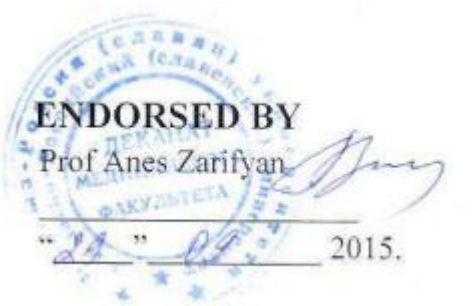
MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIA FEDERATION
MINISTRY OF EDUCATION AND SCIENCE OF THE KYRGYZ REPUBLIC
Kyrgyz – Russian Slavic University
School of Medicine



Clinical pharmacology

Course Outline (module)

Assigned to the department **Basic and Clinical Pharmacology**
Academic Curriculuma 31050150_18_1ld_plx
31.05.01. Clinical medicine
Qualification specialist
Form of training intramural
Total credit value 3 credit point
Course hours 108
Including
in-class learning 72 Scope of Testing Semesters
individual work 36 exams 9

Course Hours Sceduling (per semester)

Semester (<Course>. <Academic year>)	9 (5,1)		Total	
Weeks	18			
Type of Traning	AC	CO	AC	CO
Lectures	18	18	18	18
Practical	54	54	54	54
Practical Session	4	4	4	4
Face-to-face learning	72	72	72	72
Individual work	36	36	36	36
Total	108	108	108	108

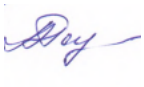
The course outline developed by

c.m.s. Kulushova G.A. d.m.n. the Head of Department Zurdinova A.A.

Reviewer(s):

PhD, drug policy consultant HoM KR, assistant of professor Jumagulova J.O.

PhD, assistant of professor Sharaeva A.T.



The course outline
Clinical Pharmacology

Developed in full compliance which FSES 3+
Federal State Educational Standard of Higher Professional Education, for students trained for specialty 31.05.01 General Medicine (The Ministry of Education and Science of the Russian order of 09.02.2016 №95)

In accordance with Academic Curriculum:
Confirmed by KRSU Board of Academics in 26.06.2018 record №2

The course outline endorsed by Basic and Clinical Pharmacology Department Meeting
Record of 26 august 2018, №1
Valid for: 2016 – 2021 academic years
The Head Basic and Clinical Pharmacology Department Zurdinova A.A.

The course outline endorsed for the following academic year

Chairman of the Educational and Methodological Board

16 November 2016 г.

The course outline has been revised, considered and endorsed for implementation
in 2016-2017 Academic Year at the Staff Meeting of _ Basic and Clinical Pharmacology Department

Record of 22 October 2016 г. . № 3
The Head of Department Basic and Clinical Pharmacology Department: Zurdinova A.A.

The course outline endorsed for the following academic year

Chairman of the Educational and Methodological Board

15 December 2017 г.

The course outline has been revised, considered and endorsed for implementation
in 2017-2018 Academic Year at the Staff Meeting of __ Basic and Clinical Pharmacology Department

Record of 14 October 2017. № 3
The Head of Department Basic and Clinical Pharmacology Department: Zurdinova A.A.

The course outline endorsed for the following academic year

Chairman of the Educational and Methodological Board

7 December 2018

The course outline has been revised, considered and endorsed for implementation
in 2018-2019 Academic Year at the Staff Meeting of Basic and Clinical Pharmacology Department

Record of 1 September 2018 № 2
The Head of Department Basic and Clinical Pharmacology Department: Zurdinova A.A.

The course outline endorsed for the following academic year

Chairman of the Educational and Methodological Board

4 September 2019

The course outline has been revised, considered and endorsed for implementation
in 2019-2020 Academic Year at the Staff Meeting of Basic and Clinical Pharmacology Department

Record of 28 August 2019 . №1
The Head of Department Basic and Clinical Pharmacology Department: Zurdinova A.A.

The course outline endorsed for the following academic year

Chairman of the Educational and Methodological Board

23 September 2020

The course outline has been revised, considered and endorsed for implementation
in 2020-2021 Academic Year at the Staff Meeting of Basic and Clinical Pharmacology Department

Record of 25 August 2020. № 1
The Head of Department Basic and Clinical Pharmacology Department: Zurdinova A.A.

The course outline endorsed for the following academic year

Chairman of the Educational and Methodological Board

9September 2021

The course outline has been revised, considered and endorsed for implementation
in 2020-2021 Academic Year at the Staff Meeting of Basic and Clinical Pharmacology Department

Record of 27 August 2020 . № 1
The Head of Department Basic and Clinical Pharmacology Department: Zurdinova A.A.

1. Course outline objectives	
1.1	Training in the selection of effective, safe, cost-effective medicines for modern individualized pharmacotherapy using the latest information on pharmacokinetics, pharmacodynamics, interaction and side effects of drugs, provisions evidence-based medicine and formulary system
2. Place of the course in the educational program	
Educational Program Unit	B1.B
2.1	**Students Preliminary Training Requirements:**
2.1.1	Pharmacology
2.1.2	Pharmacoeconomics
2.1.3	Pharmacoepidemiology
2.1.4	Propaedeutics of internal diseases
2.1.5	Faculty therapy
2.1.6	Endocrinology
2.2	**Course Units and Practical Sessions imposing the prior Proficiency**
2.2.1	Obstetrics and gynecology
2.2.2	Hospital therapy
2.2.3	Infectious diseases
2.2.4	Otorhinolaryngology
2.2.5	Psychiatry, medical psychology
2.2.6	Evidence-based medicine
2.2.7	Outpatient therapy
2.2.8	Anesthesiology, intensive care, intensive care
2.2.9	Dermatovenerology
2.2.10	Diagnostic and treatment standards
3.Students competencies resulting from the course unit (Module)	
OPK-8: readiness for medical use of drugs and other substances and their combinations in solving professional problems	
Knowledge:	
Level 1	• general clinical pharmacology, the concept of clinical pharmacodynamics and pharmacokinetics, factors affecting the pharmacokinetics of drugs, the importance of lipophilicity, polarity, the degree of dissociation, the concept of bioavailability, processes of absorption, distribution, communication with proteins, volume of distribution, metabolism and excretion of drugs; • types of pharmacotherapy, goals of treatment; • types of drug interactions; • classification of side effects by type, principles of pharmacovigilance, the Naranjo scale; • principles of rational use of medicines; • principles for the selection of medicines by the steps of rational use of medicines,criteria for their selection; • principles of informing, instructing, caution on the use of medicines;

