MINISTRY OF HEALTH PROTECTION OF UKRAINE

ODESSA NATIONAL MEDICAL UNIVERSITY

Faculty of Dentistry

Department of General and Clinical Epidemiology and Biosafety with a course in microbiology and virology

I APPROVE

Vice-rector for scientific and pedagogical work

Eduard BURIACHKIVSKYI

September 1, 2023

METHODICAL DEVELOPMENT OF PRACTICAL LESSONS

Faculty of dentistry, course 2

Educational discipline "EPIDEMIOLOGY"

Approved:

Meeting of the department of general and clinical epidemiology and biosafety with the course of microbiology and virology of the Odessa National Medical University

Protocol No. 1 dated September 1, 2023.

Head of the department  (Mykola GOLUBIATNYKOV)

Developers:

head of the department, Prof., Doctor of Medicine, M.I. Golubiatnykov

professor of the department, Doctor of Medicine, O. V. Bachynska

associate professors of the department: PhD of Medicine Servetskyi S.K., PhD of Medicine Fedorenko T.V.

assistants: PhD of Medicine T.V. Gerasimenko, PhD of Medicine. Melnyk O.A., Jurtubaeva H.M., Hrytsenko K.S., Kostolonova L.V.

Practical lesson No. 1

TOPIC: Basic epidemiological concepts. Reservoirs and sources of pathogens of infectious diseases. Mechanisms, factors and ways of transmission of infectious disease agents - 2 hours.

Goal:*Get acquainted*with:

- Definition of epidemiology as a science.
- Stages of development of epidemiology.
- Tasks of epidemiology
- Quantitative and qualitative manifestations of the epidemic process.
- Determining the source of infection.
- Cyclical I will run infectious diseases, hersignificance forcarrying out anti-epidemic measures.
- Carrier categories, media measures. The concept of receptivity

Basic concepts:

***Epidemiology*–**it is a science that studies the causes of the emergence and spread of infectious diseases and develops measures to combat them and prevent them.

***Epidemic process*–**is a continuous process of interaction of micro- and macro-organisms at the population level, which is manifested by the spread of specific infectious became among people (disease and medium)and ensures preservation pathogen in nature as biological species"(according to L.V. Gromashevskyi). In other words, the process of emergence and spread among the population of infectious diseases is called an epidemic process.

***The source of the causative agent of infection*–**it is a living infected organism (sometimes a natural environment) in which the pathogen has optimal conditions for its reproduction, accumulation and release into the environment.

***Transmission mechanism*–**this is the process of moving the pathogen from one organism to another, which was formed in the process of evolution and ensures the existence of this species in nature.

Sporadic morbidityis the level of morbidity common to a given area, or individual diseases occurring in a specific area.

Epidemic morbidity- this is the group nature of diseases, it is conditionally divided into outbreak, epidemic and pandemic.

Epidemic outbreak are group diseases among people who are connected by a common source of infection, route or factor of transmission. Outbreaks are usually limited to a family, an organized group or a settlement.

Epidemic is an intensive and widespread spread of an infectious disease that covers the population of a region of the country or several countries. Epidemics are characterized by a high incidence rate that exceeds the sporadic rate for a given area.

Pandemic is an intensive spread of an infectious disease that covers countries and continents. Yes, the 7th cholera pandemic and HIV pandemic are currently ongoing. In 2009, the WHO declared a pandemic of influenza A (H1N1).

Actuality of theme.

History shows that humanity has suffered from infectious diseases throughout its existence. Memories of them are found in ancient Egyptian papyri, dated 4000-3000 BC. Descriptions of diseases similar to natural smallpox, plague, and leprosy can be found in the works of ancient authors, ancient Chinese writings, and even in the Bible. Epidemiology as a science was born in the social experience of fighting infectious diseases. Despite the fact that people considered epidemics "God's punishment" and tried to fight them with the help of sacrifices, prayers, and fasting, already in those distant times ideas about the natural causes of the origin of epidemics were gradually born empirically.

Starting from the XI century. the isolation of the sick, the burial of those who died from contagious ("overwhelming") diseases in special cemeteries were used, and from the 14th century. the first attempts at quarantine and disinfection measures were implemented. The development of microbiology, the discovery of antibiotics, the widespread use of vaccine prophylaxis in the 20th century. contributed to significant success in the fight against infectious diseases.

Plan

I. Organizational moment (greetings, checking those present, announcing the topic, the purpose of the lesson, motivating students to study the topic).

II. Control of basic knowledge: Theoretical questions for the lesson:

1. Definition and tasks of epidemiology.
2. The concept of the epidemic process and its links.
3. Driving forces of the epidemic process.
4. Classifications of infectious diseases.
5. Characteristics of the main sources of infection.
6. Mechanisms of transmission of pathogens of infectious diseases.
7. Quantitative and qualitative manifestations of the epidemic process.
8. The concept of the source of infection.
9. Indications for hospitalization of infectious patients.

III. Formation of professional skills and abilities. Practical works (tasks) performed in class

1. Determine the source of infection.
2. Carry out measures to detect carriers.
3. Determine the mechanism, ways and factors of transmission.
4. Identify contact persons.
5. Carry out anti-epidemic measures aimed at the links of the epidemic process (source of infection, mechanism of transmission and susceptible organism).

Determine indications for hospitalization of an infectious patient.

Topic content:

Epidemiology–it is a science that studies the causes of the emergence and spread of infectious diseases and develops measures to combat them and prevent them.

The main tasks of epidemiology:

1. Determination of the medical and socio-economic significance of infectious diseases and their place in the population morbidity structure.

2. Study of patterns of spread of infectious diseases over time (years, months, etc.), territories and among different population groups (age, sex, household, professional, ethnic, etc.).

3. Identifying the causes and conditions that determine the nature of the spread of an infectious disease.

4. Development of recommendations for the prevention and control of this infectious disease.

In recent years, there has been a noticeable tendency to expand the boundaries of epidemiology and involve new objects in its field. Thus, the population approach is intensively developing in clinical disciplines: oncology, cardiology, endocrinology, psychiatry, etc. The epidemiological method of research, which was formed in the epidemiology of infectious diseases, turned out to be effective and found wide application in the study of the distribution patterns of diseases of a non-infectious nature among the population.

Epidemiological research methodis basic in epidemiology and allows to reveal patterns of spread of diseases over time, territorially and among different population groups. Therefore, it allows you to concentrate preventive measures in a certain period of time, which precedes the rise of the disease in the territory where the probability of its occurrence is the highest and on such population groups that have the highest risk of the disease. There is a well-founded opinion that epidemiology is a diagnostic discipline of public health care.

Epidemic process

***Epidemic process*–**is a continuous process of interaction of micro- and macro-organisms at the population level, which is manifested by the spread of specific infectious became among people (minoroba and medium)and ensures preservation pathogen in nature as biological species"(according to L.V. Gromashevskyi). In other words, the process of emergence and spread among the population of infectious diseases is called an epidemic process.

There are certain regularities in the formation of the epidemic process. They were substantiated by L.V. Gromashevsky as the basic law of epidemiology:

"The epidemic process arises and is maintained only under the conditions of constant interaction of the three main driving forces (or links) - the source of the causative agent of the infection, the mechanism of transmission and the organism susceptible to this infection"(scheme 1).

Scheme 1. Links of the epidemic process

The source of the causative agent	Mechanism of pathogen	Susceptible organism

These elements are closely related and ensure the continuity of the epidemic process. When at least one of the links is eliminated, the epidemic process stops. This law became the main methodological basis for the development of a modern system

of prevention of infectious diseases.

The source of the causative agent of infection

The source of the causative agent of infection–it is a living infected organism (sometimes a natural environment) in which the pathogen has optimal conditions for its reproduction, accumulation and release into the environment. The optimal conditions for the existence of pathogenic microorganisms are the infected body of a person or a warm-blooded animal, which is caused by the presence of a constant body temperature, pH and nutrient medium necessary for the existence of parasitic microorganisms. In recent years, a small group of saprophytic microorganisms that live freely in water and soil and do not necessarily need to exist in a living creature has been isolated. However, entering the body of a warm-blooded host, they acquire pathogenic properties and lead to diseases (listeriosis, legionellosis, gas gangrene, etc.).

Depending on the type of source of the pathogen, infectious diseases are divided into anthroponoses, zoonoses, anthropozoonoses, and sapronoses.

In anthroponosis, the source of infectious agents is only an infected person (patient or carrier). Anthroponoses include most infections with an aspiration mechanism of transmission (measles, chicken pox, meningococcal infection, etc.). In anthroponoses, there is a sequential transfer of pathogens from the organism of the source of infection to a susceptible organism of another person, which in turn also becomes a source of the pathogen for other people. The epidemic process is the only way of existence of these microorganisms - obligate parasites. The continuity of the epidemic process ensures their existence in nature. Only warm-blooded animals can be sources of pathogens for zoonoses. The mode of existence of zoonotic pathogens in nature is the epizootic process, that is, the process of spreading infectious diseases in the animal population. In most zoonoses, human diseases are accidental in the epizootic process chain, they are not related to each other. A sick person does not pose a danger to other people and is the "end branch" in the chain of the epizootic process (for example, with brucellosis, leptospirosis and tick-borne encephalitis, sick people are not contagious to the environment).

Many species of animals are the source of pathogens of zoonotic infections for humans. So, domestic animals include large and small cattle (anthrax, brucellosis, leptospirosis, foot-and-mouth disease, etc.), pigs (leptospirosis, trichinellosis, taeniosis, brucellosis, yersiniosis), horses, donkeys (mange, scabies, leptospirosis), dogs and cats (rabies, toxoplasmosis, toxocarosis, filariasis), birds (ornithosis, salmonellosis). Wild animals can also be sources of these infections, but are less important for human infection due to the rarity of contacts. Rodents are of great epidemiological importance, as they are the source of causative agents of more than 40 infectious diseases (plague, tularemia, yersiniosis, leptospirosis, rickettsiosis, hemorrhagic fevers, tick-borne and Japanese encephalitis, etc.).

A person can become infected with zoonoses in various situations: when caring for animals (due to infected secretions of animals, contaminated objects); when providing veterinary care (tularemia, anthrax, brucellosis); when consuming water and food contaminated with animal secretions (tularemia, leptospirosis); when swimming

in open bodies of water contaminated with animal secretions; when bitten by animals suffering from rabies and rabies; when slaughtering animals, removing the skin, dissecting animals (plague, tularemia, anthrax); when eating meat and milk of sick animals (tuberculosis, brucellosis, foot and mouth disease, salmonellosis); when bitten by blood-sucking arthropods (plague, tularemia, tick-borne and Japanese encephalitis, yellow fever).

The causative agents of sapronoses are saprophyte microorganisms that live freely on environmental objects, for them epidemic and epizootic processes are not a way of existence. Human infection with sapronoses usually does not lead to infection of other people and is a "biological dead end" for microorganisms. Sapronoses include such diseases as legionellosis, yersiniosis, tetanus, etc. The source of infection for such pathogens can be soil, water, that is, those objects of the environment that are the place of their natural existence.

Mechanism, factors and ways of transmission of infection

***Transmission mechanism*–**this is the process of moving the pathogen from one organism to another, which was formed in the process of evolution and ensures the existence of this species in nature.

In the implementation of the mechanism, transmission factors (environmental objects on which the pathogen can persist for a certain time, and sometimes accumulate) play a certain role. Water, food, air, household items, soil and living vectors are the factors of transmission of infectious disease agents.

The sequence and set of factors that are involved in the transmission of the pathogen in specific conditions determine the path of transmission of the pathogen, that is, the method of implementation of the transmission mechanism. Thus, the fecal-oral mechanism can be implemented by the water route when the pathogen is transmitted through water, the alimentary route when consuming contaminated food products, and the contact-household mechanism - when the pathogen is transmitted through household items. Thus, in each specific situation, pathogens can be transmitted in one way or another, through various objects.

Currently, the following types of transmission mechanisms are distinguished:

1. Aspiration (implemented by air-droplet and air-dust ways).
2. Fecal-oral (implemented water food andcontact and household means).
3. Transmissive (with the participation of carriers).
4. Contact (implemented by sexual and contact-domestic means).
5. Parenteral (when the causative agent penetrates through skin with broken integrity, using contaminated medical instruments, using injectable drugs).
6. Vertical (infection of the child from the mother perinatally or intranatally).

Characteristics of transmission mechanisms

Aspiration mechanismtransmission consists of the phase of releasing the causative agent into the air space during exhalation (coughing impulse, sneezing, talking) and its subsequent introduction into the entrance gate of the infection with the flow of air movement. This mechanism can be carried out in two ways - air-droplet

and air-dust. The pathogen is released from the source of infection in the form of a liquid aerosol and is released into the environment with a stream of air during coughing or speaking. The smaller the aerosol particles, the longer it stays in the air and penetrates deeper into the respiratory tract of a susceptible person. The largest amount of the pathogen in the air is in the zone up to 2.5 m around the source of infection. Highly dispersed aerosols can stay in the air for a long time, move with its currents inside and outside the building (for example, the causative agent of chicken pox can move to adjacent rooms and to other floors). A person becomes infected by inhaling an aerosol, which is how the airborne transmission path is formed. It is implemented in such infections as ARVI, influenza, measles, chicken pox, the causative agents of which are unstable in the environment. Aerosols with large particles quickly settle and dry. Dry particles of mucus and sputum can rise into the air with dust during cleaning of premises, movement of people. In this way, an air-dust transmission path is formed, which is inherent only to pathogens resistant to drying (for example, with diphtheria, tuberculosis). Accumulation of the pathogen in dust can occur with some zoonoses during threshing of contaminated grain, processing of wool, feathers, etc. (with tularemia, Ku fever, ornithosis, etc.).

The aspiration mechanism is easily implemented in the human population due to being in groups, active communication and crowding of the population in the premises. Respiratory tract infections are able to spread rapidly among large populations, covering countries and continents (for example, influenza pandemics). They are characterized by winter-spring seasonality, which is due to an increase in the time people spend indoors, a decrease in air temperature and the level of ultraviolet radiation. The main direction of prevention for most infections transmitted by the aspiration mechanism is to increase the specific immunity of the population to the pathogen through mass vaccine prophylaxis. A certain role is also played by non-specific prevention, aimed at hardening the body, forming a rational regime of work and rest, etc.

Fecal-oral mechanism.The specific localization of the pathogen in the intestine determines its removal from the body of the source of infection with feces. Implementation of the fecal-oral mechanism of transmission can occur in three ways: water, food and contact-household, depending on the transmission factors that were involved in a specific situation.

*Waterway*is formed when drinking contaminated drinking water or swimming in open water bodies. Water pollution by sewage occurs during waterworks accidents, floods, downpours, etc. Open bodies of water can be polluted by the secretions of animals and birds. In such conditions, water outbreaks and epidemics of intestinal infections can occur, and diseases become widespread.

*Alimentary tract*transmission occurs when eating food that contains microorganisms or their toxins. Pathogens enter food products from sick animals (eggs, meat in case of salmonellosis; milk in case of brucellosis and staphylococcal mastitis of cows) or from the hands of a sick person who participates in the preparation and sale of food. Sometimes there is contamination (pollution with microorganisms) of products by mechanical vectors - flies, cockroaches or rodent secretions. Products of animal origin (milk, meat products), which are a good nutrient

medium for the reproduction of microorganisms, have the greatest epidemiological significance for the implementation of the food transmission route.

*Contact and household way*transmission is realized with the participation of such factors as household items (dishes, toys, linen, etc.) in home conditions, organized teams or medical institutions. The epidemiological significance of this route of transmission depends primarily on the level of sanitary culture of the population. Contaminated hands are the most active factor in the transmission of pathogenic microorganisms in everyday life. The role of contaminated objects is determined by the number of microorganisms and their persistence in the environment, as well as the frequency and nature of use of these objects. Dishes, linens, care items in medical facilities, toys in children's groups, door handles in common areas, etc., are of the greatest importance for the implementation of the contact-household path. Pathogenic microorganisms usually do not reproduce on objects, so the dose of the pathogen entering the human body from such objects is insignificant. This leads to the occurrence of isolated cases of diseases and the predominance of mild forms. However, group outbreaks may occur in children's groups and medical institutions.

In the fight against intestinal infections, it is important to identify the sources of infectious agents in a timely manner (isolation of patients and carriers, periodic examination of workers of decreed groups). However, the main direction of prevention is the disruption of the mechanism of transmission of pathogens (purification and disinfection of drinking water, sewage treatment, improvement of settlements, sanitary control of public catering establishments, sanitary culture of the population, etc.). Vaccination is of limited value in preventing intestinal infections and is used only in foci of infections such as hepatitis A and typhoid.

Transmission mechanismtransmission takes place with the participation of living blood-sucking vectors that carry pathogens from the source of infection to susceptible people. Most pathogens of blood infections are obligate parasites and have low resistance to environmental factors. Such pathogens are characterized by the process of vital activity in the body of a warm-blooded host and short-term transmission to another organism (warm-blooded host-carrier).

Insects – lice, fleas, mosquitoes, mosquitoes and ticks (ixod, gamaza, etc.), as well as mechanical non-blood-sucking vectors (flies, cockroaches) – are of greatest importance in the transmission of infectious disease agents.

The group of infections with a transmissible transmission mechanism is represented by both anthroponoses (rash and typhus, malaria) and zoonoses (tick-borne and Japanese encephalitis, hemorrhagic fevers, etc.). Characteristic epidemiological a sign infections, whatare transmitted transmissivethe mechanism is natural centrality, which is due to a certain area of residence carriers or animal owners

So, cells Crimeanthere are fevers in Crimea, Lyme disease in Western Ukraine. The summer seasonality of these infections is also determined by the period of biological activity of arthropods.

The main direction of combating and preventing infections transmitted by the transmission mechanism is the direct influence on the transmission mechanism by destroying vectors (disinsection). Treatment of the sources of infection (chemotherapy

for malaria, trypanosomosis) is widely used for anthroponotic blood infections.

Contact mechanisminherent in infections of the skin and mucous membranes, it can be realized in two ways - direct (during sexual contact and direct contact with the source of infection) and indirect (indirectly through transmission factors - dishes, clothes, bed linen, household items, etc.). Thus, pathogens of venereal diseases - syphilis, gonorrhea, as well as HIV infection, hepatitis B, C, D, etc. are transmitted sexually. Indirect transmission of skin infections occurs - trachoma, mycosis, scabies, etc. The same group includes wound infections - tetanus, gas gangrene, the causative agents of which enter the body through damaged skin, but the pathological process is localized in the depths of the tissues. Most pathogens transmitted by the contact mechanism have high resistance in the environment and can remain on environmental objects for a long time (causing agents of tetanus, mycoses, anthrax, etc.). However, sexually transmitted infections are usually unstable and die quickly when desiccated and exposed to ultraviolet (UV) radiation.

The main direction in the prevention of skin diseases is the influence on the mechanism of transmission (reduction of overcrowding, improvement of living conditions, improvement of sanitary culture of the population). For the prevention and fight against venereal diseases, both the identification and treatment of sources of infection, as well as the formation of a culture of sexual relations in society, and the availability of means of contact prevention of diseases of the genital tract are important.

L. V. Gromashevsky's theory of transmission mechanisms is the result of a certain period of development of epidemiology. However, the further development of society and the emergence of new infectious diseases proved the existence of several more mechanisms of transmission, in particular, parenteral and vertical.

Parenteral mechanism

The implementation of the parenteral transmission mechanism occurs in the case of penetration of the causative agent into the human blood with the help of syringes and other tools that violate the integrity of the skin and mucous membranes. This mechanism is also called artificial, iatrogenic, artificial. The development of medicine, numerous surgical and other parenteral interventions, organ transplantation, blood transfusions have led to the appearance and spread of new infections - viral hepatitis B, C, D, HIV infection, etc. Their spread was also facilitated by the spread in society of drug addiction and household parenteral interventions, such as tattooing, piercing, manicure, etc.

The parenteral mechanism of transmission is actively implemented in hospital and preventive institutions in case of violation of the rules for processing medical instruments, insufficient examination of donor blood, which leads to the occurrence of nosocomial infections. In addition, the active spread of pathogens is facilitated by the peculiarities of the course of these infections - the presence of undetected sources of infection, chronic forms of hepatitis B and C, a long asymptomatic course of HIV infection, etc.

The main direction of combating infections transmitted by the parenteral mechanism is the disruption of the mechanism itself through the active use of

disposable instruments, compliance with the disinfection and sterilization regime in the hospital, thorough examination of blood donors, identification of hidden sources of infection, etc.

Vertical mechanism

Vertical transmission of pathogens is called transmission from mother to child in the prenatal and intranatal periods (during pregnancy and childbirth) and when feeding the child with mother's milk. This mechanism of transmission ensures the transition of pathogens from one generation to the next, which led to the emergence of the name of the mechanism. The probability of vertical transmission is with viral infections that have an acute and chronic course (viral hepatitis B, C, D, HIV infection, herpes infection, rubella), as well as with bacterial and protozoan infections (staphylococcal infection, toxoplasmosis, pneumocystosis, etc.).

The vertical mechanism is always secondary, since there is no disease that is transmitted only from mother to child. Most often, vertical transmission is realized in anthroponoses with an aspiration mechanism (herpetic infections, poliomyelitis, rubella, pneumocystosis, mycoplasmosis, erythema infectiosum, etc.), as well as in zoonoses with a fecal-oral transmission mechanism (brucellosis, campylobacteriosis, toxoplasmosis, lymphocytic choriomeningitis).

Currently, infectious diseases that can be transmitted vertically are combined into a group of TORCH infections (T – toxoplasmosis; O – other infections: absolute (syphilis, tuberculosis, chlamydia, enterovirus infections, gonorrhea, listeriosis, urea and mycoplasmosis , diseases caused by group B streptococci, viral hepatitis B); probable (measles, epidemic parotitis, chickenpox, viral hepatitis A, immunodeficiency virus); hypothetical (influenza A, parvovirus, lymphocytic choriomeningitis, papillomavirus infection), R - rubella, C - cytomegalovirus infection; H - herpes virus infections).

"Law of Conformity"

The mechanism of transmission primarily depends on the primary (or epidemiological) localization of the pathogen in the body. Thus, its localization in the gastrointestinal tract leads to the excretion of microorganisms with feces, and infection of a susceptible person occurs when consuming contaminated water or food through the mouth. In this way, the fecal-oral mechanism of transmission, which is inherent in intestinal infections, is implemented. If the causative agent of an intestinal infection enters the human body through the respiratory tract, it usually does not lead to its infection and the development of the disease. Such a regularity was discovered and substantiated for the first time by L.V. Gromashevsky as "The Law of Conformity of the Mechanism of Transmission of the Pathogen to the Primary (Epidemiological) Localization in the Host's Organism." Based on this pattern, he developed an epidemiological classification of infectious diseases, which is widely used today.

Classification of infectious diseases (according to L.V. Gromashevskyi, supplemented)

1. Respiratory tract infections.

2. Intestinal infections.
3. Blood infections.
4. Infections of external covers.
5. Infections with multiple transmission mechanisms.

Susceptible population is the third link of the epidemic process

Susceptibility- this is the specific ability of the organism to respond to the penetration and vital activity of the corresponding pathogen in it by the development of the infectious process (Cherkasky B.L., 2001). Susceptibility is a necessary condition for the emergence of an infectious process, and its manifestations always depend on the state of macro- and microorganisms. Factors such as age, physical and emotional state of the organism, the dose of the pathogen, its properties and specific conditions of the development of the epidemic process affect the state of human susceptibility. Susceptibility to infectious diseases increases in particular in early childhood, during emotional stress, physical exhaustion, etc.

The human population is heterogeneous (heterogeneous) in terms of the degree of susceptibility to each specific pathogen, which is manifested by the appearance of various forms of clinical manifestations of the disease - from mild, subclinical to severe. Thus, acute hepatitis B in almost 50% of infected people has an obliterated or non-icteric course, and only 40-50% develop a characteristic icteric form of the disease.

To assess susceptibility to infectious diseases, the contagiousness index is used - a quantitative indicator of the readiness of the human body to the disease upon primary infection with a pathogen. This indicator makes it possible to estimate the probability of a person getting sick after a guaranteed infection. The higher the contagion index, the less important individual characteristics of a person are. Thus, with measles, this indicator reaches 1 (100%), that is, almost 100% of people infected with the virus will develop an infectious process with the subsequent development of an immune response. With mumps infection, the contagiousness index is 0.5 (50%), with diphtheria - 0.2 (20%), and with

polio – 0.001 (0.03%).

However, in practical activity, the indicator opposite to susceptibility, that is, insusceptibility (resistance or immunity), is of greatest importance.

There are two main forms of anti-infective immunity: non-specific and specific. Non-specific immunity protects a person not only from pathogens of infectious diseases, but also from other substances, allows maintaining the homeostasis of the body. The non-specific adverse effect is due to the action of various factors: the barrier function of the skin and mucous membranes, the bactericidal effect of the acidic contents of the stomach, the complement system, interferons, lymphokines, etc.

Specific immunity, directed against specific pathogens, is divided into hereditary (species) and acquired.

Hereditary immunitywas formed in the process of phylogenesis and ensures species immunity to specific microorganisms (for example, human resistance to rinderpest, bird cholera, etc. is known).

Acquired immunitydivided into natural and artificial. Natural acquired immunity occurs after an infectious disease, during household immunization of a person with small doses of the pathogen (active immunity) or thanks to maternal antibodies entering the child's body through the placenta and with mother's milk (passive immunity). Artificial acquired immunity is formed after the introduction of artificial specific immunotropic drugs. After the introduction of vaccines (weakened or killed microorganisms, their toxins), antibodies against the pathogen are formed in the human body, but the disease does not develop. In this way, active immunity is formed. Vaccines provide long-term protection against a specific infectious disease and are used to prevent it.

When drugs containing antibodies (immune sera and immunoglobulins) are administered, passive artificial immunity is created. It provides short-term protection, so such drugs are used for emergency prevention of some diseases (rabies, tetanus) and for the treatment of some infectious diseases (diphtheria, botulism, etc.).

Driving forces of the epidemic process

The doctrine of the driving forces of the epidemic process was substantiated by L.V. Gromashevsky, who singled out three primary driving forces (three links of the epidemic process - the source of the infectious agent, the mechanism of transmission and the susceptible organism), the interaction of which is a necessary condition for the emergence and development of the epidemic process. According to this theory, the elimination of at least one link of the epidemic process stops it. This postulate formed the basis of the formation of the system of prevention and control of infectious diseases.

Thus, isolation and disinfection of the source of infection stop the further spread of the disease. For example, hospitalization and treatment of a typhoid patient or destruction of rodents suffering from the plague ensure that new cases of the disease among people are impossible.

Disruption of the transmission mechanism- this is the most effective preventive measure for intestinal and blood infections with a transmissible transmission mechanism. Due to mass planned disinsection and draining of swamps, the elimination of endemic regions of malaria in Ukraine was achieved. Improvement of settlements, introduction of drinking water purification system, improvement of its quality, constant sanitary control and other measures made it possible to significantly reduce the incidence of intestinal infections in our country.

*Increasing the population's insensitivity*is carried out due to the implementation of two directions of prevention - non-specific and specific (immunoprophylaxis). The use of mass vaccine prevention made it possible to completely eliminate smallpox, to get rid of poliomyelitis in most countries of the world, and to significantly reduce the incidence of people with infections that are controlled by means of immunoprophylaxis (measles, mumps, rubella, diphtheria, whooping cough). Research and development of vaccine preparations has proven that the effectiveness of vaccination depends on the stability of post-infectious immunity in a given infection. Thus, the highest efficiency of immunization has been proven precisely for infections after which sterile lifelong immunity is formed (polio, measles, rubella,

etc.).

In addition to the primary or main driving forces, there are "secondary" - natural and social factors that indirectly affect the epidemic process through each of its links.

