

CLINICAL PHARMACOLOGY OF ANTIBIOTICS AND ANTIMICROBIEN CHEMOTHERAPEUTIC DRUGS WITH DIVERS CHEMICAL STRUCTURE. PERSONAL DRUG SELECTION

A. Actuality

At present, when the number of patients with serious infectious pathologies increases and multidrug resistant microbial strains occur, the problem of effective and correct antibiotic therapy is very relevant. Antimicrobien synthetic chemotherapeutic drugs - sulfamides, derivatives of naphthyridine and quinolone, nitroimidazole, 8-oxyquinoline, nitrofurantoin, oxazolidinone, possess antibacterial, antifungal and antiprotozoal properties and are widely used to treat infections caused by these pathogenic microorganisms. Knowledge of their pharmacokinetics and pharmacodynamics will allow their rational selection, association with other preparations and setting of optimal dosing regimen in the treatment of infectious diseases.

B. Training aim

Acquiring clinical and pharmacological principles to justify the prescription, use, dosing regimen of drug preparations in the given antibiotics groups, and to assess their efficacy and harmlessness.

C. Teaching objectives

The student should be able to:

- a) characterize antibiotics and antimicrobial synthetic chemotherapeutic agents with diverse chemical structure, according to their pharmacokinetic and pharmacodynamic characteristics
- b) prescribe medicinal preparations from these groups depending on the causative pathogen, the degree of resistance, the pathological condition and the age characteristics of the patient;
- c) predict the possible complications and adverse reactions of antibiotic drugs and antimicrobial synthetic chemotherapeutic agents with diverse chemical structure;
- d) predict the dependence of the adverse reactions on the dosage regimen and the functional state of the organs and body systems;
- e) apply methods of prophylaxis and correction of adverse reactions;
- f) predict the interactions of antibiotics and antimicrobial synthetic chemotherapeutic agents with diverse chemical structure;
- g) elaborate the personal form (medicines-P) of antibiotics and chemotherapeutics drug with diverse chemical structure.

D. Knowledge from previously studied disciplines and related subjects

Histology, morphopathology, pathophysiology and microbiology

Cell structure of pathogens. Classification of pathogenic germs. Pathogenesis of septic states.

Clinical disciplines. Etiology, pathogenesis of the main nosological forms of infectious pathologies. Functional and laboratory tests applied in pulmonology, septic surgery, urology, etc. Clinical manifestations of infectious diseases.

Pharmacology. Classification of antibiotics by chemical structure, mechanism of action. Characterization of antibiotic groups by action spectrum, generations. Adverse reactions of antibiotics. Antimicrobien synthetic chemotherapeutic drugs (sulfamides, derivatives of naphthyridine and quinolone, nitroimidazole, 8-oxyquinoline, nitrofurantoin and thiosemicarbazone): classification according to chemical structure, mechanism of action and developed effect, spectrum of action; indications, side effects of drugs of the given groups.

E. Questions for self-training

1. Classification of antibiotics according to spectrum and mechanism of action, antibacterial effect.

2. Clinical pharmacology of penicillins: classification, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
3. Cephalosporins: classification according to generations and mode of administration, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
4. Carbapenems: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
5. Monobactams: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
6. Aminoglycosides: classification, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
7. Tetracyclines: classification, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
8. Amphenicols: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
9. Macrolides: classification, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
10. Lincosamides: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
11. Ansamycin: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
12. Glycopeptides: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
13. Polypeptides: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
14. Indications and principles of antibiotics association (according to mechanism, spectrum of actions, and side effects).
15. Bacterial resistance to antibiotics (forms, development mechanisms, causes, ways of fighting).
16. Pharmacokinetic and pharmacodynamic peculiarities of antibiotics in children. Dosing principles. Side effects of antibiotics in children.
17. Peculiarities of antibiotic administration during pregnancy and lactation period.
18. Clinical pharmacology of Sulfamides. Classification of sulfonamides by route of administration. Classification of systemic sulfonamides by duration of action. The particularities of the spectrum and the mechanism of action. Indications and principles of dosage and choice depending on the mode of administration. Pharmacokinetics. Combined sulfamides: spectrum and mechanism of action, indications. Adverse reactions - clinical manifestations, methods of prophylaxis and treatment. Contraindications. Drug interactions. Resistance and ways to fight. Peculiarities of sulfonamide administration during pregnancy and breastfeeding.
19. Naphthyridine derivatives and quinolones. Fluoroquinolones: classification. Non-fluorinated quinolones: action spectrum, indications. Fluorquinolones: classification, spectrum features and mechanism of action of fluorquinolones from different generations. Pharmacokinetic aspects. Indications and principles of selection and use. Absolute and relative contraindications. Adverse reactions - prophylaxis and their treatment. Drug interactions.
20. Derivatives of nitroimidazole: classification. Spectrum peculiarities and mechanism of action. Pharmacokinetic aspects. Indications and principles of selection and use. Contraindications. Side effects, their prophylaxis and treatment. Drug interactions.
21. Derivatives of 8-oxyquinoline. Spectrum peculiarities and mechanism of action of systemic and topical drugs. Pharmacokinetic aspects. Indications and principles of