	• The principles of monitoring the effectiveness and safety of pharmacotherapy.
Level 2	private pharmacology issues: • clinical pharmacology of drugs used for hypertension; • clinical pharmacology of drugs used for coronary heart disease; • clinical pharmacology of drugs used in obstructive syndrome; • Clinical pharmacology of drugs used for hemostatic disorders.
Level 3	• Clinical pharmacology of drugs used for diabetes and diseases thyroid gland; • clinical pharmacology of drugs used in the inflammatory process; • clinical pharmacology of antibacterial, antiviral and antifungal agents; • principles for evaluating ongoing pharmacotherapy in a supervised patient in terms of rationaluse of medicines.
Skills:	
Level 1	• analyze the effect of drugs depending on pharmacodynamics and pharmacokinetics; • evaluate the interaction of drugs; • determine the cause-effect relationship with the development of unwanted adverse reactions; • make steps when choosing a Personal group and a Personal preparation; • analyze data on the effectiveness and safety of the use of drugs; • monitor the treatment;
Level 2	• choose a Personal group, a Personal drug for hypertension, ischemic heart disease, bronchial obstructive syndrome, hemostatic disorders, taking into account concomitantdiseases and conditions; • inform, instruct and warn the patient about ongoing pharmacotherapy; • monitor treatment.
Level 3	• choose a Personal group, a Personal drug for inflammatory diseases, diabetes, thyroid diseases, taking into account concomitant diseases and conditions; • choose etiotropic pharmacotherapy depending on the causative agent of the disease(antibacterial, antiviral, antifungal) • inform, instruct and warn the patient about ongoingpharmacotherapy; • monitor treatment; • evaluate ongoing pharmacotherapy in a supervised patient according to effectiveness criteria,safety, acceptability, drug interactions.
Expertise:	
Level 1	• skills to identify different types of pharmacotherapy Personal group and drug; • skills for conducting patient counseling (informing, instructing and warnings) • Dosage calculation methods. • skills in interpreting data on the pharmacokinetics of drugs; • skills that cause undesirable drug reactions during pharmacotherapy, registration of a "yellow" card for side effects;

	• skills to assess the interaction of drugs prescribed by patients
Level 2	• skills in conducting rational pharmacotherapy for various diseases and conditions bythe choice of the Personal group and the Personal preparation; • counseling skills to inform, instruct and warn the patient about ongoing therapy.
Level 3	• skills of critical assessment of ongoing pharmacotherapy in a supervised patient according to prescribed drugs. • predict and determine the risk of side effects of drugs; • carry out the combined prescription of drugs; • inform the patient about the planned drug therapy; • evaluate the effectiveness and safety of drug therapy

Final Students Competences

3.1	**Knowledge:**
3.1.1	goals and objectives of clinical pharmacology, unlike pharmacotherapy;
3.1.2	types of pharmacotherapy;
3.1.3	principles of rational use of medicines;
3.1.4	steps for the rational use of medicines: determining the purpose of treatment, choosing Personalgroups and Personal preparation, elements of information, instruction and warnings,monitoring the effectiveness and safety of therapy;
3.1.5	group affiliation and pharmacodynamics of the main groups of drugs;
3.1.6	basic pharmacokinetic processes, pharmacological parameters and their clinical significance .;
3.1.7	dosage regimen for various pathologies, in the elderly, during pregnancy andlactation, depending on the nature of the disease and the functional state of the patient's body;
3.1.8	features of dosage of drugs depending on age, nature of the disease and functional statethe patient’s body;
3.1.9	types, undesirable drug reactions, methods for their prevention, diagnosis and correction.
3.1.10	types and mechanisms of drug interactions, drug interactions with food, herbal remedies, components of tobacco smoke, alcohol.
3.1.11	the concept and clinical significance of pharmacogenetics, the main pharmacogenetic phenomena leading to a change in the pharmacological response to drugs.
3.1.12	methods for assessing the clinical efficacy and safety of the use of the main groups of drugs;
3.1.13	pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions,the interaction of drugs used for diseases of internal organs and emergencyconditions
3.1.14	fundamentals of the formulary system (Essential Medicines Formula);
3.1.15	the importance of clinical guidelines and protocols for the diagnosis and treatment of the most commondiseases.
3.2	**Skills:**
3.2.1	collect pharmacological and allergological history;

3.2.2	choose effective, safe and affordable medicines according to clinical diagnosis, taking into account their pharmacokinetics, pharmacodynamics, interactions with other drugsmeans, individual sensitivity, concomitant diseases, functional statethe body (pregnancy and lactation);
3.2.3	choose doses of drugs in accordance with the results of therapeutic drug monitoring and pharmacogenetic studies;
3.2.4	calculate doses of drugs for patients with chronic renal failure, impaired liver function, the elderly and senile, children;
3.2.5	calculate the load and maintenance dose of the drug according to indications;
3.2.6	explain to the patient the rules for the use of drugs
3.2.7	monitor the effectiveness and safety of the use of prescribed drugs;
3.2.8	carry out prophylaxis, diagnosis and correction of undesirable drug reactions, fill outdocuments on the notification of the development of undesirable drug reactions;
3.2.9	to diagnose and treat drug overdose.
3.2.10	carry out drug treatment of a particular patient with diseases of the internal organs and emergencyconditions;
3.2.11	use sources of clinical and pharmacological information - Forms, clinicalmanuals, protocols, guides, electronic databases, Internet resources.
3.3	**Expertise:**
3.3.1	choose the P-group of (personal) drugs depending on the diagnosis and purpose of treatment;
3.3.2	choose a P-drug taking into account effectiveness, safety, acceptability and cost.
3.3.3	choose a dosage form, route of administration, dosage regimens of a drug in a particularclinical situation;
3.3.4	to predict and determine the risk of side effects of drugs;
3.3.5	conduct a combined prescription of drugs;
3.3.6	inform the patient about the planned drug therapy;
3.3.7	assess the effectiveness and safety of drug therapy.