Social factors that influence the development of the epidemic process include: economic factors; sanitary and communal improvement; the level of development of the health care system, etc.

*Natural factors*is a set of environmental factors that affect the course of the epidemic process. Factors of inanimate nature (climate, air temperature and humidity, level of insolation, composition of water, topography) can indirectly affect the state of parasitic systems, relationships between micro- and macro-organisms.

Manifestations of the epidemic process

Manifestations of the epidemic process include its intensity, distribution of diseases over time, territory and among different population groups.

A. The intensity of the epidemic processis characterized by the rate of morbidity - absolute or intensive. However, it should be noted that the calculated rate of morbidity does not always correspond to the true intensity of the epidemic process, which is due to the level of diagnosis, the quality of registration and accounting of diseases, the level of the population seeking medical help, etc.

The level of morbidity is conventionally divided into 2 degrees: sporadic and epidemic morbidity.

Sporadic morbidityis the level of morbidity common to a given area, or individual diseases occurring in a specific area.

Epidemic morbidity- this is the group nature of diseases, it is conditionally divided into outbreak, epidemic and pandemic.

*Epidemic outbreak*are group diseases among people who are connected by a common source of infection, route or factor of transmission. Outbreaks are usually limited to a family, an organized group or a settlement.

*Epidemic*is an intensive and widespread spread of an infectious disease that covers the population of a region of the country or several countries. Epidemics are characterized by a high incidence rate that exceeds the sporadic rate for a given area.

*Pandemic*is an intensive spread of an infectious disease that covers countries and continents. Yes, the 7th cholera pandemic and HIV pandemic are currently ongoing. In 2009, the WHO declared a pandemic of influenza A (H1N1).

B. Distribution of infectious diseases over timeis an important indicator of morbidity dynamics. There are long-term and annual fluctuations in the incidence rate.

Long-term dynamicsmorbidity determines the epidemic trend, cyclicity and irregular fluctuations of morbidity. Cyclicality is the repetition in a certain order of periods of rise and fall of morbidity. This regularity is inherent in many respiratory tract infections, for example, in the pre-vaccination period with measles, the rise in morbidity was observed every 5-7 years. This is explained by demographic processes in society (birth rate, population migration) and a decrease in the immune layer of the population. After the end of a certain cycle, the virulence of the pathogen gradually increases, the number of people who do not have specific immunity increases, that is,

the stratum of the non-immune population increases. There are reasons for a new rise in morbidity, the development of a new epidemic.

Annual dynamicsconsists of the average annual incidence rate and the seasonal increase in incidence.

*Seasonality*is an increase in the incidence of disease, which naturally recurs in certain months of the year. As you know, intestinal infections are characterized by summer-autumn seasonality. In the warm period of the year, favorable conditions for the active reproduction of pathogens of intestinal infections in food products are created, the implementation of food and water transmission routes is facilitated due to violation of food storage regimes, increased water consumption, swimming in open water bodies, etc.

S. Distribution of infectious diseases by territory

Depending on the territorial distribution, infectious diseases are divided into ubiquitous and endemic.

*Ubiquitous infections*are widely found on all continents, in all countries of the world (influenza, viral hepatitis, measles, brucellosis, etc.).

*Endemic infections*are registered permanently in a defined territory, which is determined by social and natural conditions. Examples of endemic areas are areas of malaria, hemorrhagic fever of Ebola and Lassa, yellow fever in Africa, opisthorchosis in Ukraine, etc. Part of the territory, within which the spread of infection occurs, is called the area of the disease, or the nosoarea.

Exotic infections are distinguished separately, the incidence of which is not characteristic of a certain territory. Cases of such diseases occur when the causative agent is introduced from other countries (for example, cases of imported malaria in Ukraine).

D. Distribution of infectious diseases among different population groups

Infectious diseases affect different social and age groups of the population. Thus, respiratory tract infections are most common among young children who attend preschools. Zoonotic infections more often affect adults who care for animals or process animal raw materials. There is a certain distribution of diseases between urban and rural residents. An analysis of the incidence of HIV infection shows that the most vulnerable group of infected people is young people aged 20-29, mostly men. This is explained by the widespread spread of the infection among homosexual men and drug addicts. Identifying age groups at risk for a specific infection allows for the development of preventive measures aimed at a certain target audience, which increases the effectiveness of these measures.

It is also important to identify occupational risk groups for infectious diseases, which makes it possible to develop a system for the prevention of occupational infection. The specificity of the dentist's work is related to the potential danger of infection with microorganisms that can be transmitted by the aspiration mechanism, when working directly with the patient. In addition, during parenteral interventions, there is a risk of infection with viral hepatitis B and C with a parenteral transmission mechanism, as well as HIV infection.

It should be noted that the potential danger of the occurrence of infectious diseases during the professional activity of a dentist is associated with non-compliance with sanitary standards, violation of safety techniques, disinfection-sterilization and anti-epidemic modes of work in the dental clinic.

A sick person and a carrier as sources of infectious agents. Measures for their disposal

Infectious diseases have a number of properties that distinguish them from other diseases. Thus, each infection is caused by a corresponding pathogen-microorganism that has adapted to the parasitic type of existence in the human body. In addition, contagiousness and cyclicity are characteristic features of infectious diseases.

*Contagiousness*is the ability to infect other people, that is, to be transmitted from the source of the infectious agent to a susceptible organism. This difference determines the contagiousness of infectious patients, who require special treatment, the implementation of special anti-epidemic measures for their neutralization, including isolation and treatment of patients.

*Cycle*is the presence of a certain sequence of periods in the course of infectious diseases, which is of particular importance for assessing the epidemiological risk of patients. Corresponding periods of the course of infectious diseases are distinguished.

1. *Incubation period*- begins from the moment of infection and continues until the appearance of the first clinical symptoms. During the incubation period, the causative agent reproduces in places of specific localization in the macroorganism. With most infections, patients do not pose an epidemic danger during this period, however, when a significant amount of the pathogen accumulates in the last days of incubation, it can be released into the environment and transmitted to other people (for example, with measles, patients become contagious on the last day of the incubation period, with viral hepatitis And - in the last 7-10 days).

2. *Prodromal period*- lasts from the first clinical symptoms to the appearance of specific signs of the disease. During the prodromal period, there is a massive release of pathogens into the environment. However, the lack of specific symptoms characteristic of a specific infection complicates diagnosis and leads to untimely isolation of patients. Patients remain in the cell until the diagnosis is established and at this time are dangerous for the environment.

3. *The period of exacerbation of the disease*is the period of typical clinical manifestations. The largest number of pathogens is released, which contributes to the clinical manifestations of the disease (diarrhea, vomiting, runny nose, cough, etc.). The release of the pathogen gradually decreases during the peak period. Knowing the periods of contagiousness in infectious diseases allows you to clearly organize anti-epidemic measures in the center to isolate the sources of infection.

4. *The period of convalescence*is a period of fading of clinical symptoms. With most infectious diseases, the recovery period coincides with the liberation of the body from pathogens (measles, rubella, epidemic parotitis infection, etc.). However, with some infections, the release of microorganisms can last a long time and turn into a carrier, for example, with typhoid, diphtheria, salmonellosis, meningococcal infection. Such patients represent an epidemic danger, especially if they belong to decreed population groups. In this case, patients need dispensary supervision and additional

laboratory examination to resolve the issue of admission to work.

Identifying a patient with a manifest form of the disease usually does not present significant difficulties for diagnosis, therefore isolation of the patient is almost always timely. However, the course of infectious diseases can also have atypical, erased and subclinical forms. Patients with a mild course of infection often do not seek medical help, anti-epidemic measures are not carried out in relation to them. Considering the predominance of mild and erased clinical forms in almost all infectious diseases, their epidemiological significance is generally higher than that of patients with manifest forms.

In addition, there are infectious diseases with a chronic course - viral hepatitis B, C, D, HIV infection, etc. Patients with such infections remain contagious throughout their lives and therefore require constant dispensary supervision, preventive and anti-epidemic measures.

Accounting and registration of infectious diseases

The system of accounting for infectious and parasitic diseases is necessary to ensure measures aimed at preventing their spread (including clarification of the diagnosis, ensuring the necessary isolation of patients, examination of centers and control of persons who have been in contact with the patient, vaccinations, etc.), as well as for counting statistical data on individual infectious diseases in the general system of information on the health of the population.

Most infectious diseases are subject to special accounting in accordance with the Law of Ukraine "On sanitary, hygienic and anti-epidemic well-being of the population". For each case of disease, carrier detection, complication after vaccination, bite, sting, scratch, the "Emergency notification about infectious disease, foodborne, acute occupational disease" (f. 058) is filled out, which within 12 hours. sent to the territorial subdivision of the sanitary-epidemiological service at the place of registration of the disease. An emergency report must be filled out and sent by a doctor or an average medical worker who detected the disease, regardless of the circumstances (when the patient goes to the outpatient clinic, during a visit at home, during a preventive examination, etc.).

Data about the patient are entered in the "Journal of Infectious Diseases" (f. 060).

Isolation of patients and carriers

Isolation of the patient is carried out by hospitalization in an infectious disease hospital or at home.

Rules for hospitalization of infectious patients:*Compulsory hospitalization*are subject to patients with particularly dangerous and highly contagious infections (for example, plague, cholera, yellow fever and highly contagious hemorrhagic fevers (Ebola, Marburg, Lassa). The list of particularly dangerous infections is given in the "Law on sanitary-hygienic and anti-epidemic welfare of the population". Obov' patients with diphtheria, meningococcal infection, typhoid fever, paratyphoid fever, typhoid fever, malaria, tick-borne encephalitis, acute viral hepatitis, anthrax, tularemia, acute meningitis, rabies, tetanus, foot-and-mouth disease, leptospirosis, Crimean fever, etc. are subject to mandatory hospitalization.

*Hospitalization according to clinical indications*is carried out under the

conditions of a severe course of an infectious disease, the presence of concomitant diseases and complications.

*Hospitalization according to epidemiological indications*performed if the patient belongs to the decreed groups of the population (workers of the food industry, children's preschool institutions, primary classes of schools, surgical, maternity wards, operating rooms, etc.); lives in conditions of high population density (dormitories, communal apartments, barracks, boarding schools, prisons, etc.); in case of illness of a child who attends a preschool; in the case of the patient's residence in conditions of lack of amenities, for non-compliance with sanitary norms and rules, for the impossibility of isolation from other family members.

*Responsibility*the correctness and timeliness of hospitalization of the patient depends on the doctor who identified him. The doctor decides on the issue of evacuation transport, the order and time of hospitalization, coordinates it by phone with the relevant services and at the same time informs the regional SES.

Depending on the conditions, hospitalization of the patient can be carried out in cities by the transport of disinfection stations, ambulance stations, in rural areas - by the transport of the Central Hospital, dispensaries, individual vehicles, and in some cases - by the transport of other enterprises and institutions. Hospitalization of infectious patients by public transport is strictly prohibited. The procedure for hospitalization in each city and district is approved by an order of the department of health care or the Central Health Service. Evacuation of patients should be carried out within 3 hours in cities and 6 hours in rural areas after receiving notification of the need for hospitalization. After the patient is hospitalized, the staff of the reception department of the infectious disease hospital disinfects the transport at a special site.

Summing up.

List of recommended literature

Main:

1. General epidemiology: a study guide (University of the IV year) / N.O. Vynohrad, Z.P. Vasylyshyn, L.P. Cossack. — 4th ed., edition, K.: VSV "Medicine" 2017, -200 p., p. 9-18.

Additional:

1. Epidemiology: teaching. help for students higher honey. education closing IV level of accreditation / B. M. Dykiy, T. O. Nikiforova, 2006. - P. 12 – 18.

2. Law of Ukraine dated February 24, 1994, No. 400-XII "On Ensuring Sanitary and Epidemic Welfare of the Population."

3. Law of Ukraine dated April 6, 2000 No. 1645-III "On the Protection of the Population from Infectious Diseases".

Practical lesson #2

TOPIC: Disinfection and sterilization. Peculiarities of carrying out preventive and anti-epidemic measures in medical and preventive dental institutions - 2 hours.

Goal:

Familiarize yourself with, have an idea about ensuring the sanitary and anti-epidemic regime in medical institutions of the stomatological profile (a-I);

Know and master the basic requirements for compliance with the rules of personal hygiene by the medical staff of the dental clinic, preventive measures for hepatitis, HIV infection and other intra-hospital infections that are transmitted parenterally. (a-p)

To master the technique of organizing and ensuring a disinfection and sterilization regime in a dental clinic (a-III)

To develop creative abilities in the process of theoretical and practical research of problematic issues (a-IV)

Basic concepts:

Disinfection(disinfection) is a set of measures aimed at destroying or removing pathogens of infectious diseases in the environment. The main purpose of disinfectants is to disrupt the transmission mechanism of the pathogen by disinfecting possible transmission factors.

Disinsection- destruction of vector arthropods.

Deratization - extermination of rodents.

Sterilization- complete destruction of microorganisms and their spores on environmental objects.

Central disinfection- it is carried out in the focus of an infectious disease, that is, where an infectious patient is or was, for example, in an apartment or an infectious department;

Prophylactic disinfection is the disinfection of objects on which the presence of pathogenic agents is assumed, without an identified source of infection (for example, disinfection of drinking water, food products, disinfection measures in places of public use - toilets, hairdressers, railway stations, hotels, etc.)

Actuality of theme.

Nosocomial infections (HIIs) are one of the most acute problems of medicine, the relevance of which is associated with a high level of morbidity, mortality and significant socio-economic losses. According to the data of the World Health Organization (WHO), the incidence rate of VLI in the world is 8.4%, in European countries - 7.7%. According to the data of domestic researchers in Ukraine, VLIs are registered at the level of 2-30%, and their mortality ranges from 3.5 to 60%, depending on the nosological form. The problem of VLI is the most urgent for treatment and prevention facilities (LPZ) of the dental profile, since the oral cavity of even a healthy person contains a diverse, fairly stable aerobic and anaerobic microflora. The source of VLI in the dental clinic is the patient, patient or carrier, and the transmission factors are blood, saliva, pus, uncontaminated dental equipment and medical instruments, towels, sinks, handles, chairs, etc. In this connection, not only patients can become infected, but also the

medical staff of the clinic. The source of VLI can be the employees of the dental institution themselves, who carry infectious diseases in mild, chronic or latent forms.

In order to prevent VLI in dental institutions, sanitary-anti-epidemic and disinfection-sterilization regimes must be strictly observed. Therefore, knowledge of these issues is necessary for doctors of all specialties, especially dentists.

Plan

I. Organizational moment (greetings, checking those present, announcing the topic, the purpose of the lesson, motivating students to study the topic).

II. Control of basic knowledge: Theoretical questions for the lesson:

1. Disinfection: types and methods.
2. The main disinfectants approved for use in medical institutions of the stomatological profile.
3. Pre-sterilization treatment: types and methods. Requirements for the storage of sterile material.
4. Basics of sterilization: types and methods of sterilization. Operating modes of sterilizers.

III. Formation of professional skills and abilities. Practical works (tasks) performed in class:

1. Quality control of pre-sterilization treatment. Methods of testing for detergent residues and hidden blood.
2. Sterilization quality control.
3. Processing of individual dental kits and other tools and equipment of general purpose.

Topic content:

Types and methods of disinfection

Disinfection(disinfection) is a set of measures aimed at destroying or removing pathogens of infectious diseases in the environment. The main purpose of disinfectants is to disrupt the transmission mechanism of the pathogen by disinfecting possible transmission factors. Disinfection is widely used in the complex of preventive and anti-epidemic measures.

The following disinfection measures are distinguished:

1. Actually, disinfection is the destruction of pathogenic microorganisms on environmental objects.
2. Disinsection - destruction of vector arthropods.
3. Deratization - extermination of rodents.
4. Sterilization is the complete destruction of microorganisms and their spores on environmental objects.

The following types of disinfection are distinguished separately:

and) focal disinfection - is carried out in the center of an infectious disease, that is, where an infectious patient is or was, for example, in an apartment or an infectious department;

b) preventive disinfection is the disinfection of objects on which the presence of pathogenic agents is assumed, without an identified source of infection (for example, disinfection of drinking water, food products, disinfection measures in places of public use - toilets, hairdressers, railway stations, hotels, etc.)

Central disinfectionCentral disinfection is divided into current and final.

1. Current disinfection is carried out in the presence of the source of infection (patient, carrier) and is aimed at destroying pathogens immediately after their removal from the body. So, in the surroundings of the patient, excrement, vomitus, sputum, dressing material and other objects on which there may be microorganisms are constantly disinfected. Current disinfection is carried out during the entire period while the patient or the carrier is the source of infection, that is, until the end of the infectious period.

Current disinfection is carried out by medical workers in infectious disease hospitals when patients are hospitalized. If the isolation of infectious patients is carried out at home, the current disinfection is performed by the patient's relatives. Disinfection is considered timely if it begins no later than 3 hours. from the moment of detection of the patient.

Current disinfection is most important for intestinal infections, because their causative agents are periodically released from the body with excrement that is easily accessible for disinfection. The patient's personal items, dishes, sanitary equipment, patient's underwear, etc. are also disinfected.

For respiratory tract infections, current disinfection is less important, but it makes it possible to reduce the number of pathogens in the air. They use ventilation, ultraviolet radiation of air, wet treatment of surfaces with the use of disinfectants, disinfection of sputum, etc.

For current disinfection at home, the simplest disinfection methods are used:

- wet cleaning of the premises using detergents;
- boiling dishes in a 2% soda solution for 15 minutes;
- boiling linen in a 2% detergent solution before washing;
- disinfection of excrement (for intestinal infections) within 1 hour. disinfectant solutions

2. The final disinfection is carried out in the epidemic center after removing the source of infection from it (in the apartment - after hospitalization, ininfectious department - after discharge or death of the patient). The purpose of the final disinfection is to destroy pathogens remaining in the room where the patient was. In contrast to current disinfection, it is carried out once.

Facilities, excrement, vomit, linen, household items and other objects that could be contaminated are subject to decontamination.

Final disinfection is of the greatest importance in centers of infections, in which pathogens are in the environment for a long time. The scope and timing of focal disinfection, the selection of objects to be disinfected, and the means for its implementation depend on the properties of the causative agent of the infectious disease, the sanitary state of the focal point and are regulated by regulatory documents.

The high persistence of pathogens in the environment requires a high level of disinfection. Therefore, employees of the disinfection service are involved in its implementation (for example, in the case of plague, cholera, typhoid fever, Brill's disease, Ku-fever, salmonellosis, tuberculosis, ornithosis, diphtheria, fungal diseases of hair, nails, skin, etc.). In foci of viral hepatitis A, poliomyelitis, dysentery, rotavirus infection, acute intestinal infections of unknown etiology, final disinfection can be carried out by employees of medical and children's institutions, the population with the consent of epidemiologists.

Preventive disinfection

It is carried out in the absence of an identified source of infection, but when its presence is assumed.

Current disinfection is constantly carried out at water supply, sewage, public catering facilities, enterprises that process and sell food products and raw materials of animal origin, in hospital and preventive facilities, including dental clinics. Current disinfection is also carried out in places of mass gathering of people (stations, shops, hairdressers, transport, toilets, swimming pools, etc.), where there is a probability of the presence of sources of infection among the population.

Methods of disinfection

The following methods of disinfection are distinguished: mechanical, physical and chemical.

*Mechanical*the disinfection method involves wet cleaning of premises, washing, washing, shaking and knocking out. This also includes air and water filtration, which consists in cleaning from foreign particles, including microbes. The mechanical method does not lead to complete liberation from microorganisms, so it is usually combined with physical and chemical methods.

*Physical*the disinfection method is the disinfection of objects by the action of physical agents: ultraviolet radiation, dry hot air, water vapor, boiling, etc.

Boiling at 100°C for 15-45 minutes. used for processing linen and dishes, leftover food. The antimicrobial effect of boiling is enhanced by adding 2% sodium bicarbonate or soap to the water.

Radioactive radiation destroys all vegetative forms of microorganisms and their spores. It is widely used for sterilization of disposable medical instruments, suture material, etc.

Dry hot air (dry heat) has bactericidal, virucidal, insecticidal and sporicidal effects. At a temperature of 160-180°C, dry air is used in air sterilizers for disinfection of laboratory dishes, instruments, sterilization of metal, glass and silicone rubber products, in chambers - for disinfection of clothes, mattresses, pillows, blankets. During dry heat treatment at a temperature above 100°C, the structure of plant and animal fibers changes, at a temperature of 170°C they are charred.

Hot steam is used in special chambers - steam, steam-air and steam-formalin chambers. Saturated water vapor has bactericidal, virulocidal and sporicidal effects. its properties are enhanced at increased pressure, which is used in autoclaves for sterilization of medical instruments. The steam-air mixture is used in a steam-formalin disinfection chamber to treat the patient's belongings and bed linen. The chamber

method of disinfection is used for plague, cholera, typhus, epidemic typhus, Brill's disease, Ku-fever, anthrax, hemorrhagic fevers, typhoid and paratyphoid, tuberculosis, diphtheria, skin and nail mycosis, scabies, pediculosis. Steam-formalin chambers are used to disinfect fur and leather products and other unstable materials, in which formalin vapors are used at a temperature of 50-60°C.

UFO is widely used for air disinfection of premises in hospitals, dental clinics, etc.

The chemical method of disinfection is the most widespread and generally accepted in hospitals and preventive care institutions. It involves the use of chemicals that have a harmful effect on the causative agents of infectious diseases.

A modern disinfectant, as a rule, is a composition of several active substances in ratios that allow to achieve maximum synergism against the most resistant microorganisms, and also contain functional additives that facilitate the processes of washing and disinfection.

Modern disinfectants must meet several basic requirements, without which no drug can be recommended for use:

- microbiological efficiency;
- a high degree of resistance to organic impurities (for example, blood);
- aggressiveness towards structural materials intended for the manufacture of medical instruments;
- stability during storage and transportation;
- safety for medical personnel and patients;
- convenient release form;
- economy.

Characteristics of the main groups of disinfectants (by active substance)

I. Haloide-containing agents (chlorine-containing - chlorantoin, desactin;iodine-containing, bromine-containing, etc.). The active substances of this group are chlorine, iodine, bromine. Yes, iodine is included in a number of skin antiseptics allowed for treatment of injection and operating fields. Chlorine-containing products are widely used in hospitals and preventive care facilities, for disinfecting water in swimming pools, in public catering establishments, etc. They have a wide spectrum of antimicrobial action (bactericidal, tuberculocidal, virulicidal, fungicidal, sporicidal properties). The advantages of chlorine-containing preparations include speed of action and relatively low cost. However, they are aggressive towards structural metals, toxic, irritate the mucous membranes of the upper respiratory tract and eyes, can form environmentally hazardous compounds and cause metal corrosion.

II. Peroxidants ("Dezoxon-O", "Dismozon-Pur", "Odoxon", etc.). They contain active oxygen, hydrogen peroxide, peroxy compounds, ozone. Most of the agents have a wide spectrum of antimicrobial action. Peroxides are environmentally safe, easy to use However, they can have a corrosive effect, low stability, which limits the shelf life of drugs, and a high irritating effect on mucous membranes and respiratory organs.

III. Aldehyde-containing products ("Lisoformin-3000", "Septodor Forte", "Deskoton Forte", etc.). Contains such active substances as formaldehyde,

glutaraldehyde, orthophthalaldehyde, succinic aldehyde. They have a wide spectrum of antimicrobial action: bactericidal, tuberculocidal, virulicidal, fungicidal, sporicidal properties. Aldehyde-containing products have a multi-purpose purpose in hospital and preventive facilities, they almost do not cause corrosion of metals, they are effective in the presence of organic compounds. The disadvantages of drugs of this group can be considered the ability to fix organic contamination (blood, mucus, pus, etc.), which requires preliminary washing of medical products. Aldehyde-containing products also irritate the skin and mucous membranes.

IV. Surfactants (surfactants). This group includes quaternary ammonium compounds ("CHAS - Dezefect", "Deconex 51 DR", "Septodor", etc.), which have an antimicrobial effect, amines and ampholyte surface substances. A characteristic feature of these compounds is that they have a washing effect, are odorless, and do not cause metal corrosion. However, surfactants demonstrate a narrow spectrum of antiviral action, the absence of tuberculocidal and sporicidal activity. In the presence of organic substrates, their antimicrobial action decreases. They change the permeability of the microbial cell membrane, so they are widely used in composite products together with other disinfectants.

V. Guanidine-containing products ("Vitasept", "Gembar", etc.) This group of disinfectants includes preparations whose active substances are polyhexamethyleneguanidine phosphate, polyhexamethyleneguanidine hydrochloride, chlorhexidine bigluconate, etc. Guanidine-containing products are able to form films on treated surfaces, which provides a long-lasting residual bactericidal effect. The disadvantages of the drugs are a narrow spectrum of antimicrobial activity and the formation of a stable film on the treated surfaces.

VI. Alcohol-containing products ("Aerodezin 2000", "Bacilol AF", "Deconex Solarsept", etc.). The group is represented by disinfectants containing alcohols: ethanol, propanol-1, propanol-2, 2-ethylenehexanol, n-propanol, phenoxypropanol, as well as composite products based on them in combination with other active substances. Disinfectants of this group have a wide spectrum of antimicrobial action: bactericidal, tuberculocidal, virulicidal properties, but do not have a sporicidal effect. The preparations are environmentally safe, do not leave stains and residue after evaporation. However, alcohol-containing preparations quickly evaporate, which leads to a decrease in concentration, and can also be inactivated by organic impurities.

VII. Composite drugs. This is the largest group of drugs ("Deconex 50 FF", "Korzolex plus", "Lisoformin special", "Septodor Forte", etc.). The combination of drugs from two or more groups allows you to expand the spectrum of the antimicrobial action of the agent, and simultaneously provides washing properties. Therefore, composite preparations are widely used for combined treatment of medical instruments: simultaneous disinfection and pre-sterilization cleaning.

Processing modes of medical instruments

All medical devices, if during operation they come into contact with blood, wound surface and mucous membranes or can cause their damage, must be subject to thorough processing, which includes three stages: disinfection, pre-sterilization cleaning and sterilization. Dental instruments belong to the group of critical

instruments, that is, they are used to work with the mucous membranes of the oral cavity, and therefore require the sequential implementation of all stages of processing, in particular, sterilization.

Disinfection

After use, all medical products are subject to immediate disinfection, which is carried out by physical or chemical methods.

Physical method. For disinfection of products made of glass, rubber, metal, heat-resistant polymer materials, boiling of medical products in distilled water for 30 minutes is most often used. or in 2% soda solution - 15 min.

Among the physical methods for disinfection of products made of heat-resistant materials, steam (in a steam sterilizer at 1 atm. 110°C for 20 min.) and air (in an air sterilizer at 1 atm. 120°C for 45 min.) methods can also be used.

The chemical method of disinfection is the most widespread and generally accepted in the LPZ. At the same time, the disassembled medical instruments are fully immersed in one of the disinfectant solutions in a closed glass (plastic, enamel) vessel for 60-120 minutes. depending on the decontamination solution (concentration and exposure according to methodical recommendations).

All disinfectants must have a registration certificate and be accompanied by methodical instructions for their use.

In the case of using such disinfectants as "Lisoformin-3000", "Dezefect", "Septodor-forte", "Korzolex", two processing stages (disinfection and pre-sterilization cleaning) are combined into one.

After disinfection, the products are thoroughly washed under running water and subjected to pre-sterilization cleaning.

Disinfection, collection and storage of single-use instruments are carried out in accordance with the instructions of the Ministry of Health of Ukraine dated 10/22/93 No. 223. All single-use medical products are boiled for 30 minutes after use without prior washing and disassembly. or for 60 min. immersed in a disinfectant solution. After disinfection, disposable products are collected in containers and stored until their disposal.

The next stage of processing medical products is pre-sterilization cleaning.