selection and use. Contraindications. Side effects, their prophylaxis and treatment. Drug interactions.

22. Derivates of nitrofurans: classification. Spectrum peculiarities and mechanism of action of systemic, intestinal and topical drugs. Pharmacokinetic aspects. Indications and principles of selection and use. Contraindications. Side effects, their prophylaxis and combating. Drug interactions.
23. Oxazolidinones. Spectrum peculiarities and mechanism of action, pharmacokinetic aspects. Indications and principles of selection and use. Contraindications. Side effects.
24. Pharmacokinetic and pharmacodynamics aspects of synthetic chemotherapeutic drugs in children. Peculiarities of synthetic chemotherapeutic drugs administration in pregnancy and lactation.

F. Individual work (p. 1.1 and 1.2. are done in writing during the preparation process):

1.1. Indicate the pharmacological groups and drugs used in (for):

pneumonias caused by benzilpenicillin-resistant staphylococci; methicillin-resistant staphylococcal infections; follicular angina; acute pyelonephritis; antibacterial treatment in gastric and duodenal ulcers; nosocomial infections caused by *Bac. fragilis*; nosocomial infections caused by *Pseudomonas aeruginosa*; oral cavity infections; infections of the skin and soft tissues; bone infections; urinary tract infections; infections caused by chlamydiae, mycoplasmas; meningitis caused by *H. influenzae*; pseudomembranous colitis (*Clostridium difficile*); bacterial dysentery; tetanus; cholera; typhus abdominal; exanthematous typhus; prophylaxis of anaerobic infections in surgical interventions; intestinal infections; topical treatment of wounds, burns, trophic ulcers, bacterial dysentery; amebian dysentery; trichomonadosis, urinary infections; intestinal infections; infections caused by atypical germs (*Legionella*, mycoplasmas, chlamydiae); oral anaerobic infections; protozoal infections; pulmonary tuberculosis; nonspecific ulcerative enterocolitis; conjunctivitis; respiratory infections; systemic staphylococcal infections with poly-resistance.

1.2. For each indication, write the prescription(s) for the drug(s) of choice (from the list of mandatory drugs); the form of delivery and the dosage regimen should be appropriate for the respective pathology:

sodium benzylpenicillin, benzathinbenzylpenicillin, ampicillin, amoxicillin, carbenicillin, augmentin, imipenem, meropenem, cefuroxim, cefixim, cefotaxim, ceftriaxon, cefepim, ceftobiprol, gentamicin, sisomicin, amikacin, azitromicin, claritromicin, lincomycin, clindamicin, doxyciclin, cloramfenicol, rifampicin, vancomycin, colistin, fuzidin, sulfadimetoxim, sulfalen, ftalilsulfatiazol, sulfasalazin, co-trimoxazol, nalidixic acid, ciprofloxacin, lomefloxacin, moxifloxacin, norfloxacin, metronidazol, linesolid, tinezolid, nitroxolin, furazolidon, nifuroxazid.

2. Tests on Clinical Pharmacology (for faculty of medicine), Chisinau-2004, page 103.

G. Interactive activity

1. The didactic instructional work and the patient's discussion.

2. Clinical and pharmacological selection and use of drugs in some pathological conditions and diseases:

Principles of antibiotic selection and use in staphylococcal infections.

Principles of antibiotic selection and use in infections with gram-negative bacteria (*Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, etc.).

Principles of antibiotic selection and use in anaerobic infections.

Principles of antibiotic selection and use in difficult *Clostridium* infections

Principles of antibiotic selection and use in infections with atypical agents.

Principles of rational use of antibiotics and antimicrobial synthetic chemotherapeutic agents with diverse chemical structure (empirical and targeted selection).

3. Clinical cases in Clinical Pharmacology (Clinical Cases Guide), Chisinau-2017, page 141.

4. Personal Drug (P-Drug) Selection and P-Treatment (Personal Treatment) according to the criteria of effectacy, safety, acceptability and cost for inclusion in the personal form (P drugs).