

**ANTISEPTIC AND DISINFECTANT. CHEMOTHERAPEUTIC DRUGS.
ANTIMICROBIAL WITH VARIOUS CHEMICAL STRUCTURE.
SULFONAMIDES.**

A. Actuality. Approximately 50% of human diseases are caused by various pathogens: bacteria, spirochetes, rickettsia, chlamydia, protozoa, fungi, viruses, etc. In the fight with pathogens on a living tissue (skin, mucous membranes, natural and pathological cavities, wounds) or in the external environment (various objects, tools, etc.), drugs are used to prevent their multiplication or cause their destruction - antiseptics and disinfectants, respectively. These medicines are widely used in health care institutions. In particular, they are an essential part of infection control practices and help prevent nosocomial infections.

In the treatment of infections, along with antibiotics, is used and other groups of drugs like sulfonamides, chemotherapeutic, antimicrobial with various chemical structure. These can often be considered as an alternative to antibiotics or even first-line drugs for the treatment of infectious diseases, such as those induced by protozoa, chlamydia, rickettsia, etc.

B. The purpose of the training is to familiarize students with the pharmacology of antiseptics, disinfectants, sulfonamides, chemotherapeutic drugs, antibacterial drugs with various chemical structure to develop skills for their selection according to the location of pathogenic microorganisms in biological environments or on different objects, to understand the role of these drugs in medical practice, correct prescription of the recipes, according to the indications.

C. Learning objectives:

1) The student needs **to know**: definition, classification and main characteristics of antiseptic, disinfectants, sulfonamides, chemotherapeutic drugs, antibacterial drugs with various chemical structure, name, drug forms and way of administration of the main drugs, mechanism of action, indications, contraindications and side effects

2) The student should **be able to**: prescribe the main antiseptics, disinfectants, sulfonamides, chemotherapeutic drugs, antibacterial drugs with various chemical structure in the drug forms, select the drugs according to the indications.

D. Initial level of knowledge required for interdisciplinary integration.

Microbiology. Taxonomy and classification of microorganisms. Spread of microorganisms in nature. Influence of environmental factors on microbes. The notion of infection. Bacteria, viruses, pathogens, protozoa, and human illnesses caused by them.

Organic chemistry. Structure of sulfonamides.

Biochemistry. Notion of antimetabolites.

Microbiology. Nutrition and metabolism of a microbial cell. Multiplication of bacteria.

E. Self-training question:

1. Antiseptics and disinfectants: definition, classification by chemical structure. Basic requirements for antiseptics and disinfectants, mechanisms of action. Factors determining antimicrobial activity and drug selection (pathogen sensitivity, degree of dissociation, concentration, lipophilicity, properties of pathological objects and processes).
2. Metal compounds. Mechanisms of action, effects, indications. Local action (astringent, irritating and cauterizing).
3. Halogen compounds. Classification. Chlorine drugs: mechanism of action, effects, indications, side effects.
4. Halogen compounds. Iodine drugs: mechanism of action, effects, indications, side effects.
5. Oxidants. Mechanism of action, effects, indications, side effects of hydrogen peroxide and potassium permanganate.
6. Detergents. Classification. Anionic detergents: mechanism of action, effects, indications.
7. Cationic detergents: mechanism of action, effects, indications.
8. Aldehydes: mechanism of action, effects, indications.
9. Phenols: mechanism of action, effects, indications.
10. Colorants: classification, mechanism of action, the particularities of use.
11. Nitrofurans derivatives: mechanism of action, effects, indications.
12. Acids and bases. Volatile oils. The mechanism of action. Indications.
13. Bisguanides: mechanism of action, effects, indications.
14. Alcohol: mechanism of action, effects, indications.
15. Thiosemicarbazone derivatives. Mechanism of action. Effects. Indications.
16. Naphthoquinone derivatives (nucine): pharmacodynamics, effects, indications.
17. Classification of sulfonamides.
18. Spectrum and mechanism of action of sulfonamides.
19. Pharmacokinetics of sulfonamides and dosing principles.
20. Indications, contraindications and side effects of sulfonamides.
21. Combined sulfanilamides. Composition. Spectrum and mechanism of action. Pharmacokinetics, Indications, contraindications, side effects.
22. Azo compounds. Composition and mechanism of action. Uses. Peculiarities of mesalazine.
23. Nitrofurans derivatives. Classification. Spectrum and mechanism of action. Indications and side effects.
24. Naphthyridine derivatives. Non-fluorinated quinolones: spectrum and mechanism of action, indications, pharmacokinetic.

25. Fluorquinolones: classification, spectrum and mechanism of action, indications, contraindications, side effects, pharmacokinetics.
26. Nitroimidazole derivatives. Classification, spectrum and mechanism of action, indications and side effect.
27. Oxazolidinediones: spectrum and mechanism of action, indications, side effects, pharmacokinetics.
28. 8-Oxynquinoline derivatives. Classification. Spectrum and mechanism of action. Indications and side effects.
29. Quinoxaline derivatives. Spectrum and mechanism of action. Indications and side effect.