Pre-sterilization cleaning involves the removal of protein, fat, and other contaminants, as well as drug residues, from products.

For pre-sterilization cleaning of medical instruments, use one of the following detergents: "Biolot", "Biodez", "Biomiy", "Bodefen" or "Lotus", "Lotus-automator" with the addition of hydrogen peroxide.

Pre-sterilization cleaning is carried out by manual or mechanized methods (using installations, machines). In the case of mechanized cleaning, the tools are immersed in the machine and processed according to the operating instructions.

The quality of the pre-sterilization treatment should be constantly checked by objective methods of control by taking samples for the presence of blood and detergent residues. At least 1% of the instruments undergoing cleaning are checked with samples. The results of the inspection are recorded in a separate journal.

Azopyram and Fakel reagent tests are used to detect blood residues, and phenolphthalein tests are used for detergent residues. In the case of positive samples, the entire batch is reprocessed and the reasons for the unsatisfactory cleaning of the medical instruments are found out.

Control of pre-sterilization cleaning is carried out by SES and disinfection service employees once a quarter, self-control by employees of the dental clinic daily, and a senior nurse at least once a week.

Azopyram test

Azopyram detects the presence of hemoglobin, peroxidases of plant origin (plant residues), chloramine, chlorine, detergents with bleach, rust and acids.

Methodology of setting azopyram sample. The object under examination is treated with a working solution of azopyram - it is wiped with a swab dipped in the reagent, or a few drops of the reagent are applied to it using a pipette. If there are traces of blood, immediately or no later than 1 minute later. after contact of the reagent with the contaminated area, a color appears, initially purple, which then quickly changes to pink-lilac or brownish within a few seconds. Color that appeared later than 1 min. after applying the reagent to the object, is not taken into account.

Test with the "Torch" reagent

1-2 drops of the solution are applied to medical products. In the presence of blood residues after 3-5 minutes. a pink or cherry color appears.

Phenolphthalein test

To perform a phenolphthalein test, it is necessary to prepare a 1% solution of phenolphthalein. 1-2 drops of the solution are applied to medical products. In the presence of residues of washing solution, a pink color appears.

After the inspection, regardless of the results, remove reagent residues from the inspected items, rinse them with water, then carry out pre-sterilization cleaning of these items again.

Basics of sterilization. Methods and modes of sterilization

Sterilization ensures the death of vegetative and spore forms of pathogenic and non-pathogenic microorganisms. The following methods of sterilization are used:

1. Thermal (steam, air, glasperlen sterilizers).
2. Chemical (gas sterilizers, disinfectant solutions).
3. Radiation (installations with a radioactive source of radiation for industrial sterilization of single-use products).

Based on fundamentally new technologies, new types of sterilizers - plasma and ozone - have been created.

Steam and air sterilization methods are most often used in the practice of the work of the refinery.

Steam method. Saturated water vapor under pressure is used for sterilization.

Processing modes:

and) And 132±2°C - 20 min. at a chamber pressure of 2.0 kgf/cm2;

b) 1120±2°C - 45 min. at a chamber pressure of 1.1 kgf/cm2.

Mode "a" is recommended for processing products made of corrosion-resistant metals, glass, and textile materials.

Mode "b" - for products made of rubber, latex and certain polymer materials (high-density polyethylene, PVC - plastics).

Air method. Dry hot air in drying cabinets is used for sterilization.

Processing modes:

and) 1180°C (+2 -10)°C - 60 (+5) min.;

b) 1 160°C (+2-10)°C - 150 min.

It is used for products made of metals, glass and silicone rubber. The method is not suitable for sterilization of textile products.

Products can also be sterilized directly on the shelves of the drying cabinet, after which they are placed on a sterile table and stored for no more than 12 hours.

Gas method. For sterilization, ethylene oxide, a mixture of ethylene oxide and methyl bromide in a ratio of 1:25, steam of an aqueous or alcoholic solution of formaldehyde are used.

Gas sterilization as a "cold" method of sterilization is used for heat-labile medical products - with ethylene oxide and a mixture of ethylene oxide and methyl bromide at temperatures of 18°, 35°, 42° and 55°C, steam of an aqueous formaldehyde solution at a temperature of 70° and formaldehyde steam in ethyl alcohol at temperatures of 42°', 45°, 65° and 80°C.

Chemical method. For sterilization, use one of the sterilant disinfectants according to methodical recommendations, for example:

and) hydrogen peroxide (6% solution) - full immersion of products in closed vessels at 18°C, exposure for 360 min., and 50°C - 180 min.;

b) dezoxon-1 (1% solution) at I not less than 18°C, exposure - 45 min.;

in) glutaraldehyde, pH 7.0-8.5 at a temperature not lower than 20°C, exposure 360 min.

The temperature of the solutions during the sterilization process is not maintained.

The chemical sterilization method is used for products made of polymer materials, rubber, glass, corrosion-resistant metals, and other materials that cannot withstand heat treatment.

After sterilization, the products are washed with sterile water, removed from the solution with sterile tweezers, alternately transferred into 3 sterile vessels with sterile distilled water (in the case of using a 6% hydrogen peroxide solution - into two) and stored in sterile closed boxes for no more than 3 days, and in in the case of storage on a laid out sterile table - no more than 12 hours.

Preserving the sterility of medical devices from the moment of their sterilization to the beginning of their intended use is one of the important aspects of their processing.

In recent years, chambers for the storage of sterile products have been widely used - special cabinets equipped with quartz emitters that provide a mode of maintaining the sterility of instruments.

Sterilization quality control

Physical, chemical and bacteriological methods are used to control sterilization equipment.

The physical method of control is carried out with the help of control and measuring equipment (manometers, timers), which allows you to fix the temperature and pressure in the sterilization chamber. This method is easy to use, but the temperature measured by the equipment does not reflect the temperature in the products being sterilized. Therefore, this type of control is complemented by other methods that allow correcting the shortcomings of instrumental methods.

For bacteriological control, biological indicators are used, which contain a certain number of viable microorganisms that have high resistance to inactivation in the sterilization process. The disadvantages of this control method are that the evaluation of the effectiveness of sterilization is carried out only after 48 hours, that is, the evaluation of the results becomes known already after the use of sterilized products.

In recent years, the chemical method of control has become increasingly important. Its advantages are accuracy, speed of sterilization assessment and ease of use. For this, during each sterilization cycle, temperature indicators in the number of at least 5 are attached to air or steam sterilizers. Unsatisfactory results of sterilization control require re-sterilization of all medical instruments (material), technical inspection of the sterilizer and elimination of deficiencies.

Peculiarities of processing dental instruments

Processing of individual dental kits and other tools and equipment of general purpose

Individual dental sets (tray, tweezers, probe, iron, elevator, spatula) must be subject to all 3 stages of processing: disinfection, pre-sterilization cleaning and sterilization (using the above methods). After the end of the exposure, the entire toolkit remains in the cabinet for cooling for 60 minutes, then it can be stored in a closed form for 3 days.

Tweezers for taking sterile instruments and material should be stored dry on a sterile tray, covered with a sterile napkin. Each tweezers can be used for no more than 1.5-2 hours. Branches of tweezers are kept immersed in a sterile vessel with a 0.5% aqueous solution of chlorhexidine bigluconate or 3% hydrogen peroxide for no more than 6 hours. Puster, holders for brushes used for restoration must be disinfected after each patient.

Brushes for restoration, gutta-percha pins are used once, after which they are disinfected and disposed of. Carpul metal injectors go through all stages of processing. Pistons for plastic carpul injectors are disinfected twice by wiping with a napkin moistened with 70° ethyl alcohol, with an interval of 15 minutes.

Suction systems are subject to disinfection twice a day: after the end of the first shift and at the end of the working day. 6% hydrogen peroxide is used for disinfection. The specified solutions are passed through the suction system of the installation in a volume of 1 liter for 2 minutes, then left in it for 30 minutes. Tips for saliva extractors are used once and must be disinfected before disposal. In the case of repeated use, after use they are subject to disinfection, pre-sterilization cleaning and sterilization: metal - by air or steam method, plastic - by chemical method.

Specimen glasses for mixing cement, pastes for sealing and glasses for rinsing

the oral cavity should be single-use only.

After each patient, spittoons are immersed in a special vessel with a disinfectant solution, and inpatients are irrigated with a disinfectant solution twice with an interval of 15 minutes, after which they are rinsed with water, and at the end of the shift and the working day, they are filled with a disinfectant solution with the opening closed.

Treatment of reusable dental burs

I stage - disinfection (chemical method)

Vessel #1. Rinse the pores in a disinfectant solution from the remains of blood, mucus, and tissues.

Vessel #2. Drills are immersed in a disinfectant solution (concentration and exposure according to methodical recommendations).

II stage - pre-sterilization cleaning (if the disinfection is one-stage, pre-sterilization cleaning is carried out).

Immerse the drills in a 1% solution of "Blanizol" and a 0.5% solution of "Biomiya" heated to 40°C for 15 minutes. Each brush is washed separately for 1 minute, rinsed with running water for 3-5 minutes, then with distilled water for 1 minute. Bores are laid out in Petri dishes, 10 pcs. in each, dry in an oven at 85°C until the moisture is completely removed.

III stage — sterilization (by physical method)

Opened Petri dishes with burrs are sterilized in a drying cabinet at 160°C for 150 minutes. After sterilization, the cups are covered with sterile lids and placed in a sterile bix.

Processing of straight and turbine dental tips

Pre-sterilization treatment and sterilization are not carried out. To reduce internal contamination, a water jet is passed through the tip connected to the compressed air system for 30 seconds, then the tip is disconnected and lubricated with a spray-cleaning system. The used tip is wiped with a sterile gauze napkin, abundantly moistened with 70° alcohol, "Bacilol-AF" twice with an interval of 15 minutes. After that, the tip is rinsed with sterile distilled water and kept on a sterile table for no more than 12 hours.

Treatment of instruments, disinfection of blood and saliva residues in orthopedic dentistry. Crown cutters and crown extractors treat reusable instruments similarly.

Metal discs with a diamond coating during reception are collected in a solution consisting of equal parts of 3% hydrogen peroxide and 10% ammonia. These disks go through all stages of processing - disinfection, pre-sterilization cleaning, sterilization in drying cabinets at 160°C or in glasperlen sterilizers for 30 seconds.

Stone disks, as a rule, are used once, after use they are subject to disinfection and disposal.

Metal spoons for removing casts are mechanically cleaned of sticky mass residues and subjected to disinfection, pre-sterilization cleaning and sterilization, and plastic spoons are used once and disposed of after disinfection.

Dental spatulas, spatula knives are used only individually, washed under running water and subject to disinfection.

After each use, the orthopedic anvil and hammer are wiped twice with a napkin

soaked in a disinfectant solution.

Impressions made of alginate, silicone materials, polyester resins and hydrocolloid, impression trays, prostheses, bridges, crowns, as well as corrosion-resistant articulators in dental institutions are disinfected from blood and saliva residues as follows: washed with water; immerse in a disinfectant solution (concentration and exposure according to methodical recommendations); rinse with running water for 30 seconds. on each side or immersed in a vessel with water for 5 minutes.

Summing up.

List of recommended literature

Main:

1. Vinohrad N. O. General epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2017. - 200 p.
2. Vinohrad N. O. Special epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2018. - 367 p
3. Epidemiology in schemes: a study guide / M. D. Chemych, N. G. Malysh, O. M. Chemych, N. I. Ilyina. – Vinnytsia: Nova Kniga, 2020. – 256 p.
4. Epidemiology: anti-epidemic measures: study guide / M. D. Chemych, N. G. Malysh, N. I. Ilyina [and others]. – Vinnytsia: Nova Kniga, 2020. – 288 p.
5. Kiselyov S. M. Basic principles of evidence-based medicine: teaching. manual / S. M. Kiselov. Zaporizhzhia: ZDMU. 2018. 117 p.

Additional:

1. Epidemiology: a textbook for students. higher med. education institutions / A. M. Andreychyn, Z. P. Vasylishyn, N. O. Vinohrad; under the editorship I. P. Kolesnikova. Vinnytsia: Nova Kniga, 2012. 576 p.: illustrations.
2. Order of the Ministry of Health of Ukraine No. 595 "On the procedure for conducting prophylactic vaccinations in Ukraine and quality control and circulation of medical immunobiological preparations" dated September 16, 2011.

Electronic information resources

1. World Health Organizationwww.who.int
2. Cochrane Center for Evidence-Based Medicinewww.cebm.net
3. Center for Disease Control and Preventionwww.cdc.gov
4. Public Health Center of the Ministry of Health of Ukrainewww.phc.org.ua
5. Ukrainian database of medical and statistical information "Health for all":http://medstat.gov.ua/ukr/news.html?id=203

Practical lesson No. 3

TOPIC: Organization and implementation of immunoprophylaxis. Preparations for creating active and passive immunity. Scheduled and epidemic vaccinations - 2 hours.

Goal:*Get acquainted, have an idea about the specific prevention of infectious diseases*

Know and learn drugs for planned and urgent prevention of infectious diseases, means of application and methods of administration of immune drugs

Master the technique of performing vaccinations

Master the skills of prescribing means of emergency prevention of tetanus and rabies, provide emergency assistance in the event of vaccination complications (a-III).

To develop creative abilities in the process of experimental and theoretical research of problematic issues

Basic concepts:

***Vaccine prophylaxis*- this is the artificial creation of an immune response by introducing a vaccine into the human body in order to create immunity to infection.**

Humoral immunity*- this is the body's immunity to infection, which is due to the presence of specific antibodies.*

Live vaccinesare immunoprophylactic drugs made on the basis of attenuated (weakened) strains of pathogens of infectious diseases in the absence of virulence and preservation of antigenic and immunogenic properties of microorganisms.

Corpuscular vaccines*- these are bacteria and viruses inactivated by physical (high temperature, UV radiation) or chemical factors (formalin, alcohol, phenol). Corpuscular vaccines contain whole cells of microorganisms.*

Chemical vaccines are antigenic components that have been isolated from a microbial cell (for example, typhoid chemical vaccine enriched with Vi - antigen, meningococcal polysaccharide vaccine, hemophilic type B polysaccharide vaccine).

Recombinant vaccines are produced using genetic engineering methods. Production of such vaccines is a complex process that schematically consists of the following stages: gene cloning; their introduction into producer cells (viruses, fungi, bacteria); cell cultivation; antigen extraction and purification.

Anatoxins are bacterial exotoxins devoid of toxic properties (under the influence of formalin and elevated temperature), but with preserved immunogenic and antigenic properties. In the production process, toxoids are purified from ballast substances (nutrient medium, microbial cell residues) and concentrated.

Actuality of theme.

In the fight against infectious diseases, preventive vaccinations are of great importance for reducing the intensity and stopping the epidemic process. Vaccination is associated with significant successes in the fight against infectious diseases, which were achieved both at the dawn of the scientific and practical development of vaccines (the works of Pasteur, Koch, Gener) and the creation of modern immune drugs. As a result of the mass coverage of the population with vaccinations, natural smallpox was eliminated, and the incidence of those infections that are controlled by means of immunoprophylaxis decreased sharply.

Plan

I. Organizational moment (greetings, checking those present, announcing the topic, the purpose of the lesson, motivating students to study the topic).

II. Control of basic knowledge: Theoretical questions for the lesson:

1. Definition of immunoprophylaxis, its types (planned and emergency).
2. The concept of "cold chain".
3. Characteristics of vaccine preparations, their classification.
4. Scheduled vaccinations by age.
5. Contraindications to vaccinations.
6. Drugs for emergency prevention of tetanus and rabies.

III. Formation of professional skills and abilities. Practical works (tasks) performed in class

1. Organization of scheduled vaccinations.

2. Post-vaccination reactions and complications

Topic content:

Active immunization of people is the most effective means of specific prevention of infectious diseases. In the fight against infectious diseases, preventive vaccinations are of great importance for reducing the intensity and stopping the epidemic process. Thanks to mass coverage of the population with vaccinations, natural smallpox was eliminated, and the incidence of infections managed by means of immunoprophylaxis decreased sharply. WHO has adopted the "Expanded Program on Immunization" for children around the world, which contains proposals for vaccination tactics for each country depending on the epidemic situation and economic level.

General basics of vaccine prevention

Vaccine prophylaxis is the artificial creation of an immune response by introducing a vaccine into the human body with the aim of forming immunity to infection.

Mechanisms of formation of post-vaccination immunity

Humoral immunity is the body's immunity to infection, which is due to the presence of specific antibodies. Vaccine prophylaxis is aimed at creating active artificial anti-infective immunity by introducing antigens of an infectious agent into the human body in the form of a vaccine. After the initial introduction (vaccination) into the non-immune organism of the vaccine strain of the pathogen, antibodies of the class appear in the blood, with subsequent switching to the synthesis of antibodies of the IgG class, immune memory cells are formed. After re-introduction of the antigen (revaccination), thanks to the inclusion of memory cells in the blood, protective antibodies quickly accumulate and a so-called "booster" effect occurs. At the same time, the production of specific antibodies begins almost immediately, and their level can be higher than after the initial introduction of the antigen. The third dose of antigen usually further enhances the process of antibody formation, but subsequent additional doses of antigen may not lead to an increase in their production, but, on the contrary, to immunodepression.

The main regularities of the immune response used during immunoprophylaxis:

- obtaining strong and long-lasting immunity is ensured by repeated

administration of vaccine preparations;

* the immune response to vaccination is specific and individual. Active immunization does not ensure the development of the same degree of immunity in all vaccinated children;

■ the highest level of artificial immune response can be obtained against infections, after the transfer of which a fairly stable natural immunity is created (measles, rubella, mumps, etc.);

■ active immunization causes the formation of immunity after a certain period of time, therefore it is advisable to use it mainly for preventive purposes.

Classification and characteristics of the main vaccines

Classification of vaccine preparations

1. Live vaccines.
2. Inactivated vaccines:

and) corpuscular;
b) chemical;
in) recombinant;
d) toxoids

Characteristics of live vaccines

Live vaccines are immunoprophylactic drugs made on the basis of attenuated (weakened) strains of infectious disease agents in the absence of virulence and preservation of antigenic and immunogenic properties of microorganisms. Thanks to the preservation of the ability of microorganisms to reproduce in the body of a vaccinated person, a vaccine infection develops without pronounced clinical symptoms, which causes the formation of a persistent immune response.

Advantages of live vaccines:

■ stimulate the formation of long-term and stable immunity;

■ to create a protective level of antibodies, a single injection of the vaccine is sufficient (except for the vaccine against poliomyelitis);

*live vaccines are administered by various routes: subcutaneous, intradermal, intranasal, per os.

Disadvantages of using live vaccines:

■ the need to observe the "cold chain" (from the moment of manufacture to use, the vaccine should be stored and transport at a temperature of +4 - +8°C);

■ when carrying out vaccinations with live vaccines, it is not recommended to use disinfectant solutions that can remain on the skin for a long time and lead to inactivation of the vaccine (for example, tincture of iodine);

*during the use of the vaccine, it is not recommended to prescribe corticosteroids, antibiotics, because they can negatively affect the formation of the immune response;

■ have higher reactogenicity compared to inactivated vaccines.

Currently, live vaccines against poliomyelitis, measles, mumps, rubella, tuberculosis, etc. are widely used in Ukraine.

Characteristics of inactivated vaccines

1. *Corpuscular vaccines are bacteria and viruses inactivated by physical (high*

temperature, UV radiation) or chemical factors (formalin, alcohol, phenol). Corpuscular vaccines contain whole cells of microorganisms. For their production, virulent strains are used that die, but retain their antigenic and immunogenic properties (pertussis vaccine as a component of AKDP; leptospirosis, encephalitis vaccines, etc.).

Corpuscular vaccines have slightly lower reactogenicity than live vaccines, but their immunogenicity is also lower. To create permanent immunity, 2- or 3-time vaccination is usually carried out. Considering the fact that short-term immunity is formed after vaccination with inactivated vaccines, additional revaccinations are necessary.

2. *Chemical vaccines are antigenic components that have been isolated from a microbial cell (for example, typhoid chemical vaccine enriched with Vi - antigen, meningococcal polysaccharide vaccine, hemophilic type B polysaccharide vaccine). Bacterial polysaccharides are thymus-independent antigens, therefore, their conjugates with a protein carrier (diphtheria or tetanus toxoid in a minimal amount or the protein of the actual microorganism against which the vaccine is made) are used to form T-cell immune memory. An important feature of chemical vaccines is low reactogenicity.*

3. *Recombinant vaccines are produced using genetic engineering methods. Production of such vaccines is a complex process that schematically consists of the following stages: gene cloning; their introduction into producer cells (viruses, fungi, bacteria); cell cultivation; antigen extraction and purification.*

An example of such a vaccine, which has found wide application, is the vaccine against hepatitis B. To make it, the area of the hepatitis B virus gene encoding the synthesis of the surface antigen (HBsAg) is inserted into the DNA of yeast cells that multiply rapidly and accumulate a significant amount of HesAg. The antigen is isolated, purified from yeast residues and used as a hepatitis B vaccine.

Recombinant vaccines are safe and effective, and can be used to develop combination vaccines that provide immunity against multiple infections at the same time (for example, hepatitis B vaccine + AKDP).

4. *Anatoxins are bacterial exotoxins devoid of toxic properties (under the influence of formalin and elevated temperature), but with preserved immunogenic and antigenic properties. In the production process, toxoids are purified from ballast substances (nutrient medium, microbial cell residues) and concentrated. Thanks to these procedures, the reactogenicity of toxoids decreases and the volume of the drug for administration decreases. Anatoxins are produced both as monopreparations (diphtheria, botulinum, tetanus, staphylococcal, gangrenous) and associated (diphtheria-tetanus, botulinum trianatoxin). To achieve strong antitoxic immunity, a two-time administration of toxoid with subsequent revaccination is necessary. The preventive effectiveness of toxoids reaches 95-100% and persists for several years. An important feature of toxoids is the development of persistent immune memory, therefore the appointment of toxoids for the prevention of diphtheria in the center of infection and emergency prevention of tetanus (introduction of toxoids stimulates the rapid accumulation of antitoxic antibodies in blood serum in high titers, which prevents the development of the disease).*

Anatoxins have low reactogenicity. However, their disadvantage is considered to be the impossibility of forming antibacterial immunity in the population (only antitoxic immunity is formed), which does not provide protection against infection and the development of carriers.

Vaccination against tuberculosis

Tuberculosis is an infectious disease characterized by the formation of specific granulomas in various organs (mainly in the lungs) and polymorphism of the clinical picture.

Vaccination against tuberculosis is carried out with BCG (Bacille Calmette-Guerin) vaccine. French scientists Calmette and Guerin, after whom the vaccine is named, spent 13 years (1906-1919) passing a virulent strain of Mycobacterium bovis on glycerin-potato agar with bile. The BCG vaccine was used for preventive purposes in 1928.

BCG is a live vaccine containing an attenuated strain of Mycobacterium bovis (lyophilized mycobacteria in sodium glutamate). One ampoule contains 20 doses (1 mg), one vaccination dose is 0.05 mg of the drug. The vaccine is used intradermally in a dose of 0.05 mg and a volume of 0.1 ml, immediately before use it is diluted in 2 ml of sterile isotonic sodium chloride solution. To vaccinate newborns who have contraindications to BCG vaccination, and to vaccinate all newborns in tuberculosis-free territories, use the BCG-M preparation (contains a 2-fold reduction in the amount of bacterial mass). One dose of BCG-M is 0.025 mg.

*Vaccination scheme.*All newborn children who have no contraindications are subject to vaccination for the prevention of tuberculosis. Vaccination is carried out on the 3rd-5th day of the child's life (not earlier than the 48th hour after birth) with the vaccine for the prevention of tuberculosis (hereinafter - BCG). Premature children are vaccinated after the child reaches a body weight of ≥ 2500 g. Vaccinations for the prevention of tuberculosis are not carried out on the same day as other vaccinations. Children who were not vaccinated in the maternity hospital are subject to mandatory vaccination in health care institutions.

Children who are less than two months old are vaccinated against tuberculosis without a preliminary Mantoux test. After two months of age, before vaccination, the child should have a Mantoux test. Vaccination is carried out with a negative test result. Children vaccinated with BCG, who did not form a scar, but there is reliable confirmation of the vaccination, are not subject to re-vaccination. The interval between Mantoux test and vaccination should be at least 3 days and no more than 2 weeks.

Method of introduction. 0.1 ml of BCG vaccine is injected intradermally at the border of the upper and middle thirds of the outer surface of the left shoulder after treating the skin with a 70% alcohol solution. A whitish papule forms at the injection site, which then disappears in 15-20 minutes.

It is considered inadmissible to inject the drug under the skin (there is a danger of developing a cold abscess), it is forbidden to apply a bandage and treat with iodine and other antiseptic solutions at the place of vaccine injection.

Post-vaccination immunity. After BCG vaccination, bacteria spread through lymphatic vessels to regional lymph nodes, and a cellular immune response is formed. Immunity after BCG vaccination is formed 6-8 weeks after vaccination.

A local reaction occurs after 4-6 weeks at the injection site of the BCG vaccine: first there is an infiltrate with a diameter of up to 5-10 mm with a nodule in the center, at the site of which a crust is formed, and then a scar. In some cases, a pustule develops, followed by an ulcer and the formation of a scar. It is usually formed in 90-95% of vaccinated people through 2-4months up to 1 cm in diameter).

Vaccination against hepatitis B

Hepatitis B is an infectious liver disease caused by a hepadnovirus and is characterized by an acute or chronic course with asthenovegetative, dyspeptic, jaundiced syndromes and hepatosplenomegaly. The disease can have a moderate and severe course, sometimes with the development of massive liver necrosis, but subclinical and non-jaundic forms of the course with the formation of chronic hepatitis are more common. Hepatitis B is a common infection with parenteral, transplacental and sexual transmission. Among the 6 billion inhabitants of our planet, more than 2 billion are infected with the hepatitis B virus (HBV), of which 360 million are chronic carriers. In 95% of children infected with hepatitis B from their mother, the infection takes a chronic course, which often leads to cirrhosis or liver cancer in adulthood.

Taking into account the ease of infection with hepatitis B in the conditions of medical institutions and in everyday life, the persistence of the virus in the environment, vaccination is recognized as the most effective method of prevention of hepatitis B at the present time.

There are two types of hepatitis B vaccines.

1.*Inactivated vaccines are obtained from the plasma of HbsAg carriers. They are not widely used due to the possibility of infection with the hepatitis B virus and other infections with a parenteral transmission mechanism.*

2.*Recombinant vaccines - for their production, the subunit of the hepatitis B virus gene responsible for the production of HbsAg is injected into yeast or other cells; after completion of the yeast cultivation process, HbsAg is isolated and purified from ballast substances. As a sorbent, the vaccine contains aluminum hydroxide, as well as the preservative merthiolate. Several vaccines against hepatitis B have been created:*

- "Engerix B" - "SmithKline Beechem" (Great Britain);
- "Euvax" - "Aventis Pasteur" (South Korea);
- DNA-recombinant vaccine against hepatitis B (Cuba).

There are also associated vaccines containing vaccines against hepatitis A and B; against hepatitis B, diphtheria, tetanus and whooping cough ("Infanrix Penta" and "Infanrix Hexa").

*Vaccination schemes.*All newborns are subject to hepatitis B vaccination.

For vaccination of children, a vaccine is used according to the scheme: 0 (first day)-2-6 months of the child's life.

If the mother of the newborn is HBsAg "-" (negative), which is documented, vaccination of the child can be started during the first months of life or simultaneously with vaccination against whooping cough, diphtheria, tetanus, poliomyelitis. In the case of combining immunization with vaccination against whooping cough, diphtheria, tetanus, poliomyelitis, the following schemes are recommended: 2-4-6-18 months of life or 2-4-9 months of life.

Newborns with a body weight < 2000 g, born from HBsAg "-" (negative) mothers, are vaccinated when the child reaches a weight of 2000 g or when the child reaches the age of 1 month.