4.COURSE (MODULE) STRUCTURE AND CONTENT

Class code	Subject name /Tipe of class/	Semester/ Academic Year	Hours	Competencies	Literature	Interactive session	Notes
	Module 1. General clinical pharmacology						

1.1	Introduction to Clinical pharmacology. Pharmacotherapy /lecture/	9	2	PC-8	L1.2 L2.1 L2.2 E1	0	
1.2	Clinical Pharmacokinetics and pharmacodynamics of drugs funds/lecture/	9	2	PC-8	L1.2 L2.1 L2.2 E1	0	
1.3	Side effects of medicinalfunds. Pharmacovigilance/lecture/	9	2	PC-8	L1.2 L2.1 L2.2 E6 E7 E9	0	
1.4	Drug interactions. Interaction assessment tools/lecture/	9	2	PC-8	L1.2 L2.1 L2.2 E3 E4 E8	0	
1.5	Rational pharmacotherapy. Choice of P-gruppa and P-drug/lecture/	9	2	PC-8	L1.2 L2.1 L2.2	0	
1.6	Application features medicines in the elderly, children and pregnant/lecture/	9	2	PC-8	L1.2 L2.1 L2.2 E6 E7 E10	0	
1.7	Clinical Pharmacokinetics/Pr/ medicines /Pr/	9	3	PC-8	L1.2 L2.1 L2.2 E1	0	Work on website by interactive clinical pharmacology
1.8	Side effects of medicinal funds. Pharmacovigilance / Pr /	9	3	PC-8	L1.2 L2.1 L2.2 E1 6E7E9 E10	0	Decision situational tasks
1.9	Drug interactions funds. Interaction Evaluation BOS / Pr /	9	3	PC-8	L1.2 L2.1 L2.2 E3 E4 E8	0	Decision situational tasksusing electronicbases

1.10	Principles of rational use of drugs. Selection Criteria P-groups and P-drug / Pr /	9	3	PC-8	L1.2 L2.1 L2.2 E10	0	Compilation tables for choice and calculations for criteriaof choice
1.11	Independent work on the section "General clinical pharmacology "/ IW/	9	16	PC-8	L1.1L1.2L 2.1L2.2 E1 E2 E3 E4 E5 E6 E7 E8 E9 E10	0	Preparation for colloquium by section "Generalclinical pharmacology", work in Databases training presentations abstracts decision situational tasks analysis pharmacokinet of personal parameters drugs
	Module 2 Private clinical pharmacology						
2.1	Clinical Pharmacology medicines used with arterial hypertension andrational principlesuse of antihypertensive funds / Lecture /	9	2	PC - 8	Л1.1 Л2.1 Л2.2 Э2 Э3 Э4	0	
2.2	Clinical Pharmacology medicines used with bronchial obstruction. Modern	9	2	PC -8	Л1.1 Л2.1 Л2.2 Э2 Э3 Э4	0	

	treatment principles bronchial obstruction / Lecture /						
2.3	Clinical Pharmacology antibacterial agentsmodern approaches / Lecture /	9	2	PC -8	Л1.1 Л1.2 Л2.2 Л2.1 Э2 Э3 Э4 Э5	0	
2.4	Clinical Pharmacology medicines used with arterial hypertension. /Pr/	9	3	PC -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э6 Э7	0	
2.5	Clinical Pharmacology medicines used with coronary heart disease. /PR/	9	3	PC -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э6 Э7	0	
2.6	Clinical Pharmacology medicines used with dyslipidemia / Pr /	9	3	PC -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4	0	
2.7	Clinical Pharmacology medicines used with bronchial obstructive syndrome / Pr /	9	3	PC -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э6 Э7	0	
2.8	Clinical Pharmacology medicines used with violations of hemostasis / Pr /	9	3	PC -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э6 Э7	0	
2.9	Clinical Pharmacology medicines used with diabetes / Pr /	9	3	PC -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э6 Э7	0	
2.10	Clinical Pharmacology medicines used	9	3	PC -8	Л1.1 Л1.2 Л2.2 Л2.1 Э2 Э3 Э4	0	

	with thyroid diseases glands / pr /				Э6 Э7 Э10		
2.11	Clinical Pharmacology anti-inflammatory drugs. DMARDs Therapy. /Pr/	9	3	РС -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э5	0	
2.12	Clinical Pharmacology antiallergic drugs / Pr /	9	3	РС -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4	0	
2.13	Clinical Pharmacology antibacterial agents. Principles antibiotic therapy. Antibiotic resistance. /Pr/	9	3	РС -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э5 Э6 Э7	0	
2.14	Clinical Pharmacology antiviral and antiretroviral agents. Principles of Viral Treatment diseases / pr /	9	3	РС -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э5 Э6 Э7	0	
2.15	Clinical Pharmacology antitumor agents. The principles of chemotherapy with oncological diseases. Security monitoring and the effectiveness oftherapy / pr /	9	3	РС -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э6 Э7	0	
2.16	Protection of the Assessment Protocol use of medicines at the supervised patient / Pr /	9	6	РС -8	Л1.1 Л1.2 Л2.1 Л2.2	0	Preparation and protection Protocol by assessment use ofmedicinal means

