolysis and platelet aggregation	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
4.7	Agents affecting digestive functions	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
4.8	Seminar №5 “Pharmacology of the agents affecting the functions of the operating organs”	Preparing for the classroom	Preparation for a discussion, a written work, the tests.	The same	1
5.1	Hormonal agents (I)	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
5.2	Hormonal agents (II). Agents affecting immune processes.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
5.3	Vitamins. Potassium, sodium, magnesium and calcium agents.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
5.4	Seminar №6 “Pharmacology of the agents affecting tissue metabolism”.	Preparing for the classroom	Preparation for a discussion, a written work, the tests.	The same	1
6.1.	Antiseptic and desinfectant agents. Synthetic antimicrobial agents of different chemical structures. Sulfonamides.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
6.2.	Antibiotics.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
6.3.	Antituberculous, antispirochetal, antifun-	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1

	gal agents.				
6.4.	Antiviral, antiprotozoal, antihelminthic agents.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
6.5.	Antitumoral agents.	Preparing for the classroom	Preparation for a discussion, prescription work.	The same	1
6.6.	Seminar №7 «Chemotherapeutical agents»	Preparing for the classroom	Preparation for a discussion, a written work, the tests.	The same	1

6.2. Methodical instructions on the organization for individual students' work

1. Moiseeva I.Ya, Rodina O.P., Kustikova I.N., Vodopiyanova O.A. Pharmacology: Educational handbook. Penza: PSU Publisher, 2017.

6.3. Current and interim assessment materials

Competence development assessment

№	Type of assessment	Topics (parts) assessed	Competences and elements assessed
1	Testing	Parts 1-6	OPC-8; PC – 8
2	Checking skills (prescription works)	Parts 1-6	OPC-8; PC – 8
3	Discussion	Parts 1-6	OPC-8; PC – 8
4	Course work	Parts 4-6	OPC-8; PC – 8

Demo variant of written control work (prescription works)

Make a prescription:

1. Write out 10 rectal suppositories officinal "Anisole." Assign 1 suppository rectum at night.
2. Write down 20.0 petrolatum ointment containing 10% streptocid. Apply on the affected skin.
3. Prescribe 20.0 officinal zinc ointment (Unguentum Zinci). Apply on the affected skin.

Criteria for assessing the practical skills (prescription works)

9-10 points	all drugs are chosen correctly, the work is done completely without error and shortcomings
7-8 points	all the drugs chosen correctly, the work does not contain more than one sensitive errors and shortcomings of not more than three defects
5-6 points	two drugs are chosen correctly, the work does not contain more than two non-robust error and no more than five deficiencies
4 points or less	4 points number of errors and defects exceeded the norm for the evaluation as "satisfactory" or properly performed less than 2/3 of the entire work

Demo variant of test

1. What medicinal forms have the liniments got?

1) Liquid, soft;
2) Solid, soft;
3) Only soft,
4) Only liquid.

2. What medicinal forms have the suppositories got?

1) solid;
2) liquid;
3) soft.

3. The amount of powder-like substances in the paste constitutes

1) < 25 %;

2) 25 %< m< 65 %;
3) >65 %.

4. Ointments have the following properties:
1) Melt at body t ;
2) Have a high lubricated quality;
3) Change their characteristics at sun and air exposure.

1. Choose the dose equal to 5 mg:
1) 0,005;
2) 5,0;
3) 0,05;
4) 0,5.

6. Choose the dose equal to 25 centigram:
1) 0,25;
2) 0,025;
3) 0,0025;
4) 0,00025.

7. Soft medicinal forms are:
1) emulsion;
2) liniments;
3) mucus;
4) suppositories**;**
5) paste.

8. Indicate ways of liniments application**:**
1) internally;
2) externally;
3) transedermal

9. How to make a prescription for officinal liniments?
1) Full and abridged;
2) Only abridged;
3) Only full.

10. Pastes unlike liniments:
1) Have dense consistence;
2) Better penetrate through the skin;
3) Remain in the spot of application longer;
4) Have adsorbing and dewatering effect.

Criteria for assessing the test

"Excellent" ("5") - 91% or more correct answers to test items.
"Good" ("4") - 81-90% of correct answers to test items.
"Satisfactory" ("3") - 71-80% of correct answers to test items.
"Disappointing" ("2") - 70% or less correct answers to test items.

Demo variant of questions for a seminar

1. The classification of dosage forms.
2. Prescription and its structure. Forms of prescriptions.
3. Designation of drug dosages in the prescription.
4. Solid medicinal forms, their comparative characteristics and rules of prescription.
5. Ways of transition and discharge of the drugs from the body. Quantitative characteristic of elimination process of the drug (the elimination of the quota period T1 / 2 and clearance of the drug).

Demo variant of questions for pass-fail exam

1. Solid medicinal forms, their comparative characteristics and rules of prescription.
2. The concept of pharmacokinetics. Mechanisms of drug absorption.

3. Classification agents affecting cholinergic synapses.
4. Pharmacodynamics of adrenaline, its effects on energy metabolism. Features of action of adrenaline on the cardiovascular system at subcutaneous and intravenous introduction, indications, contraindications and side effects.
5. Narcotic analgesics. Features and mechanism of the analgesic action.