If the newborn child is in a serious condition, then his immunization should be carried out after the condition has improved before the child is discharged from the hospital.

If the mother of the newborn is HBsAg "+" (positive), the child is vaccinated according to the scheme: 0 (first day)-1-6 months of the child's life. The first dose of the vaccine is administered in the first 12 hours of the child's life, regardless of body weight. Along with vaccination, but no later than the 1st week of life, it is recommended to inject specific immunoglobulin against hepatitis B at the rate of 40 IU/kg of body weight and at least 100 IU into another part of the body. If the weight of the newborn child is <2000 g, then vaccination is mandatory, but the administered dose of the vaccine is not counted as the primary immunization dose; after the child reaches the age of 1 month, vaccination should be carried out in a series of three injections of vaccines 0-1-6 (0 - the date of the first injection of the vaccine, the minimum interval between the first and second vaccinations - 1 month, between the second and third vaccinations - 5 months). If the mother of a newborn child has an uncertain HBsAg status, the child must be vaccinated in the first 12 hours of life with a simultaneous examination of the mother's HBsAg status. In case of obtaining a positive result in the mother, prevention of hepatitis B is carried out, as in the case of vaccination of a child born from an HBsAg "+" (positive) mother. The vaccination series should not be restarted if a dose of vaccine has been missed, regardless of how much time has passed. Missing vaccine doses should be administered on a schedule with minimum intervals

Method of introduction. The vaccine is administered only intramuscularly in the area of the deltoid muscle, in young children

- in the anterolateral surface of the thigh.

The effectiveness of vaccination against hepatitis B reaches 95-97%, and the duration of post-vaccination immunity is 8-15 years.

Vaccination against poliomyelitis

Poliomyelitis (poliovirus infection) is an acute infectious disease that has a course with the development of serous meningitis (non-paralytic form), flaccid paralysis (paralytic form) or febrile type disease (abortive form).

Currently, large-scale work aimed at eradicating poliomyelitis is being carried out under the auspices of the WHO. After mass additional vaccination of children in 1996, the circulation of wild poliovirus strains stopped in Ukraine. And in 2002, the European region was certified by WHO as polio-free. Individual cases of the disease are currently being re-registered only in India and other countries of Southeast Asia.

Directions of the WHO strategy aimed at eliminating poliomyelitis:

1. Vaccination coverage of 95% of children.
1. Carrying out National days of immunization.
2. IN implementation of effective epidemiological surveillance of poliomyelitis.

Vaccination against poliomyelitis is included in the calendar of all countries of the world. Two types of vaccines are used

- live and inactivated vaccine.

1. *Live poliomyelitis vaccine (oral poliomyelitis vaccine - OPV).*

This is a trivalent drug made from attenuated strains of Seibin (poliomyelitis viruses of types I, II, III).' The vaccine is a transparent red liquid. One vaccination dose contains 0.2 ml or 4 drops, administered per os.

As a response to the introduction of OPV, 90-95% of vaccinated people develop long-term general and local immunity. In recipients of OPV, the vaccine strain of the virus is excreted in feces for several weeks, and in persons with immunodeficiency states - for months.

The vaccine must be stored frozen at a temperature of 20±1°C for 2 years or at a temperature of 6+2°C for 6 months. Freezing and thawing of the drug no more than three times is allowed.

2. *Inactivated poliomyelitis vaccine (IPV) for intramuscular administration contains formalin-inactivated poliomyelitis types I, II and III. Release form: 1 syringe or 1 ampoule containing 1 dose of vaccine. The drug is stored and transported at a temperature of 2-8°C.*

There are also combined vaccine preparations containing IPV:

- *"Tetracok" - a vaccine for the prevention of diphtheria, tetanus, pertussis and poliomyelitis (AKDP+IPV);*
- *"Pentaxish" is a vaccine against diphtheria, tetanus, pertussis, poliomyelitis and hemophilic infection type B (AKDP+IPV+HIV).*

*Vaccination schemes.*Vaccination of children for the prevention of poliomyelitis is carried out at the age of 2 months, 4 months, 6 months, 18 months, 6 years and 14 years.

Inactivated vaccine for the prevention of poliomyelitis (hereinafter - IPV) is used for the first two vaccinations, and in case of contraindications to the introduction of oral poliomyelitis vaccine (hereinafter - OPV) - for all subsequent vaccinations according to this Calendar.

The OPV vaccine is used for the 3rd-6th vaccinations (vaccination by age - 6 months, 18 months, 6 years and 14 years) in the absence of contraindications to OPV. The IPV vaccine can be used for the 3rd-6th vaccinations both individually and as part of combined vaccines.

Children who are in a family environment, in closed children's institutions with HIV-infected persons or with persons for whom administration of OPV is contraindicated, are vaccinated exclusively with the IPV vaccine.

Method of introduction. OPV is prescribed for 1 hour. before food, it is not allowed to wash it down with water or milk (the vaccine strain must be adsorbed by the cellular system of the lymphoid ring of the nasopharynx). After OPV vaccination, it is recommended to limit injections, parenteral interventions and planned operations for 2 weeks. IPV is administered intramuscularly, the vaccine can be used for the first two vaccinations and, if there are contraindications to OPV, for any vaccination.

Vaccination against diphtheria

Diphtheria is an acute infectious disease caused by toxigenic strains of corynebacteria, accompanied by general toxic manifestations and fibrinous inflammation at the entrance of the pathogen. The development of severe complications of diphtheria (infectious-toxic shock, myocarditis, polyneuritis, nephritis) can lead to death or disability of the patient.

Vaccination was started in 1960. Incidence in the pre-vaccination period averaged 170 per 100,000 population, diphtheria spread mainly in children's groups. In 1970, the incidence rate in the territory decreased sharply - to 0.2 per 100,000 population. However, in connection with the anti-vaccination campaign, vaccination coverage of the population decreased sharply, and the incidence of diphtheria increased to 27 per 100,000 population in 1994. Diphtheria "grew up", the disease was registered mainly among adults and was accompanied by a significant specific weight of complications and a high mortality rate .

Characteristics of vaccine preparations for active immunization against diphtheria

1. Adsorbed pertussis-diphtheria-tetanus vaccine (AKDP), which is a homogeneous suspension

inactivated pertussis microbial cells, purified diphtheria and tetanus toxoids; AKDP is intended for the prevention of whooping cough, diphtheria and tetanus in children aged 3 months and older. up to 3 years 11 months 29 days.

2. Adsorbed diphtheria-tetanus toxoid (ADP) is a mixture of purified and concentrated diphtheria and tetanus toxoids adsorbed on aluminum hydroxide. 1 ml of the drug contains 60 flocculating units of diphtheria and 20 binding units of tetanus toxoid.

3. Adsorbed diphtheria-tetanus toxoid with reduced antigen content (ADP-M). 1 ml of the drug contains 10 flocculating units of diphtheria and 10 binding units of tetanus toxoid.

4. Adsorbed diphtheria toxoid (AD-toxoid) - purified and concentrated toxoid adsorbed on aluminum hydroxide. 1 ml of the drug contains 60 flocculating units of diphtheria toxoid.

5. Adsorbed diphtheria toxoid with reduced antigen content (AD-M). 1 ml of the drug contains 10 flocculating units of diphtheria toxoid.

6. "Tetracocc" - contains diphtheria and tetanus toxoids, a suspension of inactivated pertussis microbial cells Bordetella pertussis and IPV (inactivated poliomyelitis vaccine).

Immunity against diphtheria and tetanus is formed in 95% of those vaccinated.

Vaccination scheme

Vaccinations for the prevention of diphtheria, tetanus and pertussis are carried out by age: at 2 months (first vaccination), at 4 months (second vaccination), at 6 months (third vaccination) and at 18 months (fourth vaccination).

To vaccinate children against whooping cough in the first year of life, vaccines with both acellular (hereinafter - AaKDP) and whole-cell (hereinafter - AKDP) pertussis component can be used.

A history of whooping cough is not a contraindication to vaccination against this disease.

Vaccination against whooping cough is given to children up to 6 years 11 months 29 days.

Revaccination against diphtheria and tetanus at 6 years of age is carried out with diphtheria-tetanus toxoid (hereinafter - ADP), the next at 16 years - with diphtheria-tetanus toxoid with reduced antigen content (hereinafter - ADP-M).

The first planned revaccination of adults according to age and epi-indications, who were previously vaccinated, is carried out by ADP-M at the age of 26 years, followed by a planned revaccination of ADP-M with a minimum interval of 10 years from the previous vaccination of ADP-M. Method of introduction.

AKDP, ADP, and AaKDP are administered intramuscularly in the upper outer quadrant of the buttock or anterolateral area of the thigh in a dose of 0.5 ml.

Vaccines for the prevention of diphtheria, whooping cough and tetanus are inactivated, stored in a dry and dark place at a temperature of +4-8°C.

Contraindications to ACDP vaccination: diseases of the nervous system with a progressive course, afebrile convulsions in the anamnesis, malignant blood diseases, neoplasms, anaphylactic shock to the introduction of ACDP in the anamnesis.

Vaccination against whooping cough

Whooping cough is an acute infectious disease with an aerosol transmission mechanism, the leading symptom of which is an attack-like spasmodic cough. In children of the first year of life, whooping cough has a severe course with the development of apnea and encephalopathy. Children aged 1 to 5-7 years are most often affected. Vaccination is the only effective way to reduce the incidence of whooping cough.

Inactivated corpuscular pertussis vaccine is included in such vaccines.

1. AKDP vaccine - the pertussis component is represented by an inactivated culture of Bordetella pertusis cells. 1 dose of vaccine (0.5 ml) contains 4 IU of pertussis vaccine, which corresponds to 10 billion pertussis microbial cells.

2. "Tetracok":contains diphtheria and tetanus toxoids, a suspension of inactivated pertussis microbial cells
and IPV.

3. Cellless (acellular) vaccines have significantly lower reactogenicity compared to whole-cell vaccines, and therefore are now widely used:

- "Infanrix" - contains pertussis toxoid, hemagglutinin and protein of the outer membrane of Bordetella bacteria pertussis;
- "Tetravak" - (AaKDP+IPV);
- "Pentavak" - (AaKDP+IPV+Hib).

Vaccination scheme - at 2, 4 and 6 months, revaccination is carried out - at 18 months. If the child has not received a whisper against whooping cough according to the calendar, then starting vaccination after 4 years of age is not recommended. Children who have had pertussis do not need immunization against it, further vaccination continues with ADP toxoid.

Three-time vaccination ensures the formation of protective immunity in 90% of those vaccinated, however, after 1-3 years, antibody titers decrease significantly, which requires revaccination in 18 months.

Post-vaccination reactions and complications. The pertussis component is considered the most reactogenic component of the AKDP vaccine.

During the first 2 days after the injection, an increase in body temperature, pain, hyperemia and swelling at the injection site are possible. Strong general reactions include hyperthermia of 40°C and above, strong local - infiltrates with a diameter of more than 2 cm, significant hyperemia of the skin with swelling of soft tissues at the injection site of more than 8 cm. In some cases, complications occur: convulsions (associated with increase in body temperature), allergic reactions (angine edema, urticaria, polymorphic rash), exacerbation of chronic diseases.

Taking into account the possible development of anaphylactic shock (usually in the first 15 minutes), after vaccination, observe the child for 30 minutes. Vaccination sites must be provided with means of anti-shock therapy.

Vaccination against measles

Measles is an acute viral infection with an aerosol transmission mechanism, which has a course with intoxication, catarrhal lesions of the upper respiratory tract, and spotted-papular exanthema. Most often, children get sick with measles, but against the background of mass vaccination, the disease is "getting older".

The European Regional Office of the WHO has set the task of achieving the elimination of measles in the region, that is, the impossibility of local cases of measles and the spread of imported cases of the disease.

According to the recommendations of the WHO, a strategy for the elimination of measles is being implemented in Ukraine, which requires the implementation of the main ones

tasks:

1. Coverage by two-time vaccination of at least 95% of children;
2. Carrying out additional revaccination among the adult population aged 15-30;
3. Implementation of effective epidemiological surveillance.

Characteristics of vaccine preparations

1. Live cow vaccine (LKV) - made from the vaccine strain L-16 of the measles virus. Release form: ampoules of 1, 2 and 5 vaccination doses.
2. "Ruvax" is a live cow vaccine.
3. "Priorix" - associated vaccine against measles, rubella and mumps; lyophilized combined preparation of attenuated vaccine strains of viruses.

All vaccines are stored at a temperature of +2-8 °C. Before use, viral vaccines are diluted with a solvent at the rate of 0.5 ml per 1 dose of vaccine. After dissolution within 3 min. the vaccine takes the form of a transparent pink liquid, which should not contain extraneous impurities, the solution cannot be stored.

Vaccination scheme. According to the vaccination calendar, vaccination is carried out at 12 months and 6 years.

Vaccination is carried out once subcutaneously under the shoulder blade or intramuscularly in the area of the shoulder, it can be combined with the administration of other vaccines. The formation of persistent immunity is observed in 95-98% of those vaccinated.

Post-vaccination reactions and complications. Cow vaccines are low reactogenic. Vaccination reactions (increased body temperature, catarrhal manifestations, rash) can be observed within 2-3 days. It is possible to develop allergic manifestations (rash, urticaria, Quincke's edema) to neomycin or egg protein, which are used in the manufacture of the vaccine. Complications of the cow vaccine are rarely observed - isolated cases of febrile convulsions, encephalitis (1:1,000,000), thrombocytopenia, etc. have been described.

Contraindications to vaccination:

• the presence of congenital or acquired immunodeficiency (vaccination is carried out 1-3 months after the course of treatment);

■ pregnancy or its planning;

■ history of severe allergic reactions to egg white;

■ administration of blood products and immunoglobulins (vaccination is postponed for at least 3 months).

Post-contact prevention. In case of contact with a measles patient, it is recommended to administer gastrointestinal tract in the first 3 days

(72 hours) after contact with persons who did not have measles and were not vaccinated. Vaccination is indicated for children from 12 months, as well as teenagers and adults up to 35 years old. If there are contraindications to vaccination or if more than 3 days have passed since the moment of contact, as well as children from 3 to 12 months. administration of human immunoglobulin (1.5-3.0 ml) is indicated.

Vaccination against epidemic mumps Epidemic mumps (viral mumps disease) is an acute viral disease with an aerosol transmission mechanism, which is accompanied by intoxication and damage to glandular organs (mainly salivary glands) and the nervous system.

Mostly children get sick, boys 1.5 times more often than girls. It is believed that 25% of male infertility is caused by epidemic parotitis. Vaccine prophylaxis is an effective means of reducing the incidence of epidemic parotitis, which allowed it to be classified as an infection controlled by means of vaccine prophylaxis. The WHO Regional Office for Europe has set a target of reducing the incidence of mumps in the region to a level of 1 per 100,000 or less by 2010.

Characteristics of vaccine preparations

1. Alive mumps cultured dry vaccine (MMV) - made from the vaccine strain L-3 of the mumps virus. The drug contains minor impurities of gentamicin sulfate and bovine serum protein. The dissolved vaccine has the appearance of a transparent pink liquid. Release form: ampoules of 1, 2 and 5 vaccination doses. The vaccine is stored at a temperature of +2-8 °C.

2. "Priorix" — associated vaccine against measles, rubella and mumps, it is a lyophilized combined preparation of attenuated vaccine strains of three viruses.

Vaccination scheme According to the vaccination calendar, vaccination is carried out at 12 months and 6 years. Boys who have not had epidemic mumps are revaccinated at the age of 15.

ZHPV is injected subcutaneously under the shoulder blade or intramuscularly in the area of the shoulder. The introduction of ZHPV can be simultaneously combined

with vaccinations against live measles and rubella vaccines, as well as with AKDP, OPV and hepatitis B vaccine in different parts of the body.

The formation of persistent immunity is observed in 95-98% of those vaccinated.

Post-vaccination reactions and complications: after vaccination with HPV, they almost never occur.

Contraindications to vaccination (see contraindications to gastrointestinal vaccination).

Post-contact prevention. In the case of contact with a mumps patient, it is recommended to administer IPV in the first 3 days (72 hours) after contact to persons who did not have mumps and were not vaccinated. Vaccination is indicated for children from 12 months, as well as teenagers and adults up to 35 years old. Administering immunoglobulin does not guarantee disease prevention.

Vaccination against rubella

Rubella is an acute viral infection with an aerosol transmission mechanism, which has a course with generalized lymphadenopathy and small papular exanthema. A particularly dangerous disease of women during pregnancy, which in almost 100% of cases leads to infection of the fetus. Postnatal (acquired) and antenatal (congenital) rubella are distinguished. Antenatal rubella is manifested by congenital heart defects, deafness, blindness, mental retardation and damage to other organs.

The European Regional Office of the WHO has set the task of reducing the frequency of congenital rubella syndrome to the level of 01.on 1000 live births. According to WHO recommendations, at least 95% of children in 12miss. and 6 years to create a protective level of immunity.

In Ukraine, the task of reducing the incidence of rubella and eliminating congenital rubella is carried out simultaneously with the measles elimination strategy.

Characteristics of vaccine preparations

Live rubella vaccine - attenuated, lyophilized, made from the vaccine strain of the rubella virus, which is cultivated on diploid human cells.

Rudivax "Aventis Pasteur" (France) is a live rubella vaccine from an attenuated strain of the rubella virus. Contains a small amount of neomycin.

Ervevax "Glaxo SmithKline"-"Biomed" is a live rubella vaccine, similar in composition to "Rudivax".

Priorix "Glaxo SmithKline" (England) - associated vaccine against measles, rubella and mumps; lyophilized combined preparation of attenuated vaccine strains of viruses.

All vaccines are stored at a temperature of +2-8 °C.

Vaccination scheme. According to the vaccination calendar, vaccination is carried out at 12 months and 6 years.

The vaccine is administered once subcutaneously under the shoulder blade or intramuscularly in the area of the shoulder, vaccination can be combined with the administration of other vaccines. The formation of persistent immunity is observed in 95-98% of those vaccinated.

Post-vaccination reactions and complications: occur rarely. After vaccination against rubella, women must prevent pregnancy for 3 months.

Contraindications to vaccination: primary immunodeficiency, allergy to aminoglycosides, pregnancy.

Post-contact prevention. In the case of contact with a rubella patient, it is recommended to administer the rubella vaccine in the first 3 days (72 hours) after contact to persons who have not had rubella and have not been vaccinated, except for pregnant women. Vaccination is indicated for children from 12 months, as well as teenagers and adults up to 35 years old. Pregnant women who have been in contact with a rubella patient are recommended to undergo a serological test using the RIGA or 1FA method. If IgG class antibodies are detected, the pregnant woman is considered seropositive and does not need to be vaccinated, and the pregnancy can be preserved. In the absence of specific anti-rubella antibodies in the first 10 days after contact with the patient, they are re-examined after 2-3 weeks. If the appearance of anti-rubella antibodies is detected on the second examination, the situation is considered as seroconversion, and in such a case termination of pregnancy is recommended.

Administration of immunoglobulin during pregnancy is not used, but it is administered in the event of a woman's refusal to terminate the pregnancy.

Vaccination against hemophilic infection

Hemophilic infection is a group of acute infectious diseases caused by Haemophilus influenzae type B, characterized by damage to the respiratory system (pneumonia, bronchitis), central nervous system (purulent meningitis), purulent foci in other organs (endocarditis, osteomyelitis, peritonitis).

Vaccination against Haemophilus influenzae (HAI) was first introduced into the vaccination calendar in Ukraine in 2006. The vaccine contains capsular polysaccharide of Haemophilus influenzae type B (belongs to inactivated chemical vaccines).

Vaccination scheme-Vaccination of children to prevent infection caused by Haemophilus influenzae type b bacillus (hereinafter referred to as Hib infection) can be carried out with monovaccines and combined vaccines containing the Hib component. Vaccination for the prevention of Hib infection should be carried out according to the schedule of 2-4-12 months.

Vaccination is given to children up to 4 years 11 months 29 days. At an older age, vaccination against Hib infection is given only to persons at risk.

The method of administration is intramuscularly in the anterolateral area of the thigh (in children under 2 years old) or in the area of the deltoid muscle.

The vaccine against hemophilic infection can be administered simultaneously with AKDP, IPV and hepatitis B vaccine in different areas of the body and with different syringes.

When sending an investigation report to the Ministry of Health of Ukraine and the State Enterprise "Center for Immunobiological Drugs", the name of the institution that sent the information and its location must be indicated.

The procedure for preventive vaccinations in Ukraine

Each state has its own preventive vaccination calendars, which are determined by the spread of infectious diseases and the availability of specific preventive measures. The order of the Ministry of Health of Ukraine No. 551

dated 11.08.14 approved a new calendar of preventive vaccinations, an extract from which is given below.

Table 1

Calendar of preventive vaccinations in Ukraine Vaccinations by age

Age	Vaccination against					
1 day		Hepatitis B				
3-5 day	Tuberculosis-vine					
2 months		Hepatitis B	Diphtheria, whooping coughtetanus	Poliomyelitis	Hemophilicinfections	
4 months			Diphtheria, whooping coughtetanus	Poliomyelitis	Hemophilicinfections	
6 months		Hepatitis B	Diphtheria, whooping coughtetanus	Poliomyelitis		
12 months					Hemophilic infections	Koru, rubella, mumps
18 months			Diphtheria, whooping cough, tetanus	Poliomyelitis		
6 years			Diphtheria, tetanus	Poliomyelitis		Koru, rubella, mumps
14 years old				Poliomyelitis		
16 years			Diphtheria, tetanus			
26 years old			Diphtheria, tetanus (in the future every 10 years)			

Taking into account the possible development of anaphylactic shock (usually in the first 15 minutes), after vaccination, observe the child for 30 minutes. Vaccination sites must be provided with means of anti-shock therapy.

Table 2

List of medical contraindications to preventive vaccinations

Vaccine	Contraindication
All vaccines and toxoids	Severe complications from the previous dose in the form of anaphylactic shock. Allergy to any component of the vaccine. Diseases of the progressive nervous system, hydrocephalus and hydrocephalus syndrome at the stage of decompensation, epilepsy, epileptic syndrome with convulsions 2 times a month or more often. An acute disease or exacerbation of a chronic one.
All live vaccines	Congenital combined immunodeficiencies, malignant neoplasms, pregnancy, HIV infection
BCG	The weight of the child is less than 2500 g: Complicated reactions to the previous administration of the vaccine (lymphadenitis, cold abscess, skin ulcer with a diameter of more than 10 mm, keloid scar, osteomyelitis, generalized BCG infection). Tubification. Phagocytosis defects
OPV	Children who are contraindicated for live vaccines, as well as members of their families, are recommended to be vaccinated with inactivated poliomyelitis vaccine (IPV)
AKDP	Convulsions in the anamnesis (instead of AKDP, ADP or vaccine with acellular pertussis component)
Live vaccines against measles, rubella, mumps	Allergic reactions to aminoglycosides. Anaphylactic reactions to egg white. Administration of blood preparations5

The main criterion when deciding the issue of contraindications to the administration of a specific vaccine is the list of contraindications defined in the instructions for its use.

Planned vaccinations with vaccine and toxoid are postponed until the end of acute manifestations of the disease and exacerbation of chronic diseases and are carried out after recovery or during remission of a chronic disease.

Post-vaccination reactions and complications

*Post-vaccination reactions*are registered in the presence of the following clinical manifestations: an increase in temperature up to 390 C, an increase in temperature over 390 C (severe general); pain, swelling of soft tissues > 50 mm, hyperemia at the injection site > 80 mm, infiltrate > 20 mm (strong local); lymphadenopathy; headache; irritability, sleep disturbance; rash of non-allergic origin; anorexia, nausea, abdominal pain, dyspepsia, diarrhea; catarrhal phenomena; myalgia, arthralgia.

*Post-vaccination complications*are characterized by the following clinical manifestations: abscesses; anaphylactic shock and anaphylactoid reactions; allergic reactions (angine edema, urticaria type rash, Stevens-Johnson syndrome, Lyell

syndrome); hypotensive-hyporesponsive syndrome (acute cardiovascular insufficiency, hypotension, decreased muscle tone, short-term disturbance or loss of consciousness, vascular disorders in history); arthritis; continuous shrill cry (lasting from 3 hours or more); convulsions; meningitis/encephalitis; anesthesia/paresthesia; acute flaccid paralysis; vaccine-associated paralytic poliomyelitis; Guillain-Barré syndrome (polyradiculoneuritis); subacute sclerosing pan encephalitis; subcutaneous cold abscess; superficial ulcer over 10 mm, etc.

Organization and implementation of preventive vaccinations

Prophylactic vaccinations are carried out in vaccination offices at medical and preventive institutions (hereinafter referred to as "infirmary"), in medical offices of preschool and general educational institutions, in medical centers of enterprises and in vaccination offices of business entities, as well as in the case of indications - in hospital conditions.

Vaccination is allowed only with vaccines registered in Ukraine in accordance with the indications and contraindications for their administration in accordance with the calendar of preventive vaccinations in Ukraine and the instructions for the use of vaccines approved by the chief state sanitary doctor of Ukraine or his deputy.

Transportation, storage and use of vaccines is carried out with mandatory compliance with the requirements of the "cold chain" in accordance with

"The procedure for ensuring proper conditions of storage, transportation, acceptance and accounting of medical immunobiological preparations in Ukraine".

Preventive vaccinations are carried out by medical workers who know the rules for the organization and technique of vaccinations, as well as measures to provide emergency care in the event of the development of post-vaccination reactions and complications.

Responsible for organizing and conducting preventive vaccinations is the head of a medical and preventive institution and persons who carry out medical practice as subjects of entrepreneurial activity and have a license for medical practice. The volumes of preventive vaccinations are coordinated with the territorial sanitary-epidemiological service.

On the day of the appointment of preventive vaccination, immediately before its administration, a medical examination with mandatory thermometry is carried out to rule out an acute disease and to inform persons to be vaccinated, parents and persons who replace them (when vaccinating minors) about possible manifestations of side effects in post-vaccination period. In the medical documentation, there is an appropriate record of informing about possible manifestations of side effects, which is signed by the citizen, and a doctor's record of permission to carry out vaccination.

Preventive vaccinations must be carried out in compliance with sanitary and anti-epidemic rules and norms. The equipment of the office where preventive vaccinations

are carried out should be as follows: a refrigerator or thermal container (if the vaccine is stored in another room, for temporary vaccination points), a cabinet for tools and medicines, bixes with sterile material, a changing table and a medical couch, tables for preparing drugs for use, a table (cabinet) for keeping documentation, a container with a disinfectant solution.

Prophylactic vaccinations are carried out only with disposable or self-locking syringes. The safety of injections during immunization for the patient is guaranteed by self-locking syringes (accuracy of the dose, impossibility of reuse).

A record of vaccination is made in the forms of medical accounting documentation approved by the Ministry of Health of Ukraine.

After the preventive vaccination, medical supervision must be provided during the period determined by the instructions for the use of the corresponding vaccine preparation.

In the medical documents, it is necessary to indicate the nature and timing of general and local reactions, if they occurred, and to register them in accordance with the "Instructions on the Organization of Epidemic Surveillance of Side Effects of Immunobiological Drugs."

The fact of refusal of vaccinations, with a note that the medical worker provided explanations about the consequences of such refusal, is recorded in the forms of medical accounting documentation approved by the Ministry of Health of Ukraine, and is signed by both the citizen and the medical worker.

Each vaccination cabinet should have instructions for the use of all drugs used for vaccinations (including those that are not included in the list of mandatory ones).

Vaccines from different manufacturers for the prevention of the same diseases can be mutually substituted.

Specific prevention of rabies

Rabies is an acute viral naturally occurring infection that affects the human nervous system and always ends fatally. The main source of rabies in nature is wild mammals (in Ukraine – foxes, wolves, dogs). Infection occurs when bitten by a sick animal, when the skin and mucous membranes are exposed.