							(presentation, Décor protocol)
2.17	Independent work on the section "Private Clinical pharmacology / Iw/	9	20	PC -8	Л1.1 Л1.2 Л2.1 Л2.2 Э2 Э3 Э4 Э5 Э6 Э7 Э8 Э9 Э10	0	Decisionsituational tasks for clinicalproblems the choice personal preparations for the maincriteria monitoring efficiency and safety ongoing therapy insick
2.18	Interim certification	9	0	PC -8	Л1.1 Л1.2 Л2.1 Л2.2	0	Pass or not

5.Assessment fund

5.1Advancement Questions and Assignments

Knowledge:

1. The subject and objectives of clinical pharmacology. Sections of clinical pharmacology (clinical pharmacokinetics, pharmacodynamics, pharmacogenetics, pharmacoeconomics, pharmacoepidemiology).
2. The concept of pharmacotherapy. Types of pharmacotherapy (etiotropic, pathogenetic, symptomatic, prophylactic). The basic principles of rational pharmacotherapy (validity, minimization, rationality, controllability, individualization). Stages of pharmacotherapy. Pharmacological history (concepts, collection rule, interpretation). Principles of developing recommendations for patients on the rules of the use of medicines. Acute pharmacological test (concept, purpose, rules of conduct). Patient adherence to treatment - compliance (concept, factors affecting adherence to treatment, methods of increasing adherence to the patient). Responsible self-medication.
3. 3. Assessment of the clinical efficacy and safety of drugs. Principles of developing programs for monitoring the effectiveness and safety of drugs. Methods for assessing the impact of drugs on quality of life.
4. Clinical pharmacokinetics. The main pharmacokinetic parameters and their clinical significance. Pharmacokinetic curve. Calculation of the load and maintenance dose of the drug. Calculation of the dose of the drug in patients with chronic renal failure. Correction of the dose of the drug in patients with impaired liver function. The main pharmacokinetic processes (absorption, distribution, communication with plasma proteins, metabolism,

excretion of drugs). Drug absorption mechanism; the participation of glycoprotein -P in the absorption of drugs; factors affecting the absorption of drugs, routes of administration of drugs. Distribution of drugs. The relationship of drugs with plasma proteins.Factors affecting the distribution and relationship of drugs with plasma proteins (diseases, drugs). Metabolism (biotransformation) of drugs: reactions of the I phase (oxidation, reduction, hydrolysis) and the II phase (conjugation).Presystemic drug metabolism (first-pass effect). Medicines with high and low hepatic clearance. Clinically significant cytochrome P-450 isoenzyme (CYP3A4, CYP2D6, CYP2C9, CYP2C19). Phenotyping of enzymes of drug metabolism and its clinical significance. Induction and inhibition of enzymes of drug metabolism: mechanisms, clinical significance. Extraghepatic drug metabolism (drug metabolism in the intestines, lungs, kidneys). Factors affecting the metabolism of drugs (gender, age, disease). Withdrawal of medicines: mechanisms and organs involved in the excretion of drugs. The role of transporters of organic anions and glycoprotein -P in drug excretion. Factors affecting the elimination of drugs (gender, age, disease). Methods for the determination of drugs in biological fluids. Organization of the activities of the laboratory of clinical pharmacokinetics in a multidisciplinary hospital.

5. Pharmacodynamics. The mechanisms of action of drugs. Antagonists, agonists, partial agonists. Target molecules of drugs (receptors, enzymes, ion channels). Types of pharmacological response: expected pharmacological response, hyperreactivity, tachyphylaxis, idiosyncrasy. The relationship between pharmacokinetics and pharmacodynamics. The concept of a therapeutic range. Therapeutic drug monitoring (indications, clinical significance, interpretation of results)

6. Legal and ethical aspects of the use of drugs. Clinical and pharmacological service in medical facilities (principles, organization, basic functions).

7. Undesirable drug reactions. WHO classification: reactions A, B, C, D, E. Toxic effects of drugs. Undesirable drug reactions due to the pharmacological effects of drugs. Allergic and pseudo-allergic reactions. Carcinogenicity of drugs. Drug dependence (mental and physical). Withdrawal syndrome. Risk factors for the development of adverse drug reactions. Diagnosis, correction and prevention of adverse drug reactions. Rules for alerting drug regulatory authorities about undesired drug reactions.

8. Overdose of drugs: diagnosis, first aid, basic principles of therapy. Overdose of opiates, barbiturates, tranquilizers.

9. The interaction of drugs. Rational, irrational and dangerous combinations. Types of drug interactions. Pharmacokinetic interaction of drugs (at the levels of absorption, distribution, metabolism, excretion). Pharmacodynamic interaction of drugs (direct and indirect). Synergism and antagonism. The interaction of drugs with food, alcohol, components of tobacco smoke, herbal remedies. Risk factors for drug interactions.

10. Features of the pharmacokinetics and pharmacodynamics of drugs in pregnant women and the fetus. Categories of drugs by risk for the fetus according to WHO: A, B, C, D, E, X. Teratogenicity, embryotoxicity and fetotoxicity of drugs. The principles of pharmacotherapy in pregnant women. Features of pharmacokinetics and pharmacodynamics of drugs for lactating women. Principles of pharmacotherapy in lactating women.

