

ANTISEPTICS AND DISINFECTANTS. SULFONAMIDES. ANTIBACTERIAL CHEMOTHERAPEUTIC DRUGS WITH DIFFERENT CHEMICAL STRUCTURES.

A. Actuality. Approximately 50% of human diseases are caused by various pathogens: bacteria, spirochetes, rickettsii, chlamydia, protozoa, fungi, viruses, etc. In the fight against pathogens, located on a living tissue (skin, mucous membranes, natural and pathological cavities, wounds) or in the external environment (various objects, instruments, etc.), drugs are used, which can prevent their multiplication or cause their destruction - antiseptics and, respectively, disinfectants. These drugs are used on a large scale in the medical and sanitary institutions. Especially, they are an essential part of infection control practices and help prevent nosocomial infections.

In the treatment of infections, along with antibiotics, are used a varied arsenal of drugs like sulfonamides and chemotherapeutics with diverse chemical structure. These can often be considered as an alternative to antibiotics or even first-line drugs in the treatment of infectious diseases, such as those induced by protozoa, chlamydia, rickettsia, etc.

B. The purpose of training: consists in studying the pharmacology of antiseptics, disinfectants, sulfonamides, chemotherapeutics, antibacterials with diverse chemical structure with the formation of the skills to select them according to the location of pathogenic microorganisms in biological environments or on various objects, elucidation of the role of these drugs in medical practice, correct prescription of drugs according to the indications.

C. Learning objectives:

- 1) The student must **to know:** definition, classification, drug forms and routes of administration, mechanism of action, indications, contraindications and adverse reactions of the antiseptic drugs, disinfectants, sulfonamides, chemotherapeutics with diverse chemical structure.
- 2) The student must **be able to:** prescribe antiseptic drugs, disinfectants, sulfonamides, chemotherapeutics with diverse chemical structure in all medicinal forms and select drugs according to the indications.

D. Knowledge of previous and related disciplines necessary for interdisciplinary integration.

Microbiology. Taxonomy and classification of microorganisms. The spread of microorganisms in nature. The influence of environmental factors on microbes. Notion about infections. Bacteria, viruses, pathogenic fungi, protozoa and human diseases caused by them.

D. Self-training questions:

1. Antiseptics and disinfectants: definition, classification by chemical structure. The basic requirements for antiseptics and disinfectants, the mechanisms of action. Factors that determine antimicrobial activity and drug selection.
2. Metal compounds: mechanisms of action, effects (astringent, irritant, cauterizing), indications, adverse reactions.
3. Halogenated compounds: classification.
4. Chlorine drugs: mechanism of action, effects, indications, adverse reactions.
5. Iodine drugs: mechanism of action, effects, indications, adverse reactions.
6. Oxidants: mechanisms of action, effects, indications, adverse reactions.
7. Detergents. Anionic detergents: mechanism of action, effects, indications.
8. Cationic detergents: mechanism of action, effects, indications.
9. Aldehydes: mechanism of action, effects, indications.
10. Phenols: mechanism of action, effects, indications.
11. Colorants: mechanisms of action, particularities of use.
12. Nitrofurans derivatives: mechanism of action, effects, indications.
12. Acids and the bases. Volatile oils: mechanisms of action, effects, indications.
13. Bisguanides: mechanism of action, effects, indications.

14. Alcohols: mechanism of action, effects, indications.
15. Thiosemicarbazone derivatives: mechanism of action, effects, indications.
16. Naphthoquinone (nucine) derivatives: mechanism of action, effects, indications.
17. Sulfonamides: classification, spectrum and mechanism of action, indications, contraindications, adverse reactions, pharmacokinetics.
18. Combined sulfonamides: composition, spectrum and mechanism of action, indications, contraindications, adverse reactions, pharmacokinetics.
19. Azo compounds: composition, mechanism of action, indications. Mesalazine particularities.
20. Nitrofurantoin derivatives: classification , spectrum and the mechanism of action , the indications and adverse reactions .
21. Naphthylidene and quinolone derivatives. The non- fluorinated quinolones: the spectrum and mechanism of action, indications, pharmacokinetics.
22. Fluoroquinolones: classification, spectrum and mechanism of action, indications, contraindications, adverse reactions, pharmacokinetics.
23. Nitroimidazole: classification , spectrum and the mechanism of action, indications and adverse reactions, pharmacokinetics.
24. Oxazolidinones: the spectrum and mechanism of action, indication , adverse reactions, pharmacokinetics.
25. 8-oxyquinoline derivatives: classification, spectrum and mechanism of action. Indications, adverse reactions.
26. Quinoxalines derivatives : the spectrum and mechanism of action, indications, adverse reactions.