Persons who have received scratches, bites, or burns on their outer coverings from animals that are sick or suspected of having rabies are subject to urgent rabies prevention. Anti-rabies vaccine and anti-rabies immunoglobulin are used for this purpose.

Therapeutic and preventive immunization is carried out in accordance with the scheme (Table 7) to persons infected or likely to be infected with the rabies virus in the event of bites, wounds, stings caused by animals, as well as when eating thermally unprocessed meat from a diseased or suspected rabies animal . The course of immunization must be started immediately, as soon as the victim sought medical help.

Anti-rabies vaccine, cultural, concentrated, purified, inactivated, dry- inactivated. It is used for therapeutic and prophylactic and prophylactic immunization of people.

The dissolved vaccine is injected slowly intramuscularly into the deltoid muscle of the shoulder, in children under 5 years old - into the upper part of the anterolateral surface of the thigh. It is not allowed to inject the vaccine into the buttock area. The vaccinated should be under medical observation for at least 30 minutes. After the course of immunotherapy, a certificate is issued indicating the type and series of drugs, the course of vaccinations, and post-vaccination reactions.

Rabies immunoglobulinmade from horse serum. Supplied in a set: 1 ampoule of immunoglobulin and 1 ampoule of immunoglobulin diluted 1:100.

Anti-rabies care consists of local treatment of the wound, introduction of anti-rabies vaccine or simultaneous use of anti-rabies immunoglobulin (AIG) and anti-rabies vaccine.

Local treatment of wounds

Local treatment of wounds is carried out immediately or as soon as possible after a bite or injury: the surface of the wound is washed abundantly with water and soap (or detergent), and the edges of the wound are treated with 70% alcohol or 5% tincture of iodine. If there are indications for the use of anti-rabies immunoglobulin, it is used immediately before applying sutures in the areas around the wound. Avoid suturing the wound if possible.

After local treatment of wounds, medical and preventive immunization is immediately started.

Therapeutic and preventive immunization

Indication. Contact and bites of people by sick or suspected rabies animals. Contraindication. Missing.

The scheme of therapeutic and preventive immunization is given in Table 5.

If, in accordance with this scheme, combined treatment with anti-rabies immunoglobulin and anti-rabies vaccine will be carried out, then both drugs are administered at the same time (first AIH, then the vaccine, in different places).

Anti-rabies immunoglobulin is prescribed as soon as possible after contact with a sick or suspected rabies animal, but no later than 3 days after contact. AIH is not used after administration of anti-rabies vaccine.

Dose of anti-rabies immunoglobulin.Heterologous (equine) antirabies immunoglobulin is prescribed at a dose of 40 IU per 1 kg of body weight. As much as possible of the calculated dose of AIH should be injected into the tissues around the wound and into the depth of the wound, the rest of the dose - intramuscularly (muscles of the buttock, upper thigh, shoulder). Before the introduction of heterologous anti-

rabies immunoglobulin, it is necessary to check the individual sensitivity of the patient to horse protein.

Table 3

Scheme of therapeutic and preventive immunization against rabies

Damage category	Nature of contact	Data about the animal		Treatment
		at the time of the bite	during 10 days of observation	
1	No skin damage or indirect contact. Protection of intact skin	Hello,sick with rabies		Not assigned
2	Protection of damaged skin and intact mucous membranes. A single superficial bite on the shoulder or forearm, lower limbs or trunk by a pet	a) healthy	healthy	Not assigned
		b) healthy	fell ill, died, disappeared	Start treatment with the appearance of signs of the animal's disease or its disappearance with 1.0 ml of vaccine on the 0th, 3rd, 7th, 14th, 30th, 90th day
		c) sick with rabies, ran away, no diagnosis known		Begin treatment immediately at 1.0 ml vaccines for the 0th, 3rd, 7th th, 14th, 30th, 90th day
3A	Glazing of damaged mucous membranes	a) healthy	healthy	Not assigned
	shell, any bite on the head or face, neck, fingers, hands, perineum, genitals, wide or deep bite of any localization, multiple (2 or more) bites inflicted by domestic animals	b) healthy	fell ill, died, disappeared	Start combined treatment for signs of the animal's illness or its disappearance. AIH on the 0th day + vaccine 1.0 ml on the 0th, 3rd, 7th, 14th, 30th, 90th day

		c) sick with rabies, ran away, diagnosis unknown		Start combined treatment immediately: AIH on day 0 + 1.0 ml of vaccine on the 0th, 3rd, 7th, 14th, 30th, 90th day
3B	Any bite or sting of any location inflicted by a wild carnivore or bat			Start combined treatment immediately: AIH on day 0 + vaccine 1.0 ml on the 0th, 3rd, 7th, 14th, 30th, 90th day

Specific prevention of tetanus

*Tetanus*is an acute infectious disease with damage to the central nervous system, which belongs to wound anaerobic infections. The pathogen enters the human body through damaged skin and mucous membranes.

Instruction on specific prevention of tetanus

(excerpt from the order of the Ministry of Health of Ukraine No. 198 of 08/05/99 "On improving the prevention, diagnosis and treatment of tetanus")

Tetanus is an infectious disease with a high mortality rate (60-80%), which can occur after any injuries with damage to the skin and mucous membranes contaminated with spores of the pathogen.

Tetanus is easier to prevent than to treat, because the treatment of tetanus, even with the use of the most modern methods, is an extremely difficult problem, and most convalescents remain disabled.

The most effective method of preventing tetanus is active immunization with tetanus toxoid (AP-toxoid).

Protection against tetanus in children is created by immunization with AKDP-vaccine and ADP-toxoid, in adults - with AP-toxoid or ADPm-toxoid.

After the end of the course of immunization, the human body for a long time (10 years) retains the ability to quickly (within 2-3 days) produce antitoxins in response to repeated administration (revaccination) of AP toxoid.

The full course of primary immunization involves vaccination, which includes 3 vaccinations with the AKDP vaccine with an interval of 1 month and the first revaccination, which is carried out at 18 months of age. To maintain immunity against tetanus at a sufficient level, revaccination must be carried out periodically at intervals of 10 years by a single injection of AP toxoid or ADPm toxoid.

To prevent the occurrence of tetanus in case of injuries, it is necessary to carry out emergency prevention, which involves primary surgical treatment of the wound and the creation of immunological protection. Immunoprophylaxis is carried out differently depending on the patient's previous immunization by revaccination with AP toxoid or by means of active-passive immunization by simultaneous administration of AP toxoid and anti-tetanus serum (TPS) or immunoglobulin.

Emergency active-passive prophylaxis in previously unvaccinated people does not guarantee prevention of tetanus in all cases, besides, it is associated with the risk of immediate and long-term reactions and complications in response to the introduction of PPS. In order to avoid re-introduction of PPS in cases of new injuries, all persons who have received active-passive immunization must necessarily complete the course of active immunization by means of a single revaccination with AP toxoid.

Drugs used for emergency immunoprophylaxis of tetanus

- Adsorbed tetanus toxoid (AP).
- Adsorbed diphtheria-tetanus toxoid with reduced antigen content (ADP-m).
- Anti-tetanus human immunoglobulin (TPLI), which is made from the blood of immune people. One prophylactic dose of PPLI contains 250 IU.
- Antitetanus serum (TPS), which is obtained from the blood of hyperimmunized horses. One prophylactic dose is 3000 IU.

Indications for emergency prevention of tetanus:

- injuries with a violation of the integrity of the skin and mucous membranes;
- frostbite and burns (thermal, chemical, radiation) 2nd, 3rd and 4th degrees;
- penetrating injuries of the gastrointestinal tract;
- out-of-hospital abortions;
- childbirth outside medical institutions;
- gangrene or tissue necrosis of any stage, abscesses;
- animal bites

Emergency prevention of tetanusinvolves primary surgical treatment of the wound and simultaneous specific immunoprophylaxis.

Emergency immunoprophylaxis of tetanus must be carried out within 20 days from the moment of injury, taking into account the duration of the incubation period. In case of severe open injuries, to ensure a full-fledged immune response to tetanus toxoid, the drug should be administered no earlier than the 3rd and no later than the 12th day after the injury.

The appointment of means for emergency immunoprophylaxis is carried out differently depending on the availability of documentary evidence of vaccination or data of immunological control of the intensity of anti-tetanus immunity, as well as taking into account the nature of the injury.

Table 4

Scheme of selection of preventive means for emergency specific prevention of tetanus

The previous onesvaccination against tetanus	**Age group**	**Dates after the last vaccination**	**Drugs used for emergency immunoprophylaxis**		
			AP-anatoxin[1]	**PPLI[2]**	**PPP**
1. There is documentary confirmation of previous vaccinations					
Full course scheduled vaccinations according to age	Children and teenagers	Regardless of the term	Do not enter[3]	Do not enter	Do not enter
Course of scheduled vaccinations without of the last century revaccination	Children and teenagers	Regardless of the term	0.5 ml	Do not enter	Do not enter
Full course immunization	Adults	No more than 5 years	Do not enter	Do not enter	Do not enter
		More than 5 years	0.5 ml	Do not enter	Do not enter
Two vaccinations	All ages groups	No more than 5 years	0.5 ml	Do not enter	Do not enter
		More than 5 years	1.0 ml	250 MO	3000 MO
One vaccination	All ages groups	No more than 2 years	0.5 ml	Do not enter	Do not enter
		More than 2 years	1.0 ml	250 MO	3000 MO
Not vaccinated	Children up to 5 miss.	-	Do not enter	250 ME	3000 MO
	Others are aged groups	-	1.0 ml	250 ME	3000 ME
2. There is no documentary confirmation of vaccination					
There were no contraindications to vaccinations	Children up to 5 miss.	-	Do not enter	250 MO	3000 MO

in the anamnesis	Children from 5 months, teenagers, military servicemen, ex-servicemen military service zbovki		0.5 ml	Do not enter	Do not enter
Other contingents	All ages groups		1.0 ml	250 MO	3000 MO

Summing up.

List of recommended literature

Main:

1. Order No. 551 of the Ministry of Health of Ukraine dated August 14, 2014 "On improving preventive vaccinations in Ukraine" as amended from May 18, 2018 (Order No. 947 "On amendments to the Calendar of preventive vaccinations in Ukraine").

2. Immunity. Truth and myths about vaccination. Eula Byss. Nash Format publishing house. 2020.

3. General epidemiology: study guide (University of the IV year) / N.O. Vynohrad, Z.P. Vasylyshyn, L.P. Cossack. — 4th ed., edition, K.: VSV "Medicine", 2017. - 200 p. - pp. 57-63, 75-80.

Additional:

1. Epidemiology: textbook / by ed. Prof. I.P. Kolesnikova – Vinnytsia: Nova kniga, 2012. – 576 p.

2. Immunoprophylaxis in the practice of a family doctor / [A.P. Podavalenko, T.O. Chumachenko, V.I. Zadorozhna and others]. - Kh.: Folio, 2008. - 221 p.

Practical lesson No. 4

TOPIC: Anti-epidemic measures in foci of infections with an aerogenic transmission mechanism (diphtheria, measles, influenza) - 2 hours.

Goal:*Get acquainted*with: Epidemiological characteristics of a group of respiratory tract infections.

Organize and carry out anti-epidemic measures in centers of diphtheria, measles, meningococcal infection, influenza.

Basic concepts:

Insulation-measures that consist in separating epidemically dangerous persons from their surroundings (infectious patients, persons suspected of having an infectious disease, and in the case of quarantine infections - carriers of their pathogens, as well as persons who were in contact with the sick).

Prevention (from the Greek. προφύλακτικός — preventive; English. prophylaxis, preventive medicine) — a system of scientifically based measures aimed at preventing non-infectious and infectious diseases, as well as at improving health.The main tasks of prevention: prevention of various pathological conditions, chronization of pathological processes and the development of secondary diseases; reduction of progression and risks of disease complications; general strengthening of health.

Hospitalization is the placement of a patient who needs hospitalization for the purpose of examination, treatment, or maternity care. There are both planned and emergency hospitalizations, everything depends on the general condition of the patient, which determines further actions. It is important that hospitalization takes place in a timely manner, this will help to provide timely qualified assistance and prevent negative consequences or any complications caused by acute symptoms.

Actuality of theme.

The aerial mechanism of transmission is extremely easy to implement and in most cases is specific to the human population. This circumstance determines a number of peculiarities in the manifestations of the epidemic process: the speed of spread, high level of morbidity, especially among the children's population, severe complications, etc.

Despite the fact that effective means of specific prevention of diphtheria, measles, whooping cough, epidemic parotitis have been developed today, these diseases are quite common and dangerous for both children and adults. Cases of these diseases, complications and fatal consequences among different age groups are constantly being registered. As for meningococcal infection, given the periodic upsurges in morbidity with negative consequences, there is a need to study the issue of introducing immunization against this disease for the population.

The problem of influenza is particularly relevant today, as the causative agent is highly variable, which determines the constant evolution of the ways of spread, changes in the level of susceptibility of the population and leads to epidemic and even pandemic spread.

This determines the relevance of respiratory tract infections and the need to study them for future doctors.

Plan

I. Organizational moment (greetings, checking those present, announcing the topic, the purpose of the lesson, motivating students to study the topic).

II. Control of basic knowledge: Theoretical questions for the lesson:

- common signs characterizing a group of respiratory tract infections;
- sources and reservoirs of infection in measles, diphtheria, influenza, meningococcal infection;
- factors and ways of transmission in measles, diphtheria, influenza, meningococcal infection;
- qualitative and quantitative manifestations of the epidemic process in measles, diphtheria, influenza, meningococcal infection;
- anti-epidemic measures for the above-mentioned infectious diseases.

III. Formation of professional skills and abilities. Practical works (tasks) performed in class

- conduct an examination of the epidemic focus of respiratory tract infection.
- master the method of organizing and carrying out anti-epidemic measures in centers of measles, diphtheria, influenza, meningococcal infection.

Topic content:

Diphtheria

sick people on diphtheria, and also discovered bacteria carriers subject tocompulsory hospitalization.

*Discharge*patients from a hospital, it is carried out after clinical recovery and receiving a 3-fold negative result of bacteriological examination of smears from the mucous membrane of the oropharynx and nasopharynx for the presence of Corynebacterium diphtheriae, which are carried out at intervals of 2 days, no earlier than the 3rd day after the end of the course of treatment. The discharge of carriers of toxigenic strains of diphtheria pathogens is also carried out after receiving a 2-time negative bacteriological examination. Diphtheria convalescents are subject to dispensary supervision in the outpatient department of the polyclinic within 3 months after discharge from the hospital.

In the epidemic center, patients and carriers of bacteria are identified, isolated and hospitalized. Not only patients with clinical signs of diphtheria should be hospitalized, but also those suspected of having this disease. Contact persons are subject to medical supervision for 7 days, which includes a daily examination, thermometer, examination by an otorhinolaryngologist, and a one-time bacteriological examination of the mucus of the nose and oropharynx. Until the results are received, persons belonging to the decreed groups are suspended from work. Identified carriers of toxigenic and non-toxigenic diphtheria bacteria are isolated in infectious hospitals, where sanitation is carried out.

In the centers of diphtheria, taking into account the persistence of the pathogen in the environment and the possibility of its transmission through dishes, children's toys and other objects, final disinfection is carried out by the disinfection service. To disinfect dishes, boil them in a 2% soda solution for 15 minutes. or immersed in a solution of desactin for 30 minutes. Linen and towels are also disinfected by boiling or by immersing in a disinfectant solution. Chamber disinfection is also used to disinfect things.

Persons who have not been vaccinated, as well as children and adolescents who are due for scheduled revaccination, are subject to preventive vaccination in the center of infection. The following drugs are used to prevent diphtheria: adsorbed pertussis-diphtheria-tetanus vaccine (APV), adsorbed diphtheria-tetanus toxoid (ADP), adsorbed diphtheria-tetanus and diphtheria toxoids with reduced antigen content (ADP-M and AD-M).

Measles

The patient is hospitalized according to clinical or epidemiological indications. Isolation lasts until the 4th day after the appearance of rashes, and in complicated cases - up to 10 days.

Persons who have not had measles are subject to observation for 17 days (and 21 days when immunoglobulin is administered prophylactically). In the cell, preventive examinations and thermometers are carried out daily, and all detected patients are urgently isolated. Children who were not vaccinated and did not get measles from 8 to 17 days after contact (after administration of immunoglobulin from 8 to 21 days) are separated from children's groups.

Due to the low persistence of the pathogen in the environment, final disinfection is not carried out in the measles outbreak. Wet cleaning, ventilation and irradiation with bactericidal lamps are carried out in the premises.

For the purpose of emergency prevention, people who have not had measles and have not been vaccinated are vaccinated with cowpox vaccine. If there are contraindications for vaccination, passive immunization of contacts is carried out by a single injection of immunoglobulin in the first 5 days after contact with the patient. Optimal doses of immunoglobulin administration to children: from 3 months. up to 1 year - 3 ml, from 1 to 1.5 years - 1.5 ml. Post-contact administration of immunoglobulin is indicated for children under 3 years of age, pregnant women and persons with immunodeficiency symptoms.

Influenza and other SARS

*Isolation*patients are most often performed at home, but in severe cases or due to epidemiological indications, hospitalization is carried out. Current disinfection is carried out in the source of infection - wet cleaning with the use of disinfectants, air irradiation with bactericidal lamps, boiling of towels, bed linen, handkerchiefs of the patient in a

2% solution of soda. Caregivers should use masks made of 4-6 layers of gauze, changing them every 3-4 hours. and apply intranasally 0.25% oxolin ointment.

During an increase in the incidence of influenza and SARS, it is prohibited to hold mass events, especially among children's contingents of the population. Employees of medical, shopping and children's institutions, homes for lonely old people and transport must wear gauze masks.

For emergency prevention of influenza, antiviral chemopreparations are used: rimantadine 0.05 g per day for 3-5 days, arbidol 0.2 g per day for a course of 10-14 days (during an influenza epidemic - 0.1 g once per day after 3-4 days for 3 weeks), 0.25% oxolin ointment intranasally. Human leukocyte interferon is used mainly for emergency prevention of influenza in children's groups (5 drops in the nasal passages 2-3 times a day). Anti-influenza immunoglobulin for the purpose of emergency prevention is administered to children under 3 years of age, pregnant women and persons with an immunosuppressive condition (2 injections with an interval of 2-3 weeks). Inducers of endogenous interferon formation (amizon, amiksin, groprinosin), homeopathic remedies (aflubin, influcid) and others are also used.

Meningococcal infection

All patients with meningococcal nasopharyngitis and generalized forms of infection are subject to hospitalization. Convalescents are discharged from the hospital after clinical recovery and a negative bacteriological examination of mucus from the nasopharynx, which is carried out no earlier than 3 days after the end of the course of treatment. Persons who have suffered generalized forms of meningococcal infection are observed by a neurologist for 2 years.

In the center of meningococcal infection, clinical supervision of contacts is carried out for 10 days (examination of the mouth and nasopharynx, skin, daily thermometry, examination by an otorhinolaryngologist).

Bacteriological examination(mucus from the oropharynx and nasopharynx is examined) is carried out among the following contingents to identify carriers of meningococci in the cell: a) in children's preschool institutions - children who communicated with patients (twice), and service personnel of the institution (once); b) in schools - students and teachers of the class in which the patient was found; c) in boarding schools - students and teachers of the class, as well as students, teachers and educators who communicated with the patient in the bedroom; d) in families, apartments - of all persons who communicated with the patient; e) in higher and secondary educational institutions - teachers and students of the entire course; in senior courses - only those who communicated with the patient in the study group and dormitory room. When carriers or patients with nasopharyngitis are detected, they are hospitalized for sanitation and treatment.

Persons who have communicated with a patient with a generalized form of meningococcal infection are administered normal immunoglobulin in doses for preventive purposes: children under 1 year old - 1.5 ml; 2-7 years - 3.0 ml.

*Final disinfection*is not carried out in the cell, which is due to the low resistance of the pathogen in the environment. Daily wet cleaning, ventilation and irradiation with bactericidal lamps are carried out in the premises.

For the purpose of emergency prevention, vaccination with meningococcal vaccine is carried out in foci of infection in the first 5 days after the detection of a case of a generalized form of meningococcal infection.

Persons who were with the patient in a children's institution, family, class, apartment, dormitory, in friendly contacts are subject to vaccination.

Rubella

*Hospitalization*of the patient is carried out according to clinical and epidemiological indications. The patient is subject to isolation until 5 days after the appearance of the rash, when the release of the pathogen stops.

*Observation*during the 21st day, by contact, it is held only in children's institutions. Children who were not vaccinated against rubella and did not get sick are separated from the group (from 11 to 21 days after contact). For the purpose of emergency specific prevention in the rubella center, vaccination is carried out in the first 3 days from the moment of contact to persons aged 1 to 30 years who have not had rubella and have not been vaccinated. If there are contraindications to vaccination, as well as pregnant women, it is recommended to administer immunoglobulin. Pregnant women who have been in contact with a rubella patient require special monitoring, due to the teratogenic effect of the virus. Pregnant women who are in the first trimester of pregnancy must be isolated from the patient and undergo a daily examination, thermometry and serological examination in dynamics (the first sample - in the first 10 days after contact, the second - 2 weeks after establishing contact). Termination of pregnancy is recommended when the titer of antibodies increases or during illness. Children with congenital rubella are subject to dispensary supervision.

*Final disinfection*it is not carried out in the rubella cell.

Viral mumps disease

*Hospitalized*the patient under the conditions of a severe course of the disease and according to epidemiological indications. Isolation of the patient at home is carried out up to 9 days after the onset of the disease. Children under the age of 10, who had contact with the patient, are separated from the team from 11 to 21 days from the moment of contact, provided that they did not suffer from epidemic parotitis and were not vaccinated. During this period, medical supervision is established for them, in the absence of contraindications, emergency immunization with a live mumps vaccine is carried out, but no later than 3 days from the moment of contact. Vaccination according

to emergency indications is carried out for persons aged 1 to 30 years. In the presence of contraindications to vaccination, as well as for pregnant women and children under 1 year, administration of immunoglobulin is recommended.

Since the virus is released with saliva, children's toys, dishes, etc., are subject to final disinfection. Ventilation and wet cleaning are carried out in the premises where the patient is staying.

Varicella

*Hospitalization*of a patient with chicken pox is performed according to clinical or epidemiological indications. Patients are isolated up to 5 days after the appearance of the last element of exanthema.

Children under the age of 7, who had contact with the patient, are separated from the team from 11 to 21 days from the moment of contact, provided that they did not have chickenpox. At this time, medical observation, skin examination and thermometry are carried out. Patients with herpes zoster must be isolated from children who did not suffer from chickenpox, which is due to the common causative agent of these diseases.

*Final disinfection*it is not carried out in the center of infection, given the low resistance of the pathogen in the environment. The room where the patient is is in need of ventilation and daily wet cleaning.

Scarlet fever

*Hospitalizatio*a patient with scarlet fever is carried out under the conditions of a severe course of the disease or according to epidemiological indications (employees of children's preschool institutions, surgical, children's and maternity wards, dairy kitchens; persons living in a boarding school, orphanage, dormitory; in the presence of other children aged from 3 months to 7 years who did not suffer from scarlet fever, etc.). Discharge of the patient from the hospital is carried out under conditions of clinical recovery, but not earlier than 10 days after the onset of the disease.

Scarlet fever convalescents who attend children's preschools and the first 2 classes of schools are admitted to groups 22 days after the onset of the disease, which is due to the long-term release of the pathogen from the patient. Adults who work in children's institutions and dairy kitchens are transferred to another job for 12 days after clinical recovery.

*Medical supervision*within 7 days, it is established for contact children who did not suffer from scarlet fever and attend children's preschool institutions or 1st and 2nd grades of school (for this period, children are separated from teams), as well as for adults who belong to the decreed group (without dismissal from work) . Daily examination and thermometer are carried out. If a scarlet fever patient isolates at home, the observation period for contacts who live in the same apartment with him is extended to 17 days.

When patients with angina are detected in the center of scarlet fever within 7 days from the moment of registration of the last case of infection, they are not allowed to visit children's preschool institutions, and adults - to work in children's and medical institutions, in dairy kitchens for 22 days from the onset of the disease.

Current and final disinfection is carried out in the cell.

Summing up.

List of recommended literature

Main:

1. Vinohrad N. O. General epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2017. - 200 p.
2. Vinohrad N. O. Special epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2018. - 367 p
3. Epidemiology in schemes: a study guide / M. D. Chemych, N. G. Malysh, O. M. Chemych, N. I. Ilyina. – Vinnytsia: Nova Kniga, 2020. – 256 p.
4. Epidemiology: anti-epidemic measures: study guide / M. D. Chemych, N. G. Malysh, N. I. Ilyina [and others]. – Vinnytsia: Nova Kniga, 2020. – 288 p.
5. Kiselyov S. M. Basic principles of evidence-based medicine: teaching. manual / S. M. Kiselov. Zaporizhzhia: ZDMU. 2018. 117 p.

Additional:

1. Epidemiology: a textbook for students. higher med. education institutions / A. M. Andreychyn, Z. P. Vasylishyn, N. O. Vinohrad; under the editorship I. P. Kolesnikova. Vinnytsia: Nova Kniga, 2012. 576 p.: illustrations.

3. Order of the Ministry of Health of Ukraine No. 595 "On the procedure for conducting prophylactic vaccinations in Ukraine and quality control and circulation of medical immunobiological preparations" dated September 16, 2011.

Electronic information resources

1. World Health Organizationwww.who.int
2. Cochrane Center for Evidence-Based Medicinewww.cebm.net
3. Center for Disease Control and Preventionwww.cdc.gov
4. Public Health Center of the Ministry of Health of Ukrainewww.phc.org.ua
5. Ukrainian database of medical and statistical information "Health for all":http://medstat.gov.ua/ukr/news.html?id=203

Practical lesson No. 5

TOPIC: Anti-epidemic measures in foci of infections with a fecal-oral transmission mechanism (shigellosis, hepatitis A) - 2 hours.

Goal: Determine the doctor's responsibility for the correct and timely organization of anti-epidemic measures for the above-mentioned intestinal infections.

To develop deontological ideas about work in an epidemic center of intestinal infections.

To master the skills of establishing psychological contact with patients with intestinal infections and persons who communicated with them.

Basic concepts:

Insulation-measures that consist in separating epidemically dangerous persons from their surroundings (infectious patients, persons suspected of having an infectious disease, and in the case of quarantine infections - carriers of their pathogens, as well as persons who were in contact with the sick).

Prevention (from the Greek. προφύλακτικός — preventive; English. prophylaxis, preventive medicine) — a system of scientifically based measures aimed at preventing non-infectious and infectious diseases, as well as at improving health.The main tasks of prevention: prevention of various pathological conditions, chronization of pathological processes and the development of secondary diseases; reduction of progression and risks of disease complications; general strengthening of health.

Hospitalization is the placement of a patient who needs hospitalization for the purpose of examination, treatment, or maternity care. There are both planned and emergency hospitalizations, everything depends on the general condition of the patient, which determines further actions. It is important that hospitalization takes place in a timely manner, this will help to provide timely qualified assistance and prevent negative consequences or any complications caused by acute symptoms.

Actuality of theme.

Intestinal infections are widespread throughout the world, but they are most important in developing countries. Cases of HEK, salmonellosis, shigellosis, and viral hepatitis A and E are also constantly registered in Ukraine, as well as cases of typhoid and paratyphoid. Therefore, reducing the incidence of infectious diseases, in particular intestinal infections, is an important task of epidemiology and the practical health care network.

Plan

I. Organizational moment (greetings, checking those present, announcing the topic, the purpose of the lesson, motivating students to study the topic).

II. Control of basic knowledge: Theoretical questions for the lesson:

Features of causative agents of typhoid and paratyphoid, shigellosis and viral hepatitis A, their laboratory diagnosis.