11. Clinical pharmacogenetics. Pharmacogenomics. Genetic characteristics of the patient, affecting the pharmacokinetics of drugs: polymorphisms of the genes of enzymes of the metabolism of drugs; polymorphisms of drug transporter genes. Extensive, slow and fast metabolizers. Genetic characteristics of the patient, affecting the pharmacodynamics of

drugs: genetic polymorphisms of receptors, enzymes, ion channels. The clinical significance of pharmacogenetics for the individualization of pharmacotherapy. Organization of the activities of the laboratory of clinical pharmacogenetics in a multidisciplinary hospital.
12. Principles of rational use of medicines, steps.
13. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, drug interactions used in diseases of internal organs and emergency conditions
14. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, drug interactions used in arterial hypertension.
15. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, drug interactions used in bronchial obstructive syndrome
16. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, drug interactions used in coronary heart disease.
17. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, drug interactions used in dyslipidemia.
18. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, drug interactions used in diabetes
19. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, drug interactions used for hemostatic disorders
20. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, the interaction of drugs used in diseases of the thyroid gland.
21. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, the interaction of antibacterial agents.
22. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, the interaction of antiviral and antiretroviral agents.
23. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, interaction of antitumor agents.
24. Clinical pharmacokinetics, pharmacodynamics, indications, contraindications, adverse drug reactions, drug interactions used in diseases of the gastrointestinal tract.

Expertise:
1. Determine the purpose of treatment and the steps in choosing a Personal group and a Personal preparation.
2. Develop a drug safety control program taking into account the adverse reactions that they can cause.
3. To carry out the prevention, diagnosis and correction of adverse drug reactions.
4. Fill in official documents upon notification of authorized bodies on the development of undesirable drug reactions.
5. To diagnose and treat drug overdose.
6. To choose medicines taking into account their interaction with jointly used medicines.
7. Instruct patients about possible drug interactions with food, herbal remedies, components of tobacco smoke, alcohol.
8. Choose drugs for pregnant women, taking into account the degree of risk to the fetus and for lactating drugs, taking into account the ability of drugs to penetrate into breast milk.
9. Interpret the results of pharmacogenetic studies of the choice of drugs and their doses.

10. To prescribe (choose) drug treatment for a specific patient with various diseases and emergency conditions.
11. Conduct drug treatment of a particular patient with diseases and emergency conditions.

Skills:

1. choose the P-group (personal) of drugs depending on the diagnosis and purpose of treatment;
2. choose P-drug taking into account effectiveness, safety, acceptability and cost;
3. choose a dosage form, route of administration, dosage regimens of the drug in a particular clinical situation;
4. to predict and determine the risk of side effects of the drug;
5. carry out the combined prescription of drugs;
6. inform the patient about the upcoming drug therapy;
7. to evaluate the effectiveness and safety of drug therapy.

5.2 Themes of term papers (projects)

Not provided

5.3 Assessment fund

Colloquium on the section "General Clinical Pharmacology"

Card №1

1. The subject of clinical pharmacology, goals and objectives. Pharmacotherapy, its main types.
2. The main pharmacokinetic parameters: clearance, equilibrium concentration of the drug in plasma, determination clearance values, area under the curve.
3. Adverse effects of drugs, classification, diagnosis of adverse effects of drugs, reports of adverse reactions of drugs.

Solve the clinical problem:

To stop an attack of bronchial asthma, theophylline Cp equal to 10 mg / l is required. The average clearance of theophylline is 2.8 l / h / kg. At what rate should intravenous infusion be given if F is 100% after intravenous administration?

Card №2

1. Clinical pharmacokinetics, routes of administration of drugs, factors affecting the route of administration, drug absorption, indicators and factors affecting drug absorption.
2. Drug interactions: pharmacokinetic interaction. Give examples.
3. Adverse reactions of type A, their characteristics. Give examples.

Solve the clinical problem:

To stop an attack of bronchial asthma, theophylline Cp equal to 10 mg / l is required. The average clearance of theophylline is 2.8 l / h / kg. Calculate the maintenance dose of theophylline for oral administration if the Δt is 12 hours, and F for oral administration is 96%.

Card №3

1. Clinical pharmacodynamics: mechanism of action of drugs, selectivity of the action of drugs, doses of drugs.
2. The main pharmacokinetic parameters: volume of distribution, determination of the volume of distribution, calculation of the loading dose.
3. Adverse reactions of type B, their characteristics. Give examples.

Solve the clinical problem:
To stop an attack of bronchial asthma, theophylline Cp equal to 10 mg / l is required. The average clearance of theophylline is 2.8 l / h / 70 kg. Calculate the Δt if the maintenance dose of theophylline for oral administration is 175 mg and F is 96%

Card №4
1. Principles of rational use of medicines, criteria for choosing a P-group and P-drug.
2. The main pharmacokinetic parameters: half-life of drugs, determination of t1 / 2, kinetics of drug elimination, kinetics of drug accumulation, choice of time interval for dose administration.
3. Adverse reactions of type C, their characteristics. Give examples.
Solve the clinical problem:
For the relief of psychomotor agitation, a target Cp of diazepam of 0.3 mg / l is required. The average Cl of diazepam is 1.62 l / h / kg. What is the speed with which intravenous infusion should be carried out if F with intravenous administration is 100%.

Card №5
1. The main issues of clinical pharmacokinetics: the binding of drugs to blood proteins and tissues, drug elimination, kinetics of metabolites.
2. Variability of the action of drugs: features of the use of drugs during pregnancy and lactation.
3. Adverse reactions of type D, their characteristics. Give examples.
Solve the clinical problem:
To stop an attack of bronchial asthma, theophylline Cp equal to 10 mg / l is required. The average clearance of theophylline is 2.8 l / h / 70 kg.Calculate the Δt if the maintenance dose of theophylline for oral administration is 175 mg and F is 96%, but the Cl of the drug is reduced by 2 times

Card №6
1. The main issues of clinical pharmacokinetics: the dependence of pharmacokinetics on dose and time, modes
dosage of drugs, bioequivalence of drugs.
2. Pharmacodynamic interaction of drugs. Give examples.
3. Categories of drug action by the FDA during pregnancy.
Solve the clinical problem:
For stopping of the status epilepticus the target Cp diazepam of 0.3 mg / l is necessary. The average Cl of diazepam is 1.62 l / h / kg. Calculate the maintenance dose of diazepam for oral administration, the Δt is 10 hours, and F for oral administration is 96%?

