THE SYSTEM OF ANTIEPIDEMIC MEASURES

DERATIZATION, DISINFECTION, STERILIZATION AND DEZINSECTION

Dr., conf. V. Chicu
Definition of the notion
“System of antiepidemic measures”
and the general characteristics
The system of antiepidemic measures is a set of justified actions from the scientific-practical standpoint aimed to infectious diseases prevention and control.
The objectives of the system of antiepidemic measures

- prevention of infectious diseases
- reducing the incidence
- elimination of incidence
- eradication of the infectious disease
The system of antiepidemic measures includes 2 issues:

- prophylactic measures
- antiepidemic measures
Tools of antiepidemic measures:

- aetiologic treatment
- deratization
- disinfection and sterilization
- disinsection
- immunoprophylaxis (vaccines, immune serums, immunoglobulins)
- specific prophylaxis (bacteriophage, interferon)
The system of antiepidemic measures and phases of modifications of the pathogenic agent population

<table>
<thead>
<tr>
<th>Reservation</th>
<th>Epidemic transformation</th>
<th>Epidemic spreading</th>
<th>Transformation in reservation phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prophylactic measures</td>
<td>Antiepidemic measures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Classification of antiepidemic measures

1. Control of the *source* of pathogenic agents
2. Disruption of the *mechanism* of pathogenic agents’ transmission
3. Measures to increase the non-susceptibility of population
4. General measures
Control of the source of pathogenic agents
In anthroponoses:

- **clinical and diagnostical actions:**
  - precocious detection of the patient
  - properly and timely collection of the samples from patients
  - etiotropic treatment;
  - emergency information

- **isolating the patient with an infectious disease:**
  - at home
  - hospitalization

- **antiepidemic measures in the hotbed:**
  - Establishing the borders
  - Surveillance of the persons that have had contact with the diseased
  - Using the emergency prophylaxis measures
  - Isolation and restriction measures in the hotbed
  - performing disinfection and disinsection measures

- **liquidating the hotbed**
In zooanthroponosis:

- Similar to those taken in anthroponoses (for zooanthroponosis of domestic animals)

- Radical measures - killing the diseased animals and using the animal products only after the thermal processing.

- Exterminating, burying and cremation of the animals.
Deratization involves a set of measures and means of combating the rodents that have epidemiological importance.
Preventive deratization includes:

- technical means of reducing the access of rodents to different objects;
- systematic disposal of solid waste
- agro-technical measures
Measures of exterminating the rodents:

- mechanical
- chemical
- biological
The way of using the raticides for the combating of rodents:

- using the food baits;
- processing the water;
- using toxic volatile toxic substances
Groups of raticides

- with acute toxic action (rapid) – crisid, zinc phosphide, tiosemicarbaside, phtoracetamide etc.,
- with cumulative action – zoocumarine (anticoagulants), ratindan
More frequently used raticides:

- Monophtorine
- Ratindan
- Zoocumarin
- Ftoracetamide
- Sliftor
- Zinc phosphide
Disruption of the mechanism of pathogenic agents transmission:

- disinfection;
- sterilization;
- disinsection
Disinfection – is a set of measures of extermination of infectious diseases pathogenic agents on different elements, objects of the environment.
Types of disinfection:

- prophylactic disinfection;
- hotbed disinfection
  ● current
  ● terminal
Prophylactic disinfection – includes systematic processing with disinfectants of some elements and objects (indifferently of the contamination) which can have an important epidemiological role in spreading of infectious diseases.
Hotbed disinfection is performed on the territory, that could have elements contaminated by pathogenic agents eliminated by the source of infection.

- current disinfection
- terminal disinfection
Disinfection methods and means

Mechanical
- washing
- airing
- filtering water
- cleaning dust

Physical
- boiling
- water vapors
- ultraviolet radiation
- sterilization in flame

Chemical
- substances containing chlorine, iodine, bromine;
- alcohols;
- acids;
- salts etc.
Basic factors that influence the efficiency of disinfection

• biological peculiarities of the pathogenic agent;
• content of proteins in disinfected substrates, objects;
• concentration of the solution;
• exposure;
• observance of disinfectant usage rules.
Chemical classification of disinfectants

- Phenol
- Chlorine and its compounds
- Quaternary ammonium salts
- Formaldehyde
- Acids
- Oxidants
- Alcohols
CHLORINE AND ITS COMPOUNDS – are widely used in practice. Chlorines possess antibacterial, antifungal and antiviral properties; are relatively inexpensive. Chlorine solutions are irritating to skin and corrosive to metal. In our republic for disinfection are widely used lime chloride and chloramine.
QUATERNARY AMMONIUM SALTS – active disinfectants with a detergent action, are generally odorless, colorless, nonirritating, and deodorizing solutions with bactericide, fungicide and antiviral action.