F. Independent work (is done in written form while preparing for the lesson)

1.) Brief characteristics of the compulsory drugs:

Down: Drug Name. 1. Nitrofurantoin. 2. Silver nitrate. 3. Zinc sulphate. 4. Chloramine B. 5. Iodine solution 5%. 6. Hydrogen peroxide solution. 7. Potassium permanganate. 8. Alcohol. 9. Boric acid. 10. Ammonia solution. 11. Green brilliant. 12. Chlorhexidine. 13. Cetylpyridinium. 14. Ethacridine lactate. 15. Hexamethylenetetramine. 16. Sulfaethidole. 17. Sulfadimethoxine. 18. Sulfalene. 19. Cotrimoxazole. 20. Furazolidone. 21. Nalidixic acid. 22. Ofloxacin. 23. Metronidazole. 24. Nitroxoline. 25. Linezolid. 26. Ciprofloxacin. 27. Sulfasalazine. 28. Phthalylsulfathiazole. 29. Nitrofurantoin. 30. Mesalazine. 31. Sulfacetamide.

Across: 1. Medicinal form. 2. Ways of administration. 3. Doses (therapeutic, maximum for one intake and for 24 hours). 4. Mechanism of action. 5. Indications and contraindications. 6. Side effects.

2.) Questions on medical prescription.

To prescribe the following drugs in all possible medicinal forms: 1. Nitrofurantoin. 2. Silver nitrate. 3. Zinc sulphate. 4. Chloramine B. 5. Iodine solution 5%. 6. Hydrogen peroxide solution. 7. Potassium permanganate. 8. Alcohol. 9. Boric acid. 10. Ammonia solution. 11. Green brilliant. 12. Chlorhexidine. 13. Cetylpyridinium. 14. Ethacridine lactate. 15. Hexamethylenetetramine. 16. Sulfaethidole. 17. Sulfadimethoxine. 18. Sulfalene. 19. Cotrimoxazole. 20. Furazolidone. 21. Nalidixic acid. 22. Ofloxacin. 23. Metronidazole. 24. Nitroxoline. 25. Linezolid. 26. Ciprofloxacin. 27. Sulfasalazine. 28. Phthalylsulfathiazole. 29. Nitrofurantoin. 30. Mesalazine. 31. Sulfacetamide.

Drugs used in (for): sputum disinfection, disinfection of instruments, treating water to make it potable, hand processing, wound flushing, processing the operator field, conjunctivitis treatment, hyperhidrosis, primary wound processing, prophylaxis of newborn blenorhea, pneumonia, dysentery, conjunctivitis, urinary tract infections, infection caused by *Ps. aeruginosa*, infection caused by *Bac. fragilis*, non-specific ulcerative colitis, trichomoniasis, severe purulent infection,

infections caused by actinomycetes, infections caused by pneumocystis, atypical infections, infections caused by toxoplasmas, nocardiosis, anaerobic infections, protozoan infections, tuberculosis, pseudomembranous colitis, staphylococcal and streptococcal infections with polyresistance.

3.) **Tests** (Guideline for Laboratory Work in Pharmacology).

4.) **Clinical case** (Guidelines for Laboratory Work in Pharmacology).

5.) **Virtual situation** (Guidelines for Laboratory Work in Pharmacology).

6.) **Virtual didactic movie** (during the seminar: protocol, conclusions).

7.) **Tables**

Table N1

Indications of antiseptic and disinfectant drugs

Indications	Medicines and their concentrations
Antiseptic processing of the hands	
Antiseptic processing of the operating field	
Processing mucous membranes, purulent wounds, combustion surfaces and trophic ulcers	
Conjunctivitis, keratitis, blepharitis	
Disinfection of medical and surgical instruments of care for the sick	
Disinfection of pathological removals	
Processing of the mouth and laryngeal mucosa in various infections	
Disinfection of water	

Table N2

Determine the A-C antiseptic groups (aldehydes, alcohols, halogens)

Characteristics	A	B	C
Mechanism of action	-Protein denaturation with albumin formation - Dehydration of the microbial cell	-It manifests oxidative properties by influencing the thiol groups of enzymes and proteins	- Alkylation of proteins

Effects	- antiseptic and disinfectant - astringent - Irritant - revulsive	-antiseptic and disinfectant - deodorant - bleach	- antiseptic and disinfectant - deodorant - astringent and tanning
Indications	- Processing field operator - Disinfecting instruments - Processing of hard dental tissues	- Disinfection of drinking water - Antiseptic skin, wounds, vaginal mucosa - In dentistry	- Hand processing - Plantar hyperhidrosis - For the preservation of anatomical parts
Side effects	- Irritating action on the mucosa - Local erythema	- Irritating action on the mucosa - High concentrations: acidosis, acute pulmonary edema, collapse, death.	- Local irritation -Alergic reactions

8.) Problems:

Case 1

One patient referred to the dentist with oral cavity health problems. The doctor, after examining and performing the dental procedures for the prophylaxis of infections, for diminished the formation of the dental tartar, prescribed an antiseptic drug for the mouth gargle. After use, the patient noticed taste disorders, xerostomia, burning sensations of the tongue.

Determine the prescribed antiseptic?

Explain the mechanism of action, effects and indications of the prescribed drug.

Case 2

An antimicrobial drug with bacteriostatic action was indicated to the patient with mild evolution pneumonia. After 7 days of treatment the condition improved, but in a short time the patient presented pain in the lumbar region and disruption of urination. On urine examination were determined crystalluria, cylindruria, albuminuria, hematuria.

Which drug was the cause of the complications?