Card №7
1. Clinical pharmacokinetics: factors affecting dose selection, drug metabolism, processes biotransformation, saturation metabolism.
2. Clinical pharmacodynamics: mechanism of action of drugs, selectivity of drugs, doses of drugs.
3. The main steps for the rational use of drugs, the criteria for choosing the P-group and P-drug.

Solve the clinical problem:
For stopping of the status epilepticus the target Cp diazepam of 0.3 mg / l is necessary. The average clearance of diazepam is 1.62 l / h / 70 kg. Calculate the Δt if the maintenance dose of diazepam for oral administration is 7.5 mg and F is 98%, but the Cl of the drug is reduced by 37%?

Card №8
1. The interaction of drugs: pharmacodynamic and pharmacokinetic.
2. The main issues of clinical pharmacokinetics: bioavailability of drugs, distribution medicines.
3. Adverse reactions, classification, monitoring of adverse reactions.
Solve the clinical problem:
For the relief of pain, a target CP of indomethacin of 0.3 mg / L is required. The average clearance of indomethacin is 1.76 l / h / kg. Calculate the maintenance dose of indomethacin for oral administration, if the time is 8 hours, and if ingestion is 98%?

Colloquium on the section "Private Clinical Pharmacology"
Task example:

I. Perform test tasks:

1. Which tablet antihypertensive drugs cause a rapid decrease in blood pressure?
1. reserpine
2. captopril
3. nifedipine
4. clonidine
5. hydrochlorothiazide

2. List the contraindications for the appointment of ACE inhibitors:
1. vascular stenosis of a single kidney
2. diabetic nephropathy
3. pyelonephritis
4. bilateral renal artery stenosis
5. interstitial nephritis

3. With which diuretic is enalapril possible?
1. hydrochlorothiazide
2. Veroshpiron
3. furosemide
4. inapamide

4. What side effects are characteristic of angiotensin II receptor antagonists:
1. headache
2. dizziness
3. anemia
4. tachycardia
5. bradycardia
6. angioedema

7. dry cough

5. What is advisable to use for prostate adenoma, as well as for lipid disorders?
1. hydrochlorothiazide
2. pinned
3. doxazosin
4. propranolol

6. Indicate the side effects of nifedipine
1. bradycardia
2. tachycardia
3. swelling of the legs and feet
4. redness
5. headache

7. What antihypertensive drugs are indicated for concomitant peripheral vascular diseases?
1. calcium antagonists
2. ACE inhibitors
3. β- blockers
4. α – blockers

8. List the groups of antihypertensive drugs that reduce the activity of the renin-angiotensin-aldestronic system:
1. ACE inhibitors
2. β - blockers
3. antagonists of angiotensin II
4. thiazide diuretics
5. calcium antagonists

9. The following are absolutely contraindicated for the treatment of hypertension during pregnancy and lactation:
1. ACE inhibitors
2. calcium antagonists
3. β- blockers
4. α- blockers

10. What drug is most characteristic of the effect of the "first dose" in the form of orthostatic hypotension
1. hydrolazine
2. captopril
3. glyceryl trinitrate
4. clonidine
5. prazosin

11. Which drug lowers total cholesterol and increases the content of high density lipoproteins with prolonged therapy?
1. prazosin
2. atenolol
3. hydrochlorothiazide
4. furosemide

12. In a patient with arterial hypertension and concomitant spontaneous angina, the most acceptable:
1. nifedipine
2. atenolol
3. clonidine
4. prazosin

13. Specify antihypertensive drugs that are prescribed with caution when combining diabetes mellitus and hypertension:
1. verapamil
2. propranolol
3. diltiazem
4. hydrochlorothiazide
5. enalapril

14. Indicate the rational combination of antihypertensive drugs:
1. diuretic + beta-blocker
2. diuretic + ACE inhibitor
3. verapamil + diltiazem + β-blocker
4. β-blocker + dihydropyridine calcium antagonist
5. dihydropyridine calcium antagonist + α -blocker
6. ACE inhibitor + acetysalicylic acid
7. calcium antagonist + ACE inhibitors
15. The method of monitoring the effectiveness of antihypertensive therapy is:
1. daily ECG monitoring
2. one-time blood pressure measurements
3. dynamics of the lipid spectrum
4. measurement of blood pressure in ortho- and clinopause

16. For the treatment of young patients with arterial hypertension, the most acceptable are:
1. clonidine
2. captopril
3. atenolol
4. nifedipine

17. The most rational combination in a patient with arterial hypertension and coronary heart disease will be:
1. propranolol + hydrochlorothiazide

2. atenolol + nifedipine
3. propranolol + verapamil
4. prazosin + nifedipine

18. The relief of uncomplicated hypertensive crisis should begin with the appointment:
1. nifedipine 10-20 mg under the tongue
2. 40 mg propranolol inside
3. intravenous sodium nitroprusside
4. 40 mg of furosemide inside

19. Indicate antihypertensive drugs that are contraindicated for the relief of hypertensive crisis with acute encephalopathy:
1. sodium nitroprusside
2. clonidine
3. furosemide
4. β - blocker
5. nifedipine
6. all of the above

20. What antihypertensive drugs are contraindicated in patients with cardiac hypertensive crisis, complicated by myocardial infarction:
1. calcium antagonists
2. β-blockers
3. diuretics
4. sodium nitroprusside
5. clonidine
6. hydralazine

II. Determine the purpose of treatment and make an adequate choice of the P-group and P-medication in the proposed example based on an analysis of the criteria: effectiveness, safety, acceptability and cost. Write out a prescription for the P-drug and provide the information, instruction and warning for the patient in full:
Patient M., 57 years old, went to the doctor with complaints of constantly increased blood pressure, periodically occurring redness of the face, pain in the back of the head, nausea, vomiting, heaviness behind the sternum. An objective examination: the condition is satisfactory. Heart sounds are clear, rhythmic, at the top there is soft systolic murmur, blood pressure 160/100 mm Hg, heart rate 64 beats per minute, rhythmic. On the ECG - signs of left ventricular myocardial hypertrophy. Arteries of the retina are spasmodic. Anamnesis: type 2 diabetes mellitus, diabetic nephropathy.