In 0.25% - 1.0% solutions are used for current disinfection of surfaces, in epidemic hotbeds, of surgical tools, laboratory vessels, etc.

UNIS, SEPTABIK, DENTASPRAY, PROFIK, etc. are registered and used in our republic.
FORMALDEHYDE - is used for disinfection as an aqueous 40% solution of formalin out of which 1-4% working solutions and vapors of formalin, used in disinfection chambers, are prepared.
ACIDS – more frequent are active against vegetative forms of microorganisms. Organic acids have lower disinfecting properties than non-organic ones.
IODINE AND ITS COMPOUNDS – are good disinfectants, have bactericide, fungicide and antiviral properties.
OXYDANTS - Hydrogen peroxide in 1-3% solutions has a bactericide action (3-6% effective against spores). It is widely used in prophylactic disinfection (maternities, kindergartens) and for terminal disinfection.
Disinfectants containing glutaraldehyde, didecildimethylammonia and other active agents

- **LYSOFORMIN-3000**
- **CIDEX**
- **DESOFORM**
- **FORDESIN**

are used for disinfection of medical instruments, laboratory vessels, surfaces, equipment in medical institutions (operating rooms, departments of intensive care, departments of infectious diseases etc.)
ALCOHOLS - methanol, ethanol and isopropranol dehydrate cells, disrupt membranes and cause coagulation of protein. A 70% aqueous solution has disinfectant properties but it is less effective in disinfecting objects contaminated with spores, viruses.
DISINFECTION CHAMBERS

Types of chambers:

- with hot vapors at $t^\circ$ of 100-120 °C and the excessive pressure of 0,2 – 1 atm.
- with vapors and formalin at the $t^\circ$ of 40-59 °C.
- with hot air at the temperature of 80-90 °C.
Methods of quality and disinfection effectiveness control:

- Visual
- Chemical
- Bacteriological
STERILIZATION - a set of measures for the inactivation of all microorganisms (pathogenic and saprophytes) that can contaminate different objects and substrates etc.
Phases of sterilization of medical instruments:

- Cleaning the instruments
- Sterilization
Antesterilization

- Sorting
- Soaking
- Washing
- Rinsing
- Drying
Methods of sterilization

1. Thermic
   • Sterilization with vapor.
   • Sterilization with air

2. Chemical
   • Oxide of ethylene (gas sterilization)
   • Sterilization with solutions (glutaraldehyde)

3. “Cold” methods of sterilization (radioactive)
DISINSECTION

Is a set of measures of combating the vectors of the infectious diseases pathogenic agents.
Epidemiological role of some vectors

- mosquitoes – malaria, yellow fever, tularemia, Japanese encephalitis, Dengue fever;
- lice – typhus and recurrent typhus;
- fleas – plague;
- ticks – tularemia, acarian encephalitis, Lyme disease;
- flies – intestinal infectious diseases (dysentery)
Types of disinsection

Prophylactic

Extermination of vectors
Prophylactic disinsection includes:

- creation of unfavorable conditions for the reproduction and development of vectors
- protecting living settings
- using the individual protection means
  - nets
  - repellents
Methods of vectors extermination

• Mechanical:
  - cleaning, shaking out, cleaning with a vacuum cleaner the living spaces and objects;
  - using traps;
  - using sticky paper.

• Physical – using high temperature (vapors, boiling)

• Chemical – using chemical substances toxic for vectors
Classification of insecticides depending on the way of penetrating into the vectors’ organism

- **contact insecticides** - organic compounds of chlorine (DDT, hexachlorcyclohexane); organic compounds of phosphor –(dihlophos, carbophos, metaphos, trihlophos)

- **insecticides** that penetrate via *respiratory* ways (fumigants) – sulphurous anhydride, brome methyl, components of cyanic acid etc.

- **intestinal insecticides** - boric acid
Insecticides used for the combating of pediculosis

- pyrethrum
- carbophos
- nitifor
- anti-pediculosis shampoo (anti-P)
- veda
General antiepidemic measures

- **Laboratory investigations**
  - the diagnosis of infectious diseases;
  - control of the food products, water contamination;
  - quality assessment and the efficiency of disinfection, sterilization, immunization etc.

- **Health education (Health promotion)**
  - observance by the population of some hygiene rules of prevention of water contamination (boiling the water), food products (their correct storage);
  - washing hands;
  - vaccination etc.