Demo variant of questions for exam

1.Comparative characteristics of the drugs introduction.
2. M-cholinoblocking agents: pharmacodynamics, medicines, indications and contraindications.
3.Characteristics of hypnotics - barbituric acid and derivatives. Characteristics of hypnotics - benzodiazepines, γ-oxybutyric acid, and various chemical groups.
4. Classification of antiarrhythmic agents. Pharmacodynamics and pharmacokinetics of antiarrhythmics of membranestabilising action. Indications for their use, side effects.
5. Pharmacology of drugs used to treatthyroid hyperfunction (antithyroid medicines).

Criteria for assessing the discussion session on a seminar, pass-fail exam and exam

"Excellent" - a full response, competent, logical; fluency of pharmacological terminology; answers to additional questions clear brief.
"Good" - the answer is quite logical with single errors in the particulars; single error in the Latin terminology; answers to additional questions correct, clear enough.
"Satisfactory" - the answer is not enough literate, part-time, with errors in the details; Errors in Latin terminology; answers to additional questions is not enough clear, with errors in the particulars, the material covered in part.
"Disappointing" - the answer is illiterate, incomplete, with gross errors; ignorance of the Latin terminology; answers to additional questions wrong, there is a partial view of the subject, there is no ability to rationalize their thoughts.

Demo variant of case study

A 12-year-old girl presents to your office with a sore throat and fever. You diagnose her with pharyngitis caused by group A-hemolytic streptococcus. She is given an IM injection of penicillin. Approximately 5 minutes later, she is found to be in respiratory distress and audibly wheezing. Her skin is mottled and cool, she is tachycardic (rapid heart rate), and her blood pressure has fallen to 70/20 mmHg. You immediately diagnose her as having an anaphylactic reaction to the penicillin and give a subcutaneous injection of epinephrine.

- What effect will epinephrine have on this patient’s vascular system?
- Which adrenoceptor primarily mediates the vascular response?
- What effect will epinephrine have on her respiratory system?
- Which adrenoceptor primarily mediates the respiratory system response?

Criteria for assessing the decision of case study

"Excellent" - a full response, competent, logical; fluency in pharmaceutical terminology.
"Good" - the answer is not enough to single logical errors in particular; single error in the pharmaceutical terminology.
"Satisfactory" - the answer is not enough literate, part-time, with errors in the details; errors in pharmacological terms.
"Disappointing" - the answer is illiterate, incomplete, with gross errors; ignorance of pharmaceutical terminology.

Research work

1. Pharmacoeconomic evaluation of pharmacotherapy.
2. pharmacoepidemiological evaluation of pharmacotherapy.

7. Information materials for the discipline

a) Basic reading

Pharmacology [Электронный ресурс] / Kharkevitch D.A. - M. : ГЭОТАР-Медиа, 2008. - http://www.studmedlib.ru/book/ISBN5970402648.html

б) Supplementary reading:

Фармакология [Электронный ресурс]: учебник / под ред. Р.Н. Аляутдина. - 4-е изд., перераб. и доп. - М.: ГЭОТАР-Медиа, 2013. - http://www.studmedlib.ru/book/ISBN9785970425183.html

c) Software and Internet resources

1. Microsoft Windows (DreamSpark/Microsoft Imagine Standart); reg. number 00037FFEBACF8FD7, contract № СД-130712001 of 12.07.2013. 5. Kaspersky Anti-Virus 2016-2017, reg. number KL4863RAUFQ, contract № ХП-567116 of 29.08.2016. 6. Open source software: LibreOffice; Google Chrome; Adobe Reader; 7zip.
2. Free video lectures - freevideolectures.com
3. EBS 'student Consultant - http://www.studmedlib.ru

8. Equipment

№	Specialty rooms and rooms for independent work	Facilities special facilities and space for independent work
1.	Classroom 10-314, 10th PSU enclosure, 17.2 m2	1. Desks for school - 9 pieces 2. Chairs - 18 pieces 3. Personal computer - 1 pieces 4. Visual aids (posters). 5. Training Board - 1 piece
2.	Classroom 10-204, 10th PSU enclosure for students' individual work	1. Desks for school - 10 pieces 2. Chairs - 20 pieces 3. Personal computer - 10 pieces 4. Visual aids (posters).5.

The study program for the discipline Pharmacology is prepared in accordance with the requirements of the FGOS VO and the educational plan of the specialty 31.05.01 "General Medicine"

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The programme developers:

1. ass. professor O.P. Rodina

Verification and correction are executed by ass. professor Y. A. Didyk, translation department

The programme was discussed and agreed at the department meeting "G&CPh"

Records № 11 on «04» 03 2016

Head of the department _____ professor I.Ya. Moiseeva
(signature, names)

The programme is agreed with the head of

The medical faculty _____ The dean, professor I.Ya. Moiseeva
(department) (signature, names, date)

The programme was approved by methodology council of the medical Institute

Records № 7 on «05» 03 2016

Chair of the methodology council of the medical Institute _____ professor O.V. Kalmin

List of annual registration for changes and amendments to the present programme.

Academic year	Departmental review (records №, date, head of the department signature)	Changes and amendments	Pages		
			changed	added	deleted
2016/ 2017	пересм., протокол №1 01.09.16 [signature]	без изменений			
2017/ 2018	пересм. и утв. протокол №1 от 04.09.17 [signature]	добавлен в п. 5.0 принцип обучения у обуч-ся с ОВЗ	6	6	
2018/ 2019	пересм. протокол №1 от 04.06.18 [signature]				