Protocol for assessing the use of drugs in a supervised patient
PROTOCOL
I. Conduct an analysis of the treatment, while the data should contain the following information:
•FULL NAME. the patient;

•Age;
•Floor;
• Formulated diagnosis;
• Data necessary for the calculation of single, loading doses, the choice of dosage regimen (age, height, weight, level
blood creatinine, the results of bacteriological studies, etc.);
• Data on an allergic history;
• Pharmacological history data (currently used drugs, duration
the use, dose and frequency of administration, the effectiveness and tolerability of the drug / s, independently taken
drugs);
• Conducting analysis of ongoing therapy (at work, use the educational literature, Forms, reference books,
electronic resources, clinical guidelines and protocols) - drug interactions, dose matching, multiplicities, functions of eliminating organs, etc.).
II. Make a choice according to the principles of rational use of medicines (your steps in pharmacotherapy):
• Purpose of treatment;
• The choice of a Personal group or groups for your patient (according to criteria of effectiveness, safety, acceptability
and cost) - provide data in the table with the calculations;
• The choice of a personal drug or drugs (according to the criteria of effectiveness, safety, acceptability and cost) - present the data in the table with the calculations;
• Write out a prescription for the selected drug or drugs;
• Informing, instructing and cautions on the selected drug or drugs;
• Monitoring of treatment.

Topics of essays:
• The importance of chronopharmacology for the effectiveness of pharmacotherapy
• The importance of pharmacogenetics and pharmacogenomics for the clinician
• Pharmacovigilance. Rare adverse reactions
• Modern antihypertensive therapy, the role and place of pharmacoeconomic research on the study of hypertension
• Modern therapy of bronchial asthma, pharmacoeconomic analysis of treatment
• Antiplatelet therapy and its consequences
• Drugs used for diabetes. Treatment monitoring.
• Antiviral therapy, current trends

The student's formulary list of medicines (includes the following articles on the drug: pharmacodynamics, pharmacokinetics, indications and contraindications for use, special instructions, side effects):
Enalapril
Losartan
Bisoprolol
Hydrochlorothiazide
Isosorbide dinitrate

Amlodipine
Clopidogrel
Warfarin
Salbutamol
Beclamethasone
Gliclazide
Levothyroxine
Amoxicillin
Ceftriaxone
Ciprofloxacin
Azithromycin
Doxycycline
Acyclovir
PEGylated interferon a2a, a2b
Sfosbuvir
Tenofovir
Zidovudine
Fluconazole
Rituximab
Cisplatin
Doxorubicin

5.4. List of assessment tools

Colloquium on the section "General Clinical Pharmacology"
Colloquium on the section "Private Clinical Pharmacology"
Protocol for assessing the use of drugs in a supervised patient
Abstract
Student Formular

6.COURSE (MODULE) METHODOLGICAL AND INFORMATIONAL SUPPORT

6.1 Recommended Reading

6.1.1 Required Reading List

	Authors, Compliers	Title	Bookpublisher, Year
L1.1	B. Katzung	Basic And Clinical Pharmacology	2021 https://medicscenter.com/basic-and-clinical-pharmacology-by-katzung-new-14th-edition-pdf-free-download/
L1.2	Begg E.	Clinical Pharmacology: Study Guide	M .: BINOM. Laboratory knowledge 2004

6.1.2 Advanced reading

	Authors, Compliers	Title	Bookpublisher, Year
L2.1	JAMES M RITTER and all.	A Textbook of Clinical Pharmacology and Therapeutics, 2020	http://www.pharmaresearchlibrary.com/wp-content/uploads/2013/03/A-Textbook-of-Clinical-Pharmacology-and-

			Therapeutics-5th-edition.pdf
6.2 The list of resources of the information and telecommunication network "Internet"			
E1	Interactive Clinical Pharmacology (New Zealand)		www.icp.org
E2	International Drug Database		www.drugs.com
E3	General practice database (medicine section)		www.medscape.com
E4	American Society of Clinical Pharmacologists and Pharmacotherapists		http://www.ascpt.org/
E5	European Society of Clinical Pharmacologists and Pharmacotherapists		http://www.eacpt.org
E6	Drug Interaction Resource		http://medicine.iupui.edu/flockhart
E7	British Monthly Drug Safety Bulletin		http://www.mhra.gov.uk/Publications/Safetyguidance/
E8	World Health Organization		www.who.int
6.3 List of Information and Educational Technologies			
6.3.1 Competency-based Educational Technologies			
6.3.1.1	traditional verbal methods (lectures, discussions, discussions, explanations);		
6.3.1.2	visual methods (presentations, stands, posters, types of dosage forms, reference books, textbooks, training allowances, etc.);		
6.3.1.3	practical training methods - conducting practical exercises: solving situational problems, tests, implementation of the CDS - independent work with directories and literature (regular and electronic), independent written homework.		
6.3.1.4	method of problem-oriented learning - individual, steam and group work are organized role-playing games are used, work is done with documents and various sources of information on Drugs, medical history, the choice of P-group and P-drug, information, instruction and warnings on the use of drugs.		
6.3.1.5	innovative method: clinical pharmacology in on-line mode modules on a special site on the subject separate sections (for example, there are 15 modules on clinical pharmacokinetics and pharmacodynamics), work in international databases on drug interactions, the search for medical information and its critical rating.		
6.3.1.6	methods of oral control: frontal survey, individual survey, preparation of reports on the student's independent work;		
6.3.1.7	methods of written control: control and modular work; written test assignments for student's independent work; student self-study essays;		
6.3.1.8	current control methods: control and modular work; work with case histories, preparation Protocol on the assessment of the use of drugs in supervised patients, a Student Formular for drugs.		
6.3.2 List of information help systems and software			
6.3.2.1	www.drugs.com		
6.3.2.2	www.icp.org.nz		
6.3.2.3	www.guidelines.org		
6.3.2.4	http://medicine.iupui.edu/flockhart		
6.3.2.5	www.medscape.com		
7.MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE (MODULE)			