Sources of infection in the above-mentioned infections, their epidemiological significance.

Ways and factors of transmission of intestinal infections.

Types of outbreaks and epidemics in intestinal infections, their investigation.

Manifestations of the epidemic process in these intestinal infections.

System of preventive measures for typhoid and paratyphoid, shigellosis and hepatitis A.

System of anti-epidemic measures for typhoid and paratyphoid, shigellosis and hepatitis A.

III. Formation of professional skills and abilities. Practical works (tasks) performed in class

Conduct an examination of the epidemic focus of intestinal infection.

Organize and carry out anti-epidemic measures in centers of typhoid, paratyphoid, shigellosis and viral hepatitis A.

Conduct an outbreak/epidemic investigation of enteric infections.

Topic content:

Shigellosis

*Hospitalization*of patients is carried out according to clinical and epidemiological indications. In the case of isolation at home, the patient is prescribed treatment, examination, current disinfection is carried out in the apartment.

*Discharge of convalescents from the hospital*it is carried out no earlier than the 3rd day after the normalization of bowel movements and body temperature with a negative result of the control bacteriological examination of feces (it is carried out 2 days after the end of the course of treatment). Employees of decreed groups are discharged after 2 negative bacteriological examinations of feces.

Observation in the NICU is carried out only for convalescents who belong to the decreed groups for 1 month (double bacteriological examination and clinical examination at the end of the month).

*Duration of medical supervision*for contact persons with shigellosis (dysentery) and acute intestinal infections of unknown etiology is 7 days; a daily survey, examination, observation of the nature of stools, and thermometry are carried out.

In apartment blocks, employees of food establishments and children who attend children's preschools or are in boarding schools, summer health camps, as well as unorganized children under the age of 2 are subject to a one-time bacteriological examination. With a positive result of the bacteriological examination, the above-mentioned persons are suspended from work and attendance at organized collectives.

Viral hepatitis A

Patients with viral hepatitis A (VHA) are hospitalized according to clinical and epidemiological indications. Patients are discharged from the hospital after normalization of clinical and biochemical parameters. Convalescents of the VHA are examined by a hospital doctor after 1 month. after discharge, in the presence of residual phenomena, observation is carried out in polyclinic conditions for 3 months.

In the VGA unit, medical observation is established within 35 days from the day of hospitalization of the patient (at least once a week), which includes a survey, thermometry, a medical examination with determination of the size of the liver and spleen, assessment of the color of the skin and urine; the concentration of ALT and AST, the level of bilirubin (immediately after the detection of the first patient and after 15-20 days) are examined, if possible, the blood is examined for HG markers and bile pigments in the urine. If there are repeated cases of VHA in the cell, the observation period is extended for another 35 days, counting from the last case. In children's preschool institutions during the observation period, the transfer of children and staff to other groups is prohibited, admission of new children is possible only with the permission of the epidemiologist.

Current and final disinfection using disinfectant solutions and chamber disinfection for the patient's personal belongings and bed linen are carried out in the cell.

In children's groups, prophylactic administration of immunoglobulin is carried out according to age in the following doses: 1-6 years - 0.75 ml; 7-10 years - 1.5 ml; older children and adults depending on weight - up to 3.0 ml, pregnant women - 1 ml. According to the order of the Ministry of Health of Ukraine No. 48 dated 03.02.06, vaccination of contact persons with hepatitis A vaccine for epidemic indications within the first week after contact is recommended in the center of infection.

Typhoid

*Hospitalization*patients with typhoid fever is mandatory. After clinical recovery, patients are discharged from the hospital no earlier than 21 days after normal body temperature, under conditions of three negative results of a bacteriological examination of feces and a single test of urine.

All convalescents are subject to medical supervision and weekly body temperature measurement for 2 months, then 1 time in 2 weeks - 1 month. 10 days after discharge, convalescents undergo a 5-fold bacteriological examination of feces and urine, then within 3 months. - once every month, on the fourth month - bacteriological examination of bile and RPGA. In the case of negative results of all tests, convalescents are removed from dispensary supervision. Convalescents who belong to the decreed population group ("food workers", employees of children's institutions) are not allowed to work for 1 month. after discharge, at this time they are examined bacteriologically 5 times. If the results are negative, convalescents are allowed to work, but the observation continues throughout their entire employment (the first 2 years, the examination is carried out once a quarter, then twice a year (feces and urine are examined). If Salmonella typhi is isolated in any examination after 3 months , the patient is transferred to the category of chronic carriers and removed from work related to food products and children's contingents.

*In an epidemic center*of typhoid fever, medical supervision is carried out for 21 days (examination of persons who were in contact with the patient, daily thermometry, one-time bacteriological examination of feces, urine and duodenal contents). Contact persons who belong to "food workers" or are equated with them, are suspended from work until receiving a single negative result of a bacteriological examination of feces.

*Specific prevention*contact persons are treated with typhoid bacteriophage three times with a 3-day interval. The first dose of bacteriophage is administered after taking material for bacteriological examination. Preventive vaccination is carried out according to epidemic indications for children over 7 years of age and adults with a chemical vaccine enriched with Vi-antigen.

Taking into account the stability of salmonella in the environment, disinfection is carried out in the cells. Current disinfection is performed by relatives of the patient or carrier during the entire stay in the center of infection, final disinfection is carried out by employees of the disinfection service after the patient is hospitalized.

Cholera

Anti-epidemic measures in the cholera center are carried out in the following directions:

- introduction of restrictive measures and quarantine;
- identification and isolation of persons who were in contact with the patient or carriers;
- treatment of patients with cholera and vibrio carriers;
- preventive treatment of contact persons;
- current and preventive disinfection.

Quarantineintroduced by the decision of the emergency anti-epidemic commission in the event of a threat of a cholera epidemic in the settlement. Quarantine measures include restriction of entry into the cell, ban on direct transit of intercity transport, 5-day observation (isolation) of persons who wish to leave the cell, medical observation of them and one-time bacteriological examination.

Hospitalization of cholera patients is mandatory. Convalescents are discharged from the hospital after complete clinical recovery, the end of the course of treatment and 3 negative results of bacteriological examination of feces, which are performed after 24-36 hours. after a course of etiotropic therapy for 3 days. Persons who work in the food industry, before discharge, need a 5-time bacteriological examination of feces and a one-time examination of bile.

Cholera convalescents are allowed to work immediately after discharge from the hospital. Medical supervision of convalescents lasts 3 months. after discharge In the first month, bacteriological examination is carried out once every 10 days, then once a month.

In order to identify vibriocarriers, contact persons and persons leading a disordered lifestyle, patients of psychiatric and narcological institutions, employees of the water supply and food industry are examined.

Persons who were in close contact with a patient or a carrier and have bowel dysfunction are subject to provisional hospitalization. They are discharged after 5-day medical supervision, a course of emergency antibiotic prophylaxis and 3 negative bacteriological examinations. If, under certain conditions, it is impossible to isolate the contact person in a temporary ward, they are placed under medical supervision for 5 days, and on the 1st day, a bacteriological examination of feces is carried out three times. Emergency prevention is carried out in cholera centers caused by toxigenic

cholera vibrios of serogroups O1 and O139, with doxycycline, ciprofloxacin and other antibiotics, taking into account sensitivity.

Citizens of Ukraine and foreigners who have contracted acute intestinal infections, within 5 days after returning from countries where cholera cases have been registered, are subject to a three-fold bacteriological examination. Patients with severe forms of acute intestinal infections are subject to a one-time bacteriological examination in type 2 areas and three times in type 1 areas.

Summing up.

List of recommended literature

Main:

1. Vinohrad N. O. General epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2017. - 200 p.
2. Vinohrad N. O. Special epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2018. - 367 p
3. Epidemiology in schemes: a study guide / M. D. Chemych, N. G. Malysh, O. M. Chemych, N. I. Ilyina. – Vinnytsia: Nova Kniga, 2020. – 256 p.
4. Epidemiology: anti-epidemic measures: study guide / M. D. Chemych, N. G. Malysh, N. I. Ilyina [and others]. – Vinnytsia: Nova Kniga, 2020. – 288 p.
5. Kiselyov S. M. Basic principles of evidence-based medicine: teaching. manual / S. M. Kiselov. Zaporizhzhia: ZDMU. 2018. 117 p.

Additional:

1. Epidemiology: a textbook for students. higher med. education institutions / A. M. Andreychyn, Z. P. Vasylishyn, N. O. Vinohrad; under the editorship I. P. Kolesnikova. Vinnytsia: Nova Kniga, 2012. 576 p.: illustrations.

Electronic information resources

1. World Health Organizationwww.who.int
2. Cochrane Center for Evidence-Based Medicinewww.cebm.net
3. Center for Disease Control and Preventionwww.cdc.gov
4. Public Health Center of the Ministry of Health of Ukrainewww.phc.org.ua
5. Ukrainian database of medical and statistical information "Health for all":http://medstat.gov.ua/ukr/news.html?id=203

Practical lesson No. 6

TOPIC: Anti-epidemic measures in foci of blood infections (malaria, hepatitis B and C, HIV infection). Nosocomial infections and their prevention - 2 hours.

Goal:*Get acquainted, have an idea about*hospital infections (a-I)

*To know, to learn*the main characteristics of viral hepatitis B and C, HIV infection, directions for combating them (a-II)

*Master the performance technique*organization of the anti-epidemic regime in hospitals (a-III)

*Develop creative abilities*in the process of experimental and theoretical research of problematic issues (a-IV)

Basic concepts:

Immune blot- a method used as a confirmatory test. This method allows you to detect antibodies to individual HIV proteins - gp41, gpl20, p24, p 18. The result is considered positive if antibodies to 4 or more viral proteins were detected.

Nosocomial infections(nosocomial, hospital) is a group of infectious diseases, infection with which occurs in the conditions of a medical and preventive institution.

Infection control -it is a system of effective organizational, preventive and anti-epidemic measures aimed at preventing the occurrence and spread of nosocomial infections.

Actuality of theme.

Currently, the problems of hepatitis with a parenteral transmission mechanism and HIV infection are becoming increasingly important, which is associated with the spread of medical care to the population and the presence of a significant number of hidden sources of infection in society. Viruses are characterized by resistance to disinfectants and antiseptics and represent the greatest danger as pathogens of nosocomial infections during parenteral interventions.

Plan

I. Organizational moment (greetings, checking those present, announcing the topic, the purpose of the lesson, motivating students to study the topic).

II. Control of basic knowledge: Theoretical questions for the lesson:

Definition of hospital infections.

Characteristics of hospital strains of microorganisms.

Peculiarities of epidemiology of hospital infections, mechanisms of their transmission.

Characteristics of the artificial transmission mechanism.

Nosocomial infections of medical personnel.

III. Formation of professional skills and abilities. Practical works (tasks) performed in class

Areas of control and prevention of hospital infections.

Architectural and planning, disinfection measures, anti-epidemic regime in medical institutions.

The main directions of prevention of VLI in the conditions of dental clinics.

Topic content:

Characteristics of HIV infection

Etiology

The causative agent is a virus of the genus Lentivirus, family Retroviridae, which has a spherical shape with a diameter of about 80-120 nm. The genome of the virus consists of 2 RNA chains, in the cells of the host, HIV forms DNA. The presence of the enzyme reverse transcriptase provides the ability to transfer genetic information from RNA to DNA, which determined the name of the family ("retroviruses" from the Latin "retro" - back). In addition to reverse transcriptase (revertase), HIV contains two more enzymes - protease (RNase) and integrase.

Specific glycoproteins — gp 120 and gp41 — are located on the surface of the virus envelope, which are of great importance during virus recognition of CD4 cells.

*HIV replication.*The main receptor for HIV is CD4-antigen (CD - Cell Differentiation antigen). SD 4 is a glycoprotein whose structure is complementary to gpl20, which in turn determines the tropism of HIV to cells that contain this antigen. CD4 receptors have been found in the T-helper population, Langerhans macrophage cells, the epithelium of the small and large intestines, and multinucleated giant cells in the nervous system. After the penetration of the virus into the cell with the help of revertase and protease, the DNA of the provirus is synthesized from the RNA of the virus, which, thanks to the integrase, is integrated into the DNA of the host cell and performs the function of a matrix for the synthesis of the RNA of new virions.

HIV has high genetic variability. Frequent mutations of the virus are due to the features of revertase, which is not able to correct errors during DNA synthesis. Every day, up to 10 million new variants of the virus appear in the infected body.

*Persistence of HIV in the environment.*The causative agent belongs to thermolabile viruses. Its infectivity sharply decreases when heated to 56°C for 30 minutes. The virus is quickly destroyed under the action of disinfectants (3% hydrogen peroxide solution, 0.2% sodium hypochlorite solution), during boiling it dies after 1 minute. However, the virus is resistant to freezing, UV radiation, and ionizing radiation. When dried, it dies after 7 days, and in a liquid medium at room temperature it can be stored for 15 days.

Epidemiology.HIV infection - anthroponosis.

*Sources of the causative agent of infection*there are HIV-infected persons during all periods of the disease and AIDS patients. A person becomes contagious after about 1-3 months. from the moment of infection, when there is an accumulation of the virus in the blood, sufficient to infect another person.

HIV is found in all body fluids, but the greatest amount is observed in blood, semen, vaginal contents, breast milk, cerebrospinal fluid, and lymphoid tissue.

*Mechanisms and ways of transmission.*HIV infection has several possible transmission mechanisms - parenteral, contact (sexual) and vertical. HIV infection has not yet taken a final place in the classification of infectious diseases. So, some authors include it among blood infections, others - among infections with a contact mechanism of transmission.

The main route of HIV infection is sexual. In the first years of the development of the epidemic, HIV infection mainly spread among homosexuals, but recently the significance of heterosexual contacts has increased. Moreover, there is a higher risk of infection in women, which is explained by the higher concentration of the virus in the sperm and the larger surface of the mucous membrane of the female genital organs. The presence of inflammatory processes, violations of the integrity of the mucous membranes of the genital organs (for example, the presence of concomitant sexually transmitted diseases) increase the likelihood of HIV infection. The risk of infection during single sexual contact is low, but repeated unprotected contacts make this route the most active. Given the rapid spread of BIL infection in society, the highest risk of infection arises from casual unprotected sexual contact.

*Parenteral*the mechanism of transmission is realized mainly with the use of injection drugs. Thus, in Ukraine until 1998, injection drug users made up 83% of all HIV-infected people. The high level of infection among this group is due to the use of shared syringes and needles, as well as the use of narcotic substances contaminated with infected blood.

HIV infection is also possible through transfusion of blood and its components, organ transplantation. Transfusion of HIV-infected blood leads to infection of the recipient in 98-100% of cases. Transmission factors can be not only blood, but also erythrocyte, platelet, and leukocyte masses. The highest risk of infection with HIV and viral hepatitis with a parenteral transmission mechanism occurs with transfusions of blood factors VII and IX to patients with hemophilia. This is due to the wide range of donors whose blood is used for the production of coagulation factors. Donor blood must be tested for HIV antibodies. However, there is a possibility of donation during the so-called "seroconversion window", when the amount of virus in the blood is high, but antibodies are not yet determined by routine diagnostic methods.

Intramuscular and subcutaneous injections, accidental injections with contaminated needles of medical workers lead to infection in approximately 0.3% of all cases of HIV infection (1 case per 300 injections). There is also a possibility of infection when using a reusable tool that has not been properly processed (needles, scalpels, dental instruments, etc.) for parenteral interventions.

*Vertical transmission mechanism*can be implemented in the antenatal period (the probability of fetal infection during pregnancy is 30-50%). However, the risk of infection of the child increases during childbirth, when the birth canal is traumatized, the skin and mucous membranes of the child come into contact with the mother's blood. It is also possible to infect the child during breastfeeding (the probability is from 7 to 22%).

The risk of infection of the child increases in the following cases:

- the infection of the woman occurred during pregnancy;
- in case of violation of fetoplacental blood circulation and inflammatory processes in the placenta;
- with premature detachment of the placenta;
- with protracted childbirth and a long waterless interval (more than 4 hours).

In general, the susceptibility of people to HIV infection is high. The average life expectancy of HIV-infected persons is 11-12 years. However, when people over 35 years old are infected, AIDS develops after 4-5 years. The introduction of highly active antiretroviral therapy allows significantly extending the life of HIV-infected patients and improving its quality.

Young men (20-39 years old) predominate among those infected with HIV, but recently the number of infected women and children is constantly increasing.

Risk groups for HIV infection

Persons with risky sexual behavior (who have a large number of sexual partners; in the presence of concomitant diseases of the genital tract, especially in the presence of ulcerative or inflammatory processes and in the absence of the practice

of using condoms).

Recipients of blood, its components, organs.

Users of injection drugs.

Persons with piercings, tattoos.

Medical workers in regions with a high prevalence of HIV infection.

Prevalence of HIV infection.The countries of South Africa, South America, and Southeast Asia have high rates of HIV infection. The highest level of population infection is recorded on the African continent (in some countries - more than 10% of the population). In Swaziland, Botswana, Malawi, the average life expectancy of people is about 40 years, HIV infection is the main cause of child mortality. Thus, in Zimbabwe, among the causes of death of children under 5 years of age, 70% are due to AIDS.

The first cases of HIV infection were registered in Ukraine in 1987, and the HIV epidemic began in 1995, when the virus entered the environment of injection drug users.

As of January 1, 2009, 141,277 HIV-infected people were officially registered in Ukraine, and 26,804 AIDS patients. Every day in our country, 43 people become infected with HIV, and 8 die from AIDS. However, according to WHO forecasts, the real number of HIV-infected people in Ukraine may exceed 300,000 people.

The spread of HIV infection occurs mainly among high-risk groups: 62.8% are infected with HIV among injecting drug users, 31.7% among sex workers, 5% among patients with sexually transmitted diseases, 3% There is a noticeable trend towards an increase in the number of HIV-infected women. So, if in 2001, the share of HIV-infected women was 37%, then in 2007 it increased to 43%, among them women of reproductive age prevail. The significance of the sexual route of HIV transmission is increasing, which may mean that the epidemic of HIV infection will spread beyond the circle of injection drug users to the environment of ordinary, socially adapted people. This unfavorable sign characterizes the current state of the problem in Ukraine as a concentrated stage of the epidemic.

Specific diagnosis of HIV infection

The diagnosis of HIV infection can be established only after laboratory confirmation. The determination of antibodies in blood serum is most often used.

Enzyme immunoassay (ELISA) allows you to determine total antibodies to HIV, the sensitivity of this method reaches 99.5%. If the result is "+", 2 more tests are carried out in the same laboratory by the ELISA method using different test systems. If at least one of them turns out to be "+", the serum is sent for confirmatory testing.

Immune blot is a method used as a confirmatory test. This method allows you to detect antibodies to individual HIV proteins - gp41, gpl20, p24, p 18. The result is considered positive if antibodies to 4 or more viral proteins were detected.

The most acute problem of determining a patient's HIV status is caused by the presence of a period of the so-called "seroconversion window" - the time interval from the moment of infection to the formation of antibodies to HIV. Antibodies appear in 90-95% of infected persons within 3 months, in 5-9% - after 6 months, and in 0.5-1% of infected persons - after 1 year after infection. At that time, the

accumulation of the virus in an amount sufficient to infect contact persons occurs already 3-4 weeks after the moment of infection.

Testing for the presence of HIV antibodies in Ukraine is mandatory for donors and pregnant women. Other categories of the population are examined only voluntarily, after consultation and signed informed consent.

HIV antibody testing is recommended:

- risk groups (users of injection drugs, women in the sex business);
- persons who were in contact with an HIV-infected person;
- patients with signs of HIV infection or AIDS (herpes zoster, recurrent pneumonia, tuberculosis, Kaposi's sarcoma, etc.).

PCR (polymerase chain reaction) allows you to determine proviral DNA or free viral RNA in the blood. This method allows not only to determine the presence of the virus in the blood, but also to carry out its quantitative determination (determine the viral load).

Determining the level of CD4 lymphocytes allows monitoring the state of the immune system of an HIV-infected person, prescribing antiretroviral therapy (if the number of CD4 lymphocytes is less than 500 cells in 1 μl). If the level of CD4 lymphocytes is less than 200 cells in 1 μl, the diagnosis of AIDS is established.

Activities in the center of HIV infection

After an HIV-infected person is identified, confidential counseling is conducted with him, during which probable causes of infection, health consequences, and the possibility of treatment are discussed. An HIV-infected person is explained ways to prevent infection of the environment and criminal responsibility for the spread of HIV. For each case of HIV infection, an urgent report is filled out, which is sent to the territorial SES and the regional Center for the fight and prevention of HIV/AIDS. All medical documentation (outpatient card, child development history, donor card, etc.) is marked with the patient's personal code (instead of the last name and other data by which the patient can be identified) and the disease code.

During the careful collection of an epidemiological history, the possible factors of infection and the circle of contact persons are clarified. Contact persons are consulted on prevention of HIV infection, offered to undergo voluntary testing for the presence of HIV antibodies with subsequent repetition of the study in dynamics, and medical supervision is established. It is necessary to remember that all information about an HIV-infected person is a medical secret, the disclosure of which is subject to criminal liability.

The presence of episodes of donation in an HIV-infected person during the last years is ascertained, the recipients of his blood are examined. Persons in whom antibodies to HIV are detected are permanently excluded from donation.

Medical supervision of HIV-infected persons is carried out in the offices of infectious diseases of polyclinics and regional HIV/AIDS Centers. HIV-infected persons are examined twice a year, receive medical assistance and psychological support.

Prevention of HIV infection

The prophylactic approach is now recognized as the most effective strategy in the fight against HIV.

WHO identifies 4 main areas of activity in the prevention of HIV infection:

Prevention of HIV transmission through sexual intercourse and injection drug use.

Prevention of HIV infection during transfusion of blood and its preparations.

Prevention of vertical transmission of HIV from mother to child.

Organization of medical assistance and social support for HIV-infected persons and their families.

*Prevention of HIV transmission through sexual intercourse and injection drug use*is based on the so-called "harm reduction" theory, according to which assessing the degree of risk allows you to reduce it.

It is possible to reduce the risk of HIV infection thanks to active educational work among young people aimed at forming safe sexual behavior, reducing the number of sexual partners and using condoms at every sexual contact.

An important direction is also the fight against prostitution, educational work among people engaged in the sex business, distribution of condoms, testing of risk contingents for the presence of HIV antibodies.

Prevention after sexual intercourse related to HIV infection

The risk of HIV infection during sexual contact is estimated as 0.1-3% for a passive partner during anal intercourse, 0.1-0.2% for a woman and 0.03-0.09% for a man during vaginal contact. So far, the need for chemoprophylaxis after casual sexual contact has not yet been proven. However, if seduction or rape has occurred, it is recommended that the victim of violence undergo post-exposure prophylaxis according to the recommendations below for healthcare workers exposed to the risk of infection in the workplace.

If a person - the suspected source of infection - has received a negative HIV test result, or if HIV antibodies have been detected in a victim of violence, then chemoprophylaxis with antiretroviral drugs is stopped, and the affected person is sent to the regional HIV/AIDS Center for further counseling and receiving the necessary medical care for HIV infection. If the victim of violence tests negative for HIV, and the suspected source of infection is positive or unknown, a full four-week course of chemoprophylaxis with antiretroviral drugs is conducted.

In order to prevent the transmission of HIV during the injection of drugs, the "harm reduction" program is also widely used, according to which the prevention of HIV infection is considered more effective than the eradication of drug addiction. According to this program, syringe exchange actions and peer-to-peer consultations by volunteers of public organizations are held regarding the possibilities of drug addiction treatment, prevention of HIV transmission when injecting drugs. Ukraine is also implementing a methadone replacement program, the effectiveness of which is recognized throughout the world. The network of rehabilitation facilities for drug addicts is expanding.

Prevention of HIV infection during transfusion of blood and its preparations

The safety system of donor blood has been implemented in Ukraine since the end of the 80s of the 20th century. Donor blood samples must be tested for the following infections:

- HIV infection (a/t to HIV by ELISA method);

- hepatitis B (HBsAg);
- hepatitis C (a/t to HSV);
- syphilis (RW).

Blood tests for the presence of HIV antibodies are carried out using the ELISA method using test systems of the 3rd generation. In some countries, in addition to the determination of total antibodies to HIV, the early p24 antigen is determined in the blood of donors.

Prevention of HIV transmission involves testing all portions of donor blood and heat treatment of blood coagulation factors (VIII, IX). Currently, restrictions on the indications for transfusion of donor blood and its components have been introduced.

The presence of a long seroconversion window in HIV infection, when the amount of virus in the blood is already sufficient to infect another person, but antibodies in the blood have not yet been determined, is especially alarming. The possibility of the donor being at the stage of the seroconversion window has already led to the infection of 18 recipients of blood on the territory of Ukraine.

Quarantine of donor plasma is used to prevent infection of recipients due to blood transfusion. Repeat testing of donors for the presence of HIV antibodies after 4 months is implemented. after taking blood. This method of double testing of donors allows to significantly reduce the risk of HIV transmission, but it is ineffective when carrying out hemotransfusions of whole blood. Auto-donation tactics are also being actively implemented in the world, when the patient donates blood in advance, and then, after surgery or childbirth, receives his own blood or plasma.

Prevention of vertical transmission of HIV from mother to child

This area of prevention of HIV transmission in Ukraine is considered a priority.

In order to detect HIV-infected pregnant women, they are tested twice for the presence of HIV antibodies in the 1st and 3rd trimesters of pregnancy.

In case of detection of antibodies to HIV, prevention of vertical transmission from mother to child is prescribed from the 28th week of pregnancy with zidovudine, and during childbirth - with viramun. Childbirth is performed by caesarean section with the consent of the woman in labor at the 38th week of pregnancy, and women are also advised to give up breastfeeding. The implementation of this program made it possible to significantly reduce the number of children with congenital HIV infection. According to the indicators of reduction of HIV transmission from 27.5% to 8%, Ukraine is recognized by the UN as a leader in this field of prevention.

In the first 8-12 hours. after birth, children whose mothers are HIV-infected are prescribed chemoprophylaxis with an antiretroviral drug for 1 week.

Children born to HIV-positive women are first tested for HIV infection immediately after birth (p24 is tested in umbilical cord blood), then the test is repeated every 3 months. Observation of such children lasts for 18 months. If at 18 months HIV antibodies are not detected by the ELISA method, the child is considered HIV-negative and is removed from the register.

To clarify the HIV status in modern conditions, the PCR method is also used, which allows early detection of a child's HIV infection.

Children with HIV+ status can attend general children's organized groups. Scheduled immunization of HIV-infected children is carried out according to the

vaccination calendar, with the exception of live vaccines. Vaccinations are not carried out for the diagnosis of AIDS.

Prevention of occupational HIV infection

Instructions on the prevention of in-hospital and professional HIV infection (excerpt from the order of the Ministry of Health of Ukraine No. 120 dated 05.25.2000 "On improving the organization of medical care for patients with HIV infection/AIDS")

In the conditions of the rapid spread of HIV infection among the population, everyone who seeks medical help should be considered as a potential carrier of the human immunodeficiency virus. Accordingly, each workplace of a medical worker is provided with means of preventing the transmission of the human immunodeficiency virus from a possible virus carrier or AIDS patient to other patients, medical and technical personnel.

- Terms
- Control over the safety of HIV infection of medical workers during the performance of their professional duties is entrusted to the regime commission of the medical and preventive institution, the composition of which is approved by the relevant order.
- Jobs are provided:

Instructional and methodical documents, first-aid kits for urgent prevention in emergency situations, a necessary set of medical tools for one-time use, disinfectants for decontamination.

Medical instruments, dishes, underwear, devices and other instruments contaminated with blood, biological fluids and things contaminated with mucus must be disinfected immediately after use in accordance with the requirements of regulatory documentation. The decontamination regimen is similar to that used to prevent infection with viral hepatitis.

- Preventive measures during the provision of medical assistance and patient care, work with biomaterial.
- Medical workers are obliged to observe precautionary measures during manipulations with cutting and piercing instruments (needles, scalpels, scissors, etc.).

In order to avoid injuries after using syringes, the needles are not removed from them before disinfection. Before immersing the syringe with the needle in the disinfection solution, only the piston is removed. Ambulance and emergency teams should have containers made of puncture-proof material for the collection of used syringes.

- In order to avoid injuries, it is forbidden to use glass objects with broken edges for taking blood and other biofluids.
- During manipulations, which are accompanied by a violation of the integrity of the skin and mucous membranes, autopsy of corpses, laboratory tests, processing of tools and linen, cleaning, etc. medical workers and technical personnel must use personal protective equipment - surgical gowns, rubber gloves, masks, and if necessary - a protective screen, waterproof aprons, armbands, glasses. These measures will make it possible to avoid contact of the skin and mucous membranes

of the worker with the blood, tissues, and biological fluids of patients.

Before putting on rubber gloves, the skin near the nail phalanges should be treated with a 5% alcohol solution of iodine.

• Medical workers with injuries, wounds on the hands, exudative lesions of the skin of the hands, which cannot be covered with adhesive plaster or rubber gloves, are released for the period of illness from direct medical care of patients and contact with the objects of their care.

• All manipulations with blood and sera in laboratories should be performed with the help of rubber pears, automatic pipettes, dispensers.

• Any vessels with blood, other biological fluids, tissues, pieces of organs, etc. should be tightly closed with rubber or plastic covers immediately at the place of collection.

• In medical institutions, to ensure decontamination in the event of an accidental leakage of liquid, blood and other biomaterials should be transported in tripods placed in containers, bixes or pencil cases, on the bottom of which a four-layer dry napkin is placed.

• It is necessary to transport blood samples and other biomaterials from medical institutions to laboratories located outside these institutions only in containers (cases, pencil cases), which makes it impossible to accidentally or intentionally open the lids during their transportation (lock, sealing, sealing of joints adhesive plaster). After unloading, these containers are treated with disinfectant solutions. Delivery in cooler bags is optimal.

• It is not allowed to transport blood samples and other biomaterials in cardboard boxes, wooden boxes, or plastic bags.

• It is not allowed to place referral forms or other documentation in a container or bix.

• Measures for wounds, contact with blood, other biological materials of an HIV-infected or AIDS patient.

Any damage to the skin, mucous membranes of medical personnel, their contamination with patients' biomaterial during the provision of medical care to them should be qualified as possible contact with material containing HIV or another infectious disease agent.

• *If contact with blood, other biological fluids or materials was accompanied by a violation of the integrity of the skin (injection, cut), the victim must:*

- remove the gloves with the working surface inwards;
- remove blood from the wound;
- treat the damaged area with one of the disinfectants (70% solution of ethyl alcohol, 5% tincture of iodine for cuts, 3% hydrogen peroxide);
- wash your hands thoroughly with soap under running water, and then wipe them with a 70% solution of ethyl alcohol;
- put a plaster on the wound, put on a lighter;
- if necessary, to continue work, put on new rubber gloves;
- to urgently inform the management of the medical and preventive institution about the accident for its registration and emergency prevention of HIV infection.

• *In case of contamination with blood or other biofluids* without skin damage:*

- treat the place of contamination with one of the disinfectants (70% solution of ethyl alcohol, 3% solution of hydrogen peroxide, 3% solution of chloramine); wash with soap and water and treat with alcohol a second time.

In case of biomaterial contact with mucous membranes:

- oral cavity - rinse with a 70% solution of ethyl alcohol;
- nasal cavity - instill a 30% solution of albucid;
- eyes - rinse with water (with clean hands), instill a 30% solution of albucid.

A 0.05% solution of potassium permanganate can be used to treat the nose and eyes.

To reduce the likelihood of occupational HIV infection:

- before manipulations on an HIV-infected person, the medical staff must verify the integrity of the first-aid kit;
- carry out manipulations in the presence of another specialist, who can continue the medical manipulation in case of a tear of a rubber glove or a cut;
- do not rub the mucous membranes with your hands.

IN*in case of contact with biomaterial on a gown, clothing:*

- remove clothes and soak them in one of the disinfectant solutions;
- if the skin of the hands and other parts of the body becomes contaminated through clothing, wipe it with a 70% solution of ethyl alcohol, then wash it with soap and water and wipe it again with alcohol;
- wipe soiled shoes twice with a cloth dipped in a solution of one of the disinfectants.

Registration of accidents, surveillance of victims and measures to prevent occupational contamination.

Form 108-0 "Accident Registration Log when providing medical aid to BIJI-infected persons and working with HIV-infected material" is kept in all medical and preventive institutions.

The responsibility for keeping a journal and the duty to conduct interviews with medical personnel about the threat of infection are assigned to the head of the regime commission.

After the registration of the accident is carried out according to the established procedure, the victim is offered (with his consent) to undergo an examination for the presence of HIV antibodies. For the first time, blood for testing under code 115 (medical contact) is taken immediately after the accident, but no later than 5 days after it. A positive result indicates that the worker was infected with HIV before, and the accident is not the cause of the infection.

If the result is negative, the next test is carried out after 3, 6 months, and further - after a year.

In the case of detection of HIV infection in a medical worker on the basis of accounting reporting form No. 108-o, a special commission decides the issue of recognizing the infection as professional.

The availability and maintenance of accident registration logs and examination of injured medical workers is controlled by health care authorities and territorial SES.

The results of the examination of medical workers are confidential.

*3a with the exception of urine, saliva, feces due to the small amount of viruses, which practically makes infection impossible.

Post-contact prevention of HIV infection(excerpt from Order No. 580 dated 12.12.2003

"On improving the treatment of patients with HIV infection and AIDS")

Substantive provisions

Post-exposure prophylaxis (PEP) is a short-term course of antiretroviral drugs to reduce the likelihood of developing HIV infection after contact with body fluids associated with the risk of HIV infection (occurring in the workplace, during sexual intercourse or from a needle stick). For medical workers, PPE should be included in a comprehensive universal list of measures to prevent infection of medical workers at the workplace.

The risk of dangerous contact with HIV from needlesticks and other situations exists in many medical institutions that are not adequately equipped with protective equipment, especially if the prevalence of HIV infection among patients visiting these institutions is high. PKP is aimed at reducing the frequency of cases of occupational HIV infection among medical workers and increasing their motivation in serving HIV-infected patients.

PKP is also carried out for persons who have (or have been) pricked by a needle outside the workplace (for example, intravenous drug users due to accidental contact with HIV; victims of sexual violence, etc.).

Universal precautions

In medical institutions, PPE should be one of the components of a holistic approach to the prevention of infection at the workplace with blood-borne pathogens. It is necessary that this approach is based on the application of universal precautions. Universal precautions are infection control measures that reduce the risk of transmission of infectious agents between patients and healthcare workers through contact with blood and other biological fluids. The implementation of universal precautions involves careful attitude to any contact with blood and other biological fluids, as well as the use of appropriate protective measures.

The contacts associated with the risk of HIV infection in the workplace (or dangerous contact) include skin injuries with an instrument that could be infected (for example, a needle stick or a cut with a sharp instrument); contact of mucous membranes or damaged skin with tissues, blood and other biological fluids; prolonged (several minutes or more) or extensive contact of intact skin with tissues, blood and other biological fluids.

Blood and other biological fluids that are a source of infection.

It is necessary to observe universal precautions in case of contact at the workplace with blood and other biological fluids, including:

- sperm;
- vaginal secretions;
- any liquids with an admixture of blood;
- cultures or environments containing HIV, upon contact with which cases of HIV infection have been registered;
- synovial, cerebrospinal, pleural, peritoneal, pericardial, amniotic

fluids, for which the degree of their danger in terms of HIV transmission has not yet been established.

Universal precautions do not apply to feces, nasal secretions, sputum, sweat, mucus, urine, vomitus, saliva (with the exception of dental manipulations, during which saliva is often mixed with blood).

All medical facilities and all persons subject to the risk of infection in the workplace must adhere to the following recommendations:

Try not to expose yourself to the risk of infection with blood-borne pathogens by avoiding:

accidental injuries with infected needles or other sharp instruments;

contact of the mucous membrane of the oral cavity, eyes or nose, damaged areas of the skin (cuts, scratches, dermatitis, acne) with infected blood and other biological fluids;

after touching a surface contaminated with infected material, touching an area of damaged skin or mucous membranes of the eyes, nose or mouth.

It is necessary to observe safety techniques during the performance of professional duties, including the use of various protective equipment at the workplace:

use means that can isolate objects contaminated with blood (for example, use strong sealed containers for sharps, mixed near the place of their use and replaced in time to prevent their overflow), or prevent contact with them during manipulations (for example, use safe needles and needle-free systems for intravenous infusions);

improve safety rules for medical workers (for example, prohibit putting caps on used needles, bending or breaking them, doing anything else with used needles);

use personal protective equipment, including gloves, waterproof gowns, face and eye protection (shields, glasses).

Post-contact prevention

All medical workers working in medical institutions, where there is a risk of HIV infection at the workplace, should have the opportunity to receive PKP.

For this, it is necessary to create a stock of sets of antiretroviral drugs for chemoprophylaxis and to provide medical workers with the possibility of immediate consultation with a qualified specialist.

Regional Centers for the prevention and fight against HIV/AIDS should provide advisory assistance to medical institutions on PKP issues, as well as conduct PKP for persons who came into contact with HIV outside the workplace (after risky sexual intercourse and other cases related to the risk of HIV infection). .

Risk of infection at the workplace

After wound contact with blood containing HIV, the probability of infection is approximately 0.3% (95% confidence interval (CI): 0.2-0.5%). The risk of infection after exposure to HIV-infected blood on intact mucous membranes is approximately 0.09% (95% CI: 0.006-0.5%). The risk of infection after contact of intact skin with HIV-infected blood or contact with other biological fluids containing the virus has not been established.

Regular inspections in medical institutions contribute to compliance with safety techniques by personnel and reduce the risk of infection in the workplace. After

dangerous contact with HIV-infected material, the medical worker must provide counseling, chemoprophylaxis, follow-up and other necessary types of assistance. Post-exposure chemoprophylaxis can reduce the risk of HIV infection.

Indications for carrying out PKP

Injury to the skin by a sharp object (a needle stick, a cut with a sharp needle edge or a shard of glass), contaminated with blood, a liquid with a visible admixture of blood or other potentially infected material, or a needle from a patient's vein or artery.

* Bite of a healthcare worker with a skin lesion by an HIV-infected patient who is bleeding from the mouth.

■ Getting splashes of blood, liquid with a visible admixture of blood or other potentially infected material on the mucous membranes (mouth, nose, eyes).

■ Contact of splashes of blood, visibly blood-stained fluid, or other potentially infected material on broken skin (for example, in the presence of dermatitis, areas of weathered skin, abrasions, or open wounds).

*Post-contact chemoprophylaxis with antiretroviral drugs*Depending on the results of the HIV test, the following actions should be taken:

if the patient (a possible source of infection) has received a negative HIV test result, the medical worker does not need further post-contact prophylaxis;

if antibodies to HIV have been detected in a medical worker, he does not need further post-contact prophylaxis, but he should be referred to specialists for further counseling and receiving the necessary medical care for HIV infection;

if the medical worker's HIV test result is negative, and the possible source of infection is positive, then the medical worker should be prescribed a four-week course of antiretroviral chemoprophylaxis, during which the appearance of possible side effects of the drugs should be monitored; repeat the HIV test 3 and 6 months after the initial test. If a medical worker seroconverts during this period, he must be provided with the necessary assistance, including counseling, and referred to an HIV specialist for long-term treatment for HIV infection. If seroconversion does not occur within six months after contact, inform the health worker that he does not have HIV infection;

if it is impossible to determine the patient's HIV status (a possible source of infection), then he is considered HIV-infected. At the same time, it is worth following all the recommendations outlined in the previous paragraph;

the medical worker is warned about the need to use condoms within 6 months after the contact associated with the risk of HIV infection;

find out the immune status of the medical worker regarding hepatitis B; if he is not immunized, conduct passive and active hepatitis B immunoprophylaxis according to indications.

Hepatitis B

Etiology.The causative agent of GV (Dein particle) is a DNA-containing virus of the NerasipauigisIae family, is a spherical body with a diameter of 42-45 nm, has an outer lipoprotein shell and an inner part - a nucleocapsid, or the core of the virus. Viral proteins are located in the core of the virus, which are important for the reproduction of HBV. This is the internal or core antigen - HBcAg, which also

includes the antigen of the inner shell - HBeAg. In blood serum, free HBeAg is isolated, which reflects the degree of viral replication, and therefore it is called an antigen of infectivity. The outer shell of the virus is located in the cytoplasm of the infected hepatocyte and contains the surface antigen - HBsAg.

The HBV genome contains a double-stranded DNA molecule. HBV is related to various tissues and most often damages the liver. Also, viral DNA and proteins are detected in the kidneys, spleen, pancreas, skin, bone marrow and peripheral blood mononuclear cells. Peripheral mononuclear cells are the first targets in HBV infection. All this complicates the diagnosis of HBV infection with extrahepatic manifestations.

The causative agent of HBV is quite resistant to high and low temperatures: its infectious activity persists for 6 months. at a temperature of 30-32°C; when frozen to a temperature of -20°C - up to 15 years, in dried plasma - up to 25 years; heating at 60°C leads to complete inactivation of HBV after 10 hours; 98°C - partially inactivates the pathogen after 1 min., completely - within 20-30 min. The virus is resistant to the action of most disinfectants: complete inactivation when treated with a 3-5% chloramine solution occurs after 2 hours, and with a 1.5% formalin solution - after only 7 days of exposure.

Epidemiology.According to the epidemiological principle of classification of human infectious diseases, HBV belongs to infections with a parenteral mechanism of pathogen transmission.

*The source of HBV infection*there are patients with HBV, CHBV and virus carriers. The ability of HBV to persist in the human body for a long time, or even forever, is determined by the form of its existence. With HBV, the patient becomes contagious starting from the last weeks of incubation and until the complete rehabilitation of the body during the period of convalescence. In chronic forms, the duration of the epidemically dangerous period is unlimited.

*Risk groups for HBV infection:*donors and recipients of blood and its preparations, organs; injection drug addicts, medical workers, staff and patients of hemodialysis, hematology, intensive care units, oncology and tuberculosis hospitals; patients with chronic diseases of the liver and biliary tract; patients undergoing long-term treatment in hospitals; persons who lead a promiscuous sex life, homosexuals, HIV-infected.

*Transmission factors.*In those infected with HBV, regardless of the course of the infectious process, the virus is detected in all biological environments. The highest epidemiological danger is blood, semen and saliva. For probable infection, 10 4-10”5 infected HBV blood serum is sufficient. Long-term storage of the virus on objects of the external environment expands the range of possible factors for the transmission of the pathogen. These include: reusable medical tools, shaving and manicure tools, toothbrushes, scissors, etc.

*Mechanisms and ways of transmission.*GV is spread by natural and artificial means. Natural routes of transmission of HBV are sexual, vertical (prenatal and intranatal infection of the child from the mother) and horizontal (various types of direct and indirect contact in everyday life). Artificial ways include parenteral medical and paramedical interventions: medical and diagnostic, surgical

interventions, intravenous injection of narcotic substances, tattooing, piercing, etc.

Specific diagnosis of GV.HBsAg is an important serological marker for HBV. It appears 3-5 weeks after infection and is usually the first of the markers. In the incubation, prodromal and at the beginning of jaundice periods, the titer of HBsAg gradually increases, with the help of highly sensitive methods of indication, HBsAg can be detected in almost all patients with HBV at the beginning of the disease. The duration of antigen circulation varies considerably, averaging 70-80 days from the beginning of the jaundice period.

The rapid disappearance (in the first days of the jaundice period) of HBsAg with the appearance of anti-HBs, which are represented by IgM, is an unfavorable prognostic sign. This situation often precedes fulminant hepatitis. The period of time after the disappearance of HBsAg and before the appearance of antibodies to it, which lasts an average of 3-4 months with fluctuations from one month to a year, is called the phase of the immunological "cortical" window. In this phase, the only marker indicating infection is antibodies to HBsAg - anti-HBs. These antibodies circulate in the blood practically all life and are determined both in patients and in all previously infected. In 5-10% of people, anti-HBs can be the only marker of retrospective diagnosis of HBV infection. Anti-HBs are also determined in those vaccinated against HB.

HBcAg— core, core antigen of HBV, which is not secreted into the blood and therefore is not determined in the serum of infected persons. HBcAg is detected in liver tissue, nuclei of affected hepatocytes during immunomorphological examination of biopsies. Cortical antigen is characterized by high immunogenicity and causes the formation of specific antibodies - anti-HBc IgM and anti-HBc IgG, which circulate in the blood of infected people. Anti-HBc IgM appear at the end of the incubation period or at the beginning of jaundice and indicate active replication of the virus and are an indicator of HBV. The maximum concentration of anti-HCV IgM is determined at the height of the jaundice period. They circulate for 4-8 months and, with a favorable prognosis of HBV, change to anti-HBc IgG, which can circulate practically throughout life and are a reliable retrospective marker of transferred HBV.

In addition to the above-mentioned antigens and antibodies, HBeAg and anti-HBe are detected in the blood serum of patients with HBV. HBeAg appears in the first week of the jaundice period at the same time or a week after the appearance of HBsAg in 85-95% of patients. The duration of HBeAg circulation is of great prognostic value: its detection two or more months after the onset of the disease is a sign of chronic HBV. In most patients with HBV, seroconversion of HBeAg to anti-HBe occurs. HBeAg is a marker of active replication, its presence in blood serum is almost always accompanied by HBV DNA replication. Chronic carriers of HBsAg, in whose serum HBeAg is determined, represent the highest danger from an epidemiological point of view as hidden sources of infection.

Determination of the main serological markers of HBV infection using modern immunochemical methods of research, primarily ELISA, is of great importance in the diagnosis of HBV, forecasting the course of the disease, and assessing the formation of the immune response. The PCR method makes it possible to

differentiate between integrative and replicative forms of HBV infection and acts as an "arbitrator" to determine the need to start treatment and control its effectiveness.

Hepatitis C

Etiology.HCV belongs to the flavivirus family. It is a small (30-60 nm in diameter) virus whose genome is represented by an RNA molecule. According to various classifications, more than 3 genotypes of this virus have been identified so far, the most common genotypes of HCV are 1a, 16, 2a, 26, 2c and 3a, which account for more than 80% of all virus isolates. In Ukraine, 1b is most often registered. The frequency of detection of this or that genotype of HCV depends on the ways of its transmission. Thus, in European countries, genotype 1b is more often detected in those infected as a result of transfusion of blood and its components, genotypes 1a and 3a - during the injection of drugs, and genotypes 2 and 3 are associated with infection in hemodialysis units.

Compared to HBV, HCV is less resistant to physical and chemical influences: it is inactivated at a temperature of 60°C within 30 minutes, at 100°C - in 2 minutes; formalin solution (1:1000) is inactivated within 96 hours. at a temperature of 7 °C. HCV is sensitive to ultraviolet radiation.

Epidemiology.GS - anthroponosis, which belongs to blood infections with a parenteral mechanism of pathogen transmission.

The source of infectionthere are patients with all forms of HS. The most dangerous from an epidemiological point of view are patients with non-jaundice and subclinical forms of the disease, the detection of which is extremely difficult. According to the literature, 5-6 patients with a non-jaundic form of hepatitis account for one HGS patient with jaundice.

Risk groups— see GV.

Transmission factors.HCV is found in blood and practically all body fluids: urine, bile, saliva, semen, breast milk, etc. The most dangerous factor in the transmission of HS infection is blood and its components. In HCV-infected people, 1 ml of blood contains on average 10 3 - 10 4 virus particles, that is, the dose of virus sufficient for infection can be found in 0.001-0.0001 ml of blood. A direct relationship between the intensity of medical parenteral interventions and the frequency of detection of serological markers of HCV infection was revealed.

Transmission mechanisms- parenteral, which is implemented by natural means - sexual and horizontal (infection due to household hemopercutaneous contacts) and artificial - during medical and paramedical manipulations. A transmission by a vertical mechanism is also proven. In modern conditions, an increase in the share of HS transmitted by artificial parenteral means of infection (intravenous administration of narcotic substances, hemotransfusion, medical manipulations, etc.) is noted.

Specific diagnosis of HS.Determination of serological markers of HS is one of the most important components of the complex diagnostic process. Specific antibodies to HCV — anti-HCV can be determined by the ELISA method in 50-70% of patients at the beginning of the disease. On average, seroconversion occurs from 3 to 6 weeks from the moment of infection. Antibodies of the IgM class to the HCV core protein (anti-HCVs IgM) appear first in the blood serum. These antibodies are a serological marker of an acute infectious process and an additional marker of viral

replication, since the presence of anti-HCVs IgM usually coincides with viremia and increased AAT activity.

There are cases when during the dynamic examination, only HCV RNA is detected in the blood serum, and serological markers of the virus are not determined. Such indicators of laboratory tests can indicate HGS, when serological markers of HCV are not detected, that is, during the so-called period of the seronegative "window", as well as CHGS, which has a course against the background of immunodeficiency, as a result of which antibodies are not synthesized or are determined in a low concentration, which is not determined by this test system.

Interventions in the center of viral hepatitis with a parenteral transmission mechanism

Patients with acute forms of viral hepatitis require hospitalization in an infectious disease hospital, an urgent notification is submitted to the territorial SES. Patients with chronic viral hepatitis are hospitalized only according to clinical indications (during exacerbation of the disease). Convalescents from acute HF are discharged under conditions of clinical recovery, after 10 days and 1 month. after discharge, they are examined by a hospital doctor, and in the future they are subject to dispensary observation in the outpatient clinic of the polyclinic for 12 months. Deregistration is carried out in the absence of signs of chronic hepatitis and 2 negative results of a blood test for HBsAg.

*Medical supervision*according to contact persons in the cell continues during the maximum incubation period (for HCV - 6 months). An examination and laboratory examination are carried out, including for specific markers of VH, in chronic centers, contacts are examined once a year. Contact persons regarding hepatitis B are suspended from donation for 6 months. Great importance, especially in centers of chronic viral hepatitis, is given to sanitary and educational work.

Patients with chronic viral hepatitis should have individual items of personal hygiene (washcloths, towels, razors, scissors, toothbrushes) and bed linen that are subject to current disinfection. It is recommended to use mechanical contraceptives.

For emergency post-contact prevention of HBV, accelerated vaccination schemes are used - 0-1-2 months. or 0-7-21 days with revaccination after 12 months. and simultaneous administration of specific immunoglobulin against hepatitis B.

Prevention of viral hepatitis with a parenteral mechanism of transmission

*Measures aimed at sources of infection.*An important area of prevention is identification, examination and treatment of patients with acute hepatitis. It is advisable to hospitalize patients with chronic hepatitis for the first time to clarify the diagnosis, determine the activity of the process and treatment tactics. Patients with chronic viral hepatitis in the phase of virus replication are prescribed antiviral therapy.

In acute hepatitis B, the criterion for maintaining infectivity is the detection of HB5A8 and HBeAg, a marker of virus replication. Individuals in whom HBsAg continues to be determined, regardless of the presence or absence of clinical signs of the disease, are considered as sources of infection. So, for example, they cannot work in blood transfusion institutions. Persons with detected HBsAg and anti-HCV, who

work as surgeons, gynecologists, operating room nurses, are temporarily suspended from work until the results of an in-depth clinical and laboratory study are obtained, with further resolution of the issue of professional activity.

Measures aimed at breaking transmission mechanisms

The primary direction in the prevention of viral hepatitis with a parenteral transmission mechanism is the prevention of their transmission during transfusion of blood and its components.

The following are excluded from donation:

* persons in whom markers of hepatotropic viruses and/or biochemical signs of liver pathology were detected (they are subject to an in-depth examination to verify the diagnosis and determine further treatment tactics);
- patients with chronic liver diseases, including those of toxic and unknown etiology;
- persons who have contracted viral hepatitis in the past, regardless of the age of the disease;
- contact persons who communicated in the family with a patient with viral hepatitis during the last 6 months;
- recipients of donor blood and its components during the last 6 months.

Clinical and laboratory examination of donors (blood, organs, sperm) is carried out for each episode of donation. Determine HBsAg and anti-HCV. However, the absence of HBsAg does not guarantee the complete safety of blood products. The possibility of infection with hepatitis B has been proven with blood transfusions containing anti-HVs. In many countries of the world, during the selection of donors, HvsAg and anti-Hvs are determined. Negative results of HBV DNA and HCV RNA testing by PCR are considered the most accurate safety criteria, but this method has not yet found widespread use in donor screening, given the complexity of its implementation.

In order to prevent post-transfusion hepatitis, the maximum limitation of the number of donors for one recipient, the reduction of indications for the transfusion of preserved blood, the use of autotransfusion methods and blood substitutes are implemented.

*Prevention of transmission of viral hepatitis B and C during medical and diagnostic manipulations*involves the use of single-use medical and laboratory instruments, strict compliance with the rules for handling instruments and equipment for multiple use. Medical manipulations related to parenteral interventions should be carried out only for a limited range of indications.

Prevention of professional infection of medical personnel involves compliance with safety rules:

* all manipulations during which personnel may come into contact with blood or other biomaterials are carried out in rubber gloves, masks and protective glasses. All skin injuries must be covered with cautery, adhesive plaster;
- after any manipulations, hands must be hygienically cleaned (washing hands twice in warm water with soap and drying them with disposable napkins);
- medical instruments that came into contact with blood may be disassembled, rinsed and washed only after disinfection;

- if blood gets on the intact skin of medical personnel, it is necessary to urgently treat the contaminated area with a swab with a disinfectant solution or an antiseptic (3% hydrogen peroxide solution, 70° alcohol solution), then rinse under running water with soap and wipe with a disposable napkin;
- in the event of blood or other biological fluids of the patient falling on the damaged skin of the medical staff, it is necessary to remove the blood from the wound, treat it with a 70° solution of alcohol or 5% tincture of iodine, then thoroughly wash your hands under running water with soap, wipe dry, and then repeat the 70° treatment alcohol solution;
- if the patient's blood or other biological fluids have contaminated the medical worker's mucous membranes, they must be thoroughly washed with water and then treated with an antiseptic;
- in order to reduce the risk of infection with viral hepatitis B, medical workers who were injured during parenteral intervention and were not previously vaccinated, need to carry out emergency prophylaxis using specific immunoglobulin and hepatitis B vaccine according to the shortened scheme (0-1-2-12 months. or 0-7-21 days).

*Prevention of infection with hepatitis with a parenteral mechanism of transmission during non-medical parenteral interventions*primarily involves the fight against drug injection. In Ukraine, state programs to combat the abuse of narcotic substances and their illegal circulation are being implemented. The "harm reduction" model is being actively implemented, which is considered more effective than the eradication of drug addiction, and involves increasing the availability of treatment for injecting drug users. On the territory of Europe, including in Ukraine, a substitute "methadone program" is being implemented, which contributes to reducing the risk of infection with hepatitis with a parenteral transmission mechanism and HIV infection to a minimum level. There are programs for exchanging used needles and syringes for sterile disposable ones. During the exchange, volunteers can advise injecting drug users on prevention of hepatitis B and C and HIV infection and drug addiction treatment options. The introduction of such programs and the availability of disposable syringes does not lead to an increase in the number of injecting drug users, but on the contrary, contributes to an increase in the number of people who turn to treatment centers and charitable organizations for help.

Prevention of infection of newborns from mothers infected with hepatitis with a parenteral transmission mechanism

Examination of pregnant women for HBV and anti-HCV is mandatory during their observation in the women's consultation. Women in labor infected with hepatitis B or C viruses need to be hospitalized in observation departments of maternity hospitals. Children born to mothers infected with HBV need to be vaccinated with hepatitis B vaccine according to the schedule 0 (first day of life)-1-6 months. The first dose is administered in the first 12 hours. life of the child regardless of body weight. Together with vaccination, but not later than the 1st week of life, specific immunoglobulin against hepatitis B should be injected into another part of the body at the rate of 40 IU/kg of body weight and at least 100 IU.

Children born to mothers infected with hepatitis B and C are subject to

dispensary observation by a pediatrician in a children's polyclinic for 1 year. Targeted examination of such children is carried out at the age of 2, 3, 6 and 12 months. with a blood test for the presence of HCV and anti-HCV and ALT activity in 3 and 6 months. If markers of viral hepatitis are detected in a child, his outpatient card is marked and anti-epidemic measures are taken to prevent the spread of hepatitis B.

Measures aimed at increasing the immunity of the population

Vaccination plays an important role in the specific prevention of hepatitis B. According to the order of the Ministry of Health of Ukraine No. 595 dated September 16, 2011, vaccination against hepatitis B is provided by the "Calendar of preventive vaccinations in Ukraine". Modern vaccines against hepatitis B belong to the inactivated ones produced by the recombinant method. The vaccine is administered intramuscularly, in children and adults - in the deltoid muscle, and in newborns - in the anterolateral part of the thigh. The vaccine against hepatitis B induces the formation of specific antibodies to HBsAg, the titer of anti-HBbA§ — 10 IU/l is considered protective. Achieving such a level of antibodies after primary immunization leads to the formation of long-term immunological memory, which can be preserved for 5-12 years.

Vaccinations against hepatitis B are prescribed by the "Calendar of vaccinations for newborn children". The first vaccination is carried out on the first day of life, the second - at 1 month, the third - at 6 months. A vaccination series should not be started if a dose has been missed, regardless of how much time has passed. Missing doses should be administered at minimum intervals.

Vaccination against hepatitis B according to Order No. 595 is also shown:

- according to the state of health — patients with chronic liver damage; organ recipients before transplantation; children who are on hemodialysis or receive multiple transfusions of donor blood, as well as if they need staged surgical interventions;
- according to epidemic indications - to medical workers; students of secondary and higher educational institutions who have professional contact with blood, its preparations and perform parenteral interventions; persons who have been in contact with a patient with hepatitis B; recipients of donated blood and its preparations; children in orphanages and children's homes; to family members who have patients with hepatitis B and carriers of the hepatitis B virus; patients with chronic liver diseases; patients who are subject to planned surgical intervention.

For vaccination of adults, it is also recommended to use the 0-1-6 month vaccination scheme. If the child has not been vaccinated before, it is vaccinated in adolescence.

Currently, according to the recommendations of the WHO, vaccination against hepatitis B is included in the "National vaccination calendars" in more than 75 countries of the world, which made it possible to significantly reduce the incidence of hepatitis B and affect the level of carriers. Accumulated experience shows that mass vaccination of the population leads to a 10-12-fold decrease in morbidity and HBsAg carriers - from 9-12% to 1% in the population. Later, hepatitis B is planned to be included in infections managed by means of immunoprophylaxis.

Nosocomial infections(nosocomial, hospital) is a group of infectious diseases, infection with which occurs in the conditions of a medical and preventive institution. VLI also includes infectious diseases of medical workers, if their infection is related to professional activity.

In recent years, a steady increase in the incidence of acute respiratory infections has been observed, which is due to the following reasons: the creation of multidisciplinary hospital complexes (high density of patient accommodation, their permanent stay in a closed environment);

the formation of an artificial iatrogenic (artificial) transmission mechanism caused by invasive medical and diagnostic procedures;

activation of natural mechanisms of pathogen transmission (air-droplet, contact-household in conditions of close contact between patients and medical personnel);

a large number of sources of infection among patients and medical personnel (the presence of carriers, patients with erased clinical forms, hospitalization of patients during the incubation period);

widespread use of antimicrobial drugs, which leads to the formation of resistance of microorganisms; formation of hospital strains resistant to antibiotics, UFO, disinfectants; general decrease in population resistance;

underestimation of the importance of nosocomial infections by clinical doctors.

Expanding the possibilities of medical and diagnostic procedures, the use of complex medical equipment, which requires special methods of disinfection and sterilization, contributed to the formation of an artificial artificial (iatrogenic) mechanism of transmission of pathogens of infectious diseases in the conditions of medical institutions. The wide and sometimes unjustified prescription of antibiotics and chemopreparations has led to the emergence of new hospital strains of microorganisms characterized by multiple resistance to antibacterial drugs and disinfectants.

There is a high risk of nosocomial infections in almost all departments where parenteral interventions are performed (surgical, obstetrics-gynecological, dental, resuscitation, etc.). The probability of occurrence and spread of VLI also increases during a long stay of patients in a hospital against the background of prescribing immunosuppressive drugs and antibiotics.

According to WHO recommendations, nosocomial infections are divided into:diseases associated with infection of patients in hospitals; diseases associated with infection in outpatient clinics; nosocomial infections of medical personnel.

EtiologyVLI is diverse. So far, the connection of VLI with more than 300 pathogens - bacteria, viruses, fungi, protozoa and prions - has been proven.

According to the etiology, BJII can be conditionally divided into 2 groups - traditional infections, which are brought to medical and preventive institutions from the general population of people, and purulent-septic infections (SSI), which account for about 65% of all VLI. Traditional infectious diseases (SRI, children's infections with an airborne transmission mechanism, intestinal infections, etc.) can spread quickly in the conditions of medical institutions, due to the high degree of overcrowding of people in a limited space.

The main causative agents of GSI: Staphylococcus aureus, Pseudomonas

aeruginosa, Klebsiella pneumonia, Proteus, E. coli, yeast fungi, etc. The totality of GSI is conventionally divided into GSI of newborns, childbirth, postoperative and post-injection GSI.

*Hospital strains*microorganisms are characterized by common qualities acquired during their stay in medical facilities:

polyresistance to antibiotics;

high stability in the environment;

the ability to reproduce on environmental objects;

rapid development of resistance to disinfectants and antiseptics.

Epidemiology of VLI

VLI is characterized by a multiplicity of sources of infection. In the departments of purulent surgery, burn, urological, and tuberculosis hospitals, the main sources of IBD are the patients of these departments. Carriers of microorganisms and patients among medical workers also play an important role in the spread of acute intestinal infections, especially in the case of outbreaks of acute intestinal infections in hospitals or maternity hospitals. With the spread of upper respiratory infections, pneumocystosis in children's wards and hospitals for HIV-infected patients, medical workers can also be the main sources of infections.

Transmission of infections by the parenteral mechanism (hepatitis B, C, D, HIV infection, etc.) more often occurs in the direction from the patient to the medical worker, but sometimes the reverse direction of transmission of the pathogen (from the medical worker to the patient) is possible. Thus, according to the Committee on the Prevention of Viral Hepatitis of the European Regional Office of the WHO, there is a high risk of infection with the hepatitis B virus in patients who are operated on by maxillofacial surgeons with the presence of HBs-antigenemia. They often injure the skin of the hands with sharp surgical instruments, broken edges of the teeth, which makes it possible for the infected doctor's blood to get on the damaged mucous membrane of the patient.

The peculiarity of VLI is also related to the variety of mechanisms, ways and factors of pathogen transmission. Thus, along with the implementation of natural mechanisms of transmission (air-droplet, fecal-oral), a powerful artificial (iatrogenic, artificial) mechanism of transmission associated with invasive diagnostic and treatment procedures was formed in hospital conditions. In recent years, there has been a steady trend towards an increase in the volume of invasive procedures and parenteral interventions, which leads to an increase in the importance of the iatrogenic mechanism of transmission in the conditions of medical institutions. It is implemented during such manipulations as blood transfusions, organ transplantation, operative surgical interventions, injections, dental manipulations, etc.

During dental interventions, almost every manipulation in the oral cavity is accompanied by a violation of the integrity of the mucous membrane and the release of blood. The main reasons for the occurrence of intra-hospital infections in dental medical institutions are violations of the disinfection of main systems of saliva extractors, gross violations at the stage of pre-sterilization cleaning of instruments, in particular burs, endodontological and orthopedic instruments, lack of disinfection of

dental prosthetic products, etc. Violations of the sterilization of burs, drill-burs, root needles, discs, tips, etc. are also frequent problems in dental clinics. Violations in the processing of dental instruments can lead to the infection of patients with viral hepatitis with a parenteral transmission mechanism and the development of purulent-inflammatory diseases.

Risk groups for the occurrence of VLI are persons with a weakened immune status (premature and newborn children, elderly persons with concomitant pathology, postoperative patients, persons receiving immunosuppressive therapy, HIV-infected patients, women in labor) and medical personnel.

The general strategy of combating nosocomial infections was called "infection control".

Infection control -it is a system of effective organizational, preventive and anti-epidemic measures aimed at preventing the occurrence and spread of nosocomial infections.

The following directions of combating VLI are distinguished:

1. Architectural and planning measures (boxed wards of infectious disease hospitals, zoning of operating rooms, separation of children's wards from adults, etc.).
2. Organization of effective epidemiological surveillance of VLI.
3. Organization of effective anti-epidemic regime in medical institutions.
4. Shortening the terms of hospitalization of patients.
5. Increasing the effectiveness of disinfection and sterilization measures due to the formation of central sterilization departments, the use of new disinfectants, antiseptics.
6. Limitation of indications for invasive procedures, transfusion of donor blood.
7. Reasonable prescription of antibiotics and chemopreparations.
8. Prevention of VLI of medical personnel.

Nosocomial infections of medical personnel

Infection of medical personnel can occur both through the implementation of natural transmission mechanisms and iatrogenic mechanisms. Thus, during parenteral interventions and contact with the patient's blood, more than ZO pathogens can be transmitted. Infection with hepatitis B and C viruses is most common, which can lead to the development of chronic hepatitis with degeneracy into liver cirrhosis and primary hepatocellular carcinoma. Before the introduction of vaccination, the rates of HBV among surgeons, intensive care specialists, and dentists were 5-10 times higher than among doctors of therapeutic specialties. According to WHO data, 1 medical worker in the world dies of hepatitis B every day. Medical personnel are infected with the hepatitis C virus somewhat less often, but the higher probability of developing chronic hepatitis (60-80% versus 5-10% for hepatitis B) increases its epidemic danger.

To date, more than 100 cases of professional HIV infection of medical personnel have been registered in the world. Most often, HIV infection is associated with an accidental hand prick with a needle or other sharp instrument. The probability of infection when injected with a contaminated medical needle is

estimated for HIV infection at the level of 0.3%, and for viral hepatitis C - 3%. The highest risk of infection of medical personnel during an injection is noted for viral hepatitis B - 30%, but the diameter of the needle and the depth of the injection are also of great importance. According to the WHO, 600,000 to 800,000 cases of injuries with medical needles occur annually in the world, but only half of them are registered.

Against the background of the spread of the tuberculosis epidemic among the population, the risk of infection among medical workers has increased. Studies conducted by a number of authors indicate a high level of morbidity among the staff of anti-tuberculosis facilities - 4-9 times higher than in the general population, and 18 times higher among laboratory technicians of clinical microbiological laboratories. The dentist's close contact with the patient's upper respiratory tract also increases the risk of tuberculosis infection. In general, the share of tuberculosis is 50.4-67.9% of all VLI among medical workers.

In departments of purulent surgery, burn departments, up to 63% of medical personnel suffer various forms of purulent-inflammatory infections, mostly caused by opportunistic bacteria, during the year.

Medical workers are the first to encounter waves of SARS and flu cases, they have close contact with patients throughout the epidemic period, which causes a high level of morbidity among the staff.

The main directions of prevention of VLI among medical personnel

- Screening of medical personnel for the presence of infections. The examination is carried out at the time of hiring and in the future once every 6 months. during the entire period of work for tuberculosis (fluorographic examination), syphilis (RW), hepatitis B (NBsAg) and C, HIV infection (a/t to HIV).
- Teaching staff to standard technologies for performing diagnostic and treatment procedures.
- Effective disinfection and sterilization of medical instruments, control over their implementation in medical institutions.
- Definition occupational risk factors and procedures associated with an increased risk of infection and compliance with safety rules for their implementation. So, when working with sharp medical instruments, the following rules must be followed:

do not remove the needle from the used syringe until the end of disinfection; do not put the cap on the syringe needle; collect needles that have fallen apart with the help of a magnet; dispose of needles and syringes in a safe manner;

do not bend, break or separate needles from syringes without disinfection; store used syringes in tight containers.

- Introduction of new medical technologies that reduce the risk of transmission of pathogens of nosocomial infections (use of vacuum systems for taking blood during laboratory tests).

Provision of personnel with means of personal protection. During manipulations, which may be accompanied by contact of blood and other biological fluids on the skin and mucous membranes of personnel, it is mandatory to use rubber

gloves, masks, glasses, protective screens, etc.

Vaccination of medical personnel against hepatitis B, diphtheria, tetanus, etc. Medical personnel are recommended to be vaccinated during their studies at medical schools, due to the high risk of injury in the first years of work.

Implementation of emergency prevention in emergency situations, when there is a real threat of infection when in contact with a patient. The goal of emergency prevention is to interrupt the infectious process in the incubation period before the first manifestations of the disease appear. Thus, in case of contact with patients with particularly dangerous diseases (cholera, plague), antibiotic prophylaxis is prescribed, for the risk of HIV infection - antiretroviral therapy for 3 weeks.

During the performance of medical and diagnostic procedures, situations may arise that are accompanied by a violation of the integrity of the skin of medical personnel or the ingress of blood and other biological fluids of the patient on the mucous membranes and intact skin of medical workers.

Tactics in case of wounds, contact with blood, other biological materials of the patient (excerpt from the order No. 120 dated May 25, 2000 "On improving the organization of medical care for patients with HIV infection/AIDS")

If the contact with blood or other biomaterial of the patient was accompanied by a violation of the integrity of the skin (injection, cut), then the victim must:

remove the gloves with the working surface inwards;

remove blood from the wound;

treat the damaged area with a disinfectant solution (70° ethyl alcohol or 5% iodine tincture);

thoroughly wash your hands twice with soap under running water, and then wipe them with 70° ethyl alcohol;

put a plaster on the wound, put on a lighter;

if necessary, put on new rubber gloves and continue working.

If contact with blood or other biofluid was not accompanied by a violation of the integrity of the skin, it is necessary:

treat the contaminated site with 70% ethyl alcohol or 3% chloramine solution;

wash it with soap and water and treat it again with alcohol.

If the patient's biomaterial gets on the medical worker's mucous membranes, the following measures must be taken:

and) rinse the mouth with 70° ethyl alcohol;

b) instill the nasal cavity with a 30% solution of albucid;

in) wash the eyes with water (with clean hands) and drip with a 30% solution of albucid.

A 0.05% solution of potassium permanganate can be used to treat the nose and eyes.

If the patient's biomaterial gets on the gown, the clothing must:

remove clothes and soak them in a disinfectant solution;

wipe the skin of the hands and other parts of the body contaminated through clothing with 70° ethyl alcohol, then wash with soap and water and wipe again with alcohol;

wipe soiled shoes twice with a rag dipped in a disinfectant solution (3%

chloramine solution). The staff must inform the head of the clinic (office) about each case of injury related to a possible infection during the performance of professional duties and register it in the occupational injury log (Table 8).

Table 8

Record of occupational injuries related to the risk of infection

(injuries, cuts, injections without decontaminating tools, contamination of mucous membranes with biological material)

o	P1B, the position of the injured person	ge	Circumstances of the injury, if possible, indicate the patient's name, address, outpatient card number	Grantin g primar y	Measures regarding trauma, including laboratory examinations
	2		4	5	6

To provide medical assistance, each dental office must be equipped with an emergency first aid kit. The first aid kit includes:

* burners at the rate of 1-2 pcs. for each employee;
* adhesive plaster - 1 coil;
* scissors - 1 pc.;
* potassium permanganate in measured amounts (0.05 g) - 3 pcs.;
* a vessel for diluting potassium permanganate with markings for 1 l;
* ethyl alcohol 70° - 50 ml;
* a dropper tube with a 30% solution of albucid - 1-2 pcs.;
* 5% alcohol solution of iodine - 1 fl.;
* 3% hydrogen peroxide solution - 1 fl.;
* rubber gloves - 3 pairs;
* bandage, cotton swabs;
* dosages of disinfectants (stored separately):

3. chloramine (30.0 g) - 3 pcs.;
4. chlorcin (30.0 g) — 3 pcs.;

* vessel for diluting disinfectants - 1 pc.

Any damage to the skin, mucous membranes of a medical worker, their contamination with biological material from an HIV-infected person is considered an accident. In this case, in addition to the treatment of the skin and mucous membranes according to the method indicated above, mandatory registration of the accident case, examination and preventive treatment by a medical worker are carried out with his consent.

The accident registration log is kept in all medical institutions (Table 9).

Table 9

Accident log form

o	Date and time of the	Nature accident	Work performed at the time of the accident	Full name the victim	Source of possible infection	Personal code or name of the person (with his consent)

	2	3	4	5	6	7

The information entered in the accident log is signed by the head of the department or his deputy and the chairman of the regulatory commission. Blood sampling from a medical worker to check for HIV antibodies is carried out on the day of the accident, 3, 6 and 12 months later.

Specific prophylaxis of infections transmitted parenterally

Prevention of viral hepatitis B (HBV)

The medical staff of the dental clinic (dentist, nurse) belongs to the group of increased risk of infection with parenteral infections, therefore they are subject to scheduled vaccination against HBV. Vaccination is carried out with a genetically engineered vaccine according to the scheme 0-1-6 months.

For emergency vaccination of persons who were at risk of infection with the hepatitis B virus, simultaneously with the vaccine, immunoglobulin against HBV is administered intramuscularly no later than 24 hours later. after possible infection. The vaccine is administered according to the scheme: the first dose - immediately after a possible infection, the second - after 1 month, the third - after 2 months. and the fourth - after 12 months. Vaccination schedules and doses for each individual vaccine may be modified according to their instructions. If after

at the end of the full course of vaccination, the level of antibodies to HBsAg is determined below 1000/l, another booster dose of the vaccine is administered.

Prevention of HIV infection

If the accident occurred while working with biomaterial known in advance to be infected with HIV, the victim is given emergency prophylaxis with azidothymidine (AZT) or its analogues at a dose of 800-1000 mg/day for 3 weeks (with the consent of the victim). It is desirable to start prophylaxis with antiretroviral drugs as soon as possible, but no later than 24-36 hours. after the accident.

Summing up.

List of recommended literature

Main:

1. Vinohrad N. O. General epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2017. - 200 p.
2. Vinohrad N. O. Special epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2018. - 367 p
3. Epidemiology in schemes: a study guide / M. D. Chemych, N. G. Malysh, O. M. Chemych, N. I. Ilyina. – Vinnytsia: Nova Kniga, 2020. – 256 p.
4. Epidemiology: anti-epidemic measures: study guide / M. D. Chemych, N. G. Malysh, N. I. Ilyina [and others]. – Vinnytsia: Nova Kniga, 2020. – 288 p.
5. Kiselyov S. M. Basic principles of evidence-based medicine: teaching. manual / S. M. Kiselov. Zaporizhzhia: ZDMU. 2018. 117 p.

Additional:

1. Epidemiology: textbook for students. higher med. education institutions / A. M. Andreychyn, Z. P. Vasylishyn, N. O. Vinohrad; under the editorship I. P. Kolesnikova. Vinnytsia: Nova Kniga, 2012. 576 p.: illustrations.

2. Order of the Ministry of Health of Ukraine No. 595 "On the procedure for conducting prophylactic vaccinations in Ukraine and quality control and circulation of medical immunobiological preparations" dated September 16, 2011.

Electronic information resources

1. World Health Organizationwww.who.int
2. Cochrane Center for Evidence-Based Medicinewww.cebm.net
3. Center for Disease Control and Preventionwww.cdc.gov
4. Public Health Center of the Ministry of Health of Ukrainewww.phc.org.ua
5. Ukrainian database of medical and statistical information "Health for all":http://medstat.gov.ua/ukr/news.html?id=203

Practical lesson No. 7

TOPIC: Design of epidemiological studies - 2 hours.

Goal:familiarize yourself with the basics of epidemiological research design (case-control, cohort, randomized clinical trials), the concept of "gold standard".

Basic concepts:

Term	Definition
Evidence-based medicine	- evidence-based section of clinical medicine
Scientific research	–is organized specifically to receive (confirm) new data
Randomization	- random distribution of patients into groups - the optimal method of treatment selection, which allows avoiding a systematic error when dividing patients into groups. Conducting randomization allows patients to be divided into groups mainly with the same characteristics.
The gold standard of medicine	The principle of randomization (random) - "randomly selected groups" - has become the gold standard of medicine. The most acceptable and reliable is a randomized study with the principle of double-blind control.
Non-randomized studies	provide for the allocation of patients to groups in a non-random way if random allocation is impossible for technical reasons or ethical reasons.
Cohort studies	involve the formation of two or more groups (cohorts) of patients, of which only one is evaluated for the appropriate medical or therapeutic intervention, although the clinical result is recorded in all groups. Observations can last for years (for example, the effect of smoking on the development of lung cancer).
Description of a case or series of cases	- these are short messages about successful treatment or manifestations of threatening complications of pharmacotherapy, which is extremely necessary for operational medical information.
"pyramid of evidence"	Systematic reviews, randomized clinical trials, cohort studies, case-control studies, case reports, editorials, insights, animal studies, in vitro studies
Clinical epidemiology	- the methodological basis of DM. She studies the patterns of distribution of any diseases, predicts them in each specific patient based on the study of the clinical course of the disease in similar cases. KE solves all its problems directly on people and in no case on animals or elements of the human body - the culture of tissues, cell membranes, etc.
Epidemiological method	- is a set of techniques designed to study the causes, conditions of the occurrence and spread of diseases and other conditions in the human population.
Population	- this is a large group of people living in a certain

	geographical region (for example, in Ukraine) and reproduces itself in a number of generations.
Sample	is a specially selected part of the population. Clinical trials are usually performed on samples, since it is impossible and usually not necessary to study the entire population.
valid (final) clinical result (clinical outcome)	– a phenomenon that is important for changing health indicators (recovery, disability, mortality, life expectancy) and/or quality of life;
indirect (indirect) efficiency criterion	– a laboratory indicator or symptom, the dynamics of which directly characterizes the patient's condition and is reflected in the final clinical result;
absolute risk	- the absolute difference between the frequency of development of an undesirable effect when using a medicinal product (LZ) and the frequency of development of the same effect without the use of a drug;
relative risk	- the ratio of the frequency of the development of an undesirable effect among persons who were exposed to the factor under investigation (used drugs) to the frequency of the development of a similar effect in the group of persons who were not exposed to this factor (did not use drugs).
Epidemiological research design	The design of an epidemiological study means all the features of conducting a specific study, provided for in its plan. These features are denoted by numerous terms, and only their combination makes it possible to see all the characteristic features of the study.
Continuous epidemiological studies	- this is research conducted in the scope of the general population, which in epidemiology is more often denoted by the term population.
Selective epidemiological studies	- based on data obtained during the study of the incidence of a relatively small part of the population - a sample. The purpose of sample studies is to obtain representative information that could be extrapolated to the entire population.
Descriptive research	- provides for obtaining descriptive epidemiological data, that is, data on morbidity. Such a study can be independent, but the obtained new descriptive epidemiological data prompts the continuation of the study to explain the detected manifestations of the disease. Therefore, a descriptive study is, as a rule, only the first part of a full-fledged epidemiological study, which necessarily includes an analytical part as well.
Analytical research	- dedicated to identifying the causes of the occurrence and spread of diseases. The search process corresponds to general scientific ideas about two methods (directions) of identifying connections between the supposed cause and effect. According

	to the methods of finding reasons, two types of analytical studies have been developed: case-control and cohort studies.
A case-control study	- an analytical retrospective study, the purpose of which is to identify risk factors for the disease being studied. The main group is selected from people with the disease being studied, the control group consists of people who do not have this disease. The fact of the influence of the investigated risk factors is determined by a survey of persons in the compared groups.
Observational study	does not involve interference in the natural process of the emergence and spread of diseases.
Experimental study	- a controlled intervention in the natural course of the disease in order to identify its causes is foreseen.
Routine examination	- is considered any epidemiological research, within the scope of official duties. It does not involve obtaining new scientific data, on the contrary, routine research is carried out within the framework of currently existing scientific ideas about the causes of the occurrence and spread of the disease.
A prospective study	- involves the study of information as new (fresh) cases of the disease appear, which did not exist before the beginning of the study, the study of cause-and-effect relationships is based on the second method - from cause to effect.
A retrospective study	- based on the study of information about cases of the disease that occurred at any time in the past, while using the first method of finding cause-and-effect relationships - from the effect to the cause.
Dynamic (longitudinal) study	- involves the systematic study of information about morbidity among the same population group.
Clinical research	-related to the place of epidemiological research, it is used only to denote experiments carried out in the clinic to assess the potential effectiveness of medicinal drugs, methods of diagnosis, and treatment schemes for patients. Such studies are called RCTs.
Clinical study (KD)	is a prospective comparative study of the effectiveness of two or more interventions (therapeutic, preventive or diagnostic), in which the results are compared in groups that differ in the applied intervention. At the same time, the hypothesis about the effectiveness of the tested method (the impact of the intervention on the result) that arose before the research is usually tested.
"simple blind method"	- not informed patient
"double blind method"	- both the patient and the researcher are not informed. Thus, the "double-blind method" serves as a type of control to prevent the influence of bias on the results of the study.

triple blind method	- the patient, the researcher, and the statistician processing the research materials are not informed.

Actuality of theme

Globalization of information processes in all spheres of knowledge and, in particular, in medicine, has posed qualitatively new problems of choosing a solution for the doctor, the health care organizer, and the patient. Even in new reference books, outdated information is often given, and the recommendations of experts in textbooks and reviews are not supported by evidence. The flow of medical information continues to grow - there are about 40,000 medical and biological journals in the world, in which approximately 2 million articles are published annually. Practitioners and managers of the health care system urgently need a critical assessment of information. Only evidence-based medicine, or evidence-based medicine, can solve these problems. It is now at the center of attention of clinicians, health care leaders, lawyers, patients and the public.

Evidence-based medicine involves the conscientious, reasoned, and common-sense use of the best current evidence to treat each patient. According to another definition, evidence-based medicine is a branch of medicine that is based on evidence that involves searching, comparing, summarizing and disseminating the obtained evidence for use in the interests of patients. The practice of evidence-based medicine involves combining individual clinical practical experience with the best available independent clinical evidence obtained from systematic studies.

The practice of evidence-based medicine involves combining individual clinical practical experience with the best available independent clinical evidence obtained from systematic studies. Individual clinical practical experience is defined as the professionalism and judgment acquired by an individual clinician through the means of his clinical practice. Best independent clinical evidence refers to data from clinically relevant studies, often in fundamental fields of medicine, but mainly of clinical research while preserving the accuracy and precision of diagnostic tests (including clinical examinations of patients), assessing the adequacy of prognostic markers, as well as the effectiveness and safety of therapeutic, rehabilitative and preventive measures.

Physicians should use both individual clinical experience and the best available clinical evidence, and never just one. Without individual hands-on clinical experience, clinical decision-making is significantly influenced by evidence obtained from even flawlessly conducted studies, which may be inadequate for an individual patient. On the other hand, making practical decisions without taking into account independent practical decisions can also harm the patient.

Plan

I. Organizational moment (greetings, checking those present, announcing the topic, the purpose of the lesson, motivating students to study the topic).

II. Control of basic knowledge: Theoretical questions for the lesson:

1. Peculiarities of conducting an epidemiological study.
2. Solid research.
3. Sample studies.