F. Individual works for the student's (points 1, 2, 3 and 4 is obligatory and is done in written form while preparing for the lesson)

1) To prescribe the following drugs in all possible medicinal forms:

1. Nitrofurantoin. 2. Silver nitrate. 3. Zinc sulfate. 4. Alcoholic iodine solution of 5%. 5. Hydrogen peroxide solution. 6. Potassium permanganate. 7. Ethyl alcohol. 8. Boric acid. 9. Nitrofurantoin. 10. Metronidazole. 11. Brilliant green. 12. Chlorhexidine. 13. Cetylpyridinium. 14. Linesolid. 15. Hexamethylenetetramine. 16. Sulfadimethoxine. 17. Sulfacetamide. 18. Nitroxoline. 19. Ciprofloxacin. 20. Co-trimoxazole. 21. Phthalylsulfathiazole. 22. Sulfasalazine . 23. Nalidixic acid. 24. Ofloxacin.

No.	<i>The name of the medicine</i>	<i>Form of delivery, dosage</i>
1.	Sulfadimethoxin	Tablets 0.2; 0.5
2.	Co-trimoxazole Sulfamethoxazole : Trimethoprim = 5:1	Tablets 0.24; 0.48 Suspension 80ml (0.24/5ml) Sol. 5 ml in ampoules
3.	Acid nalidixic	Tablet and capsule 0.5
4.	Ofloxacin	Tablets 0.2; 0.1 Sol. 0.2% - 100ml in the vials (i/v) Eye drops 0.3% - 5ml Ophthalmic ointment 0.3% - 3.0
5.	Metronidazole	Tablets 0.2; 0.4 Vaginal tablets 0.5 Vaginal suppositories 0.5; 1.0 Sol. 0.5% - 10ml in ampoules Sol. 0.5% - 100ml in vials (i/v)
6.	Nitroxoline	tablet 0.05

7.	Linezolid	Sol. 0.2% - 300ml in vials (i/v) Tablets 0.6
8.	Ciprofloxacin	Tablets 0.25; 0.5 Sol. 1% - 10ml in ampoules Sol. 0.2% - 100ml in the vials (i/v) Ophthalmic sol. 0.1% - 10ml Ophthalmic ointment 0.3% - 3.0
9.	Sulfasalazine	Tablet 0.5
10.	Phthalylsulfathiazole	Tablet 0.05
11.	Nitrofurantoin	Tablet 0.05; 0.1
12.	Sulfacetamide	Eye drops 20% - 10 ml
13.	Nitrofurazone	Tablets 0.02 Ointment 0.2% - 25.0 Sol. 0.02% - 400ml in bottles (local)
14.	Silver nitrate	Sol. 10% - 10ml in bottles (local) Ointment 1% - 30.0
15.	Zinc sulfate	Tablets and dragees 0.01; 0.2 Eye drops 0.25% - 10 ml
16.	Alcohol sol. of iodine	Sol. 5%- 10 and 25 ml in vials
17.	Hydrogen peroxide solution	Sol. 3% - 100 ml in vials (external)
18.	Potassium permanganate	Powder 3.0 _ Sol. 0.5% and 5% - 100 ml in the vials (local)
19.	Alcohol ethyl	Sol. 20% ; 33% ; 70%; 90% - 100ml in vials
20.	Acid boric	Powder 10.0 Sol. 0.5%; 1% - 20ml and 40ml in bottles (local) Ointment 5% - 15.0
21.	Green of brilliant	Sol. alcoholic 1%; 2% - 15ml and 30ml in bottles
22.	Chlorhexidine	Sol. 0.05% - 100ml in bottles Vaginal suppositories 0.016
23.	Cetylpyridinium	Tablets 0.0012
24.	Hexamethylenetetramine	Tablet 0.25 ; 0.5 Sol. 40% - 5ml in ampoules Sol. 40% - 50ml in vials

2) List the groups and drugs used in (for): Antiseptic components of toothpastes, unpleasant odor from the oral cavity, disinfection of water to make it drinkable, antiseptics in poisoning with morphine alkaloids, treatment of oropharyngeal infections, antiseptics for washing cavities in surgery, antiseptics for reducing bacterial plaque, hands disinfection, operating field processing, disinfectants with decolorizers, disinfection of instruments, antiseptics in the treatment of simultaneous bacterial and fungal infections, plantar hyperhidrosis, preservation of anatomical parts, antiseptics in methemoglobinemia, gargles of the oral cavity in dental manipulations, prophylaxis of blepharitis and blenorrhea, pneumocystis pneumonia (caused by *Pneumocystis carinii*), nonspecific ulcerative colitis, intestinal infections, pulmonary tuberculosis, atypical infections, infections caused by toxoplasma, synthetic chemotherapy in urinary tract infections, protozoan infections, gastric and duodenal ulcers, anaerobic infections, pseudomembranous colitis, staphylococcal and streptococcal infections with polyresistance, infections caused by *Ps. aeruginosa*.

1) **Tables** (recapitulation of knowledge)

Table 1

Indications of antiseptic and disinfectant drugs

Indications	Medicines and their concentrations
Antiseptic hand treatment	
Processing field operator	
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 2

Determine the groups of antiseptics A-C (aldehydes, alcohols, halogenated)

Characteristic	A	B	C
Mechanism of action	- Denaturation of proteins with the formation of albuminates	It exhibits oxidizing properties by influencing the thiol groups of enzymes and proteins	Alkylation of proteins
Effects	- antiseptic -disinfectant - astringent - irritating - revulsive	-antiseptic and disinfectant - deodorant - bleach	antiseptic and disinfectant - deodorant - astringent
Indications	- Operating field processing - Disinfection of instruments - Processing of hard dental tissues	-Disinfection of drinking water - Antisepsis of skin, wounds, vaginal mucosa - In dentistry	- Processing of hands - Plantar hyperhidrosis - For the preservation of anatomical parts
Side effects	- Irritating effect on the mucous membrane - Local erythema	- Irritating effect on the mucous membrane High concentrations: acidosis, acute pulmonary edema, collapse, death.	-Local irritation -Allergic reactions

Table 3

Characteristic comparison of derivatives nitrofurantoin

Drugs	Route of administration	Indications
Nitrofurantoin		
Furadonin		
Furazolidone		
Furazidone		

4) Problems of situation:

Problem 1

A patient came to the dentist with oral health problems. The doctor, after examining and performing dental procedures for the prevention of infections, reducing the formation of dental tartar, prescribed an antiseptic medicine for gargling the oral cavity. After use, the patient noticed taste disturbances, xerostomia, burning sensations of the tongue.

Determine the prescribed antiseptic?

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

Problem 2

The patient with pneumonia of mild evolution in ambulatory conditions was prescribed an antimicrobial drug with bacteriostatic action. After 7 days of treatment, the condition improved, but in a short time the patient complained of pain in the lumbar region and dysregulation of urination. During the urine examination, crystalluria, cylindruria, albuminuria, hematuria were determined.

What medicine was the cause of the complications?

What will be their preventive measures?

5) Tests for self-training (Guidelines for Laboratory Work in Pharmacology).

G) Interactive activity

1. Experimental and virtual didactic movie (elaboration of minutes, conclusions).

2. Clinical case (Guidelines for Laboratory Work in Pharmacology).

3. Virtual situations (Guidelines for Laboratory Work in Pharmacology).