7.1	For lecture classes there are 2 lecture halls equipped with a demonstration equipment - computers, multimedia devices, educational and visual aids (thematic presentations according to the work program of the discipline).
7.2	For practical classes, there are 6 training rooms equipped with specialized furniture, visual stands in all sections of the discipline, boards, training windows with various medicines, technical means - Wi-Fi, computers, multimedia devices
7.3	To provide educational information at the department there is a cathedral library, reference books medicines, Forms, manuals, study guides, educational and methodological recommendations, manuals, visual thematic stands, printers, copier machines, scanners.
7.4	To ensure discipline, the department uses visual demonstration materials - trays with a set of medicines of various forms: solid, soft, liquid dosage forms, a set of tasks according to the recipe, prescription forms, sets of tests, colloquiums in all sections of the discipline, a list of medicines to be included in the student form.

8.METHODICAL INSTRUCTIONS FOR TRAINERS IN DEVELOPMENT OF THE DISCIPLINE (MODULE)

The training consists of classroom lessons (108 hours), including a lecture course (18 hours) and practical classes (54 hours), and independent work (36 hours). During the training, students go through 2 sections in clinical pharmacology: General Clinical Pharmacology and Private Clinical Pharmacology.

The main academic time is devoted to practical work on the development of analysis skills pharmacokinetic parameters of drugs, the choice of the Personal group and the Personal drug with certain clinical conditions, monitoring the effectiveness and safety of treatment, informing, instructing and warning. The proportion of classes conducted in interactive forms, makes up at least 20% of classroom activities. Examples of interactive forms and methods of conducting classes: role-playing games, training, situational tasks, brainstorming discussions, defense of the Evaluation Protocol medicines in a supervised patient.

When studying a discipline (module), it is necessary to use knowledge, skills and mastery of skills, obtained in the study of pharmacology, therapy and master practical skills: analyze and evaluate the quality prescribed treatment; collect a complete medical history of the patient, conduct a survey of the patient, his relatives (collect biological, medical, psychological and social information; conduct physical examination of the patient (examination, palpation, auscultation, measurement of blood pressure, determining the characteristics of the pulse, respiratory rate), send him to a laboratory and instrumental examination, for consultation with specialists; interpret the results of the examination, make a preliminary diagnosis to the patient, outline the scope of additional studies to clarify the diagnosis, formulate a clinical diagnosis; determine the purpose of treatment, choose a Personal group and a Personal drug, write a prescription for the selected drug, spend informing, instructing, warning the patient, monitoring the treatment; justify pharmacotherapy in a particular patient with major pathological syndromes and emergency conditions, determine the route of administration, the regimen and dose of drugs, evaluate the effectiveness and safety of the treatment (based on evidence-based medicine).

Practical classes are held as in the traditional form, including clinical demonstrations, clinical analysis and independent work of students with patients, the use of visual aids, video and multimedia materials, situational and test tasks, and in the form of active and interactive forms of conducting classes in in accordance with the requirements of GEF-3 VPO (problem lecture,

lecture - provocation, role-playing and business games, training, game design, situation-case, discussions with and without brainstorming). Independent work of students implies preparation for classes, current, intermediate and intermediate controls, performance of analytical work - execution of the Protocol on the evaluation of the use of medicines in a supervised patient.
Work with educational literature is considered as a type of educational work in the discipline "clinical pharmacology" and performed within the hours allotted for its study (in the section of the CPC). Each student is provided with access to library funds of the department, including electronic resources.
For each section of the discipline developed guidelines for students and methodological directions for teachers.
During the study of the discipline, students independently supervise a patient with diseases internal organs in the hospital, draw up and present a fragment of the academic history of the disease with emphasis leading clinical syndrome and academic history of a patient with a disease of internal organs, including a comprehensive study of the patient: interrogation, physical examination, laboratory plan instrumental research and analysis of the results, isolation and justification of the leading syndrome, substantiation of the diagnosis with differential diagnosis, non-drug and drug treatment, rational use of physiotherapy methods.
Writing a Protocol contributes to the formation and consolidation of skills (abilities) of rational use medicines. Student work in a group creates a sense of teamwork and sociability.
Students undergo midterm certification in the form of 2 colloquia in the sections "General Clinical Pharmacology" and "Private Clinical Pharmacology" and pass the Protocols for assessing the use of drugs in supervised the patient.
Under section 1 "General Clinical Pharmacology" there are 8 tickets. The colloquium consists of 3 questions and 1 situational task.
Under section 2, Private Clinical Pharmacology, there are 8 options. The colloquium consists of 2 blocks: 1 block – tests and block 2 - a problem with the steps of RILS: to determine the diagnosis, the purpose of treatment, the choice of P-group and P-drug, writing the recipe. informing, instructing and warning, monitoring treatment.
When evaluating the work for each block, it is set according to 1 rating (on a 100 point scale). As a result, for 3 blocks a student gets 3 grades, which are summed up at the end and divided by 3. For example, if a student gets 80 points for 1 block, for 2 block - 65 points, for 3 block - 90 points, in the end it turns out - 235/3 = 78.3 points. Passing score is considered when the student scores 61 points and above. A student with 61 or more points will be admitted to the next certification in section 2. If the student scores less than 61 points, then until the next current certification he must retake test.
At the end of the study sections, the student must pass the “Protocol on the evaluation of the use of medicines in supervised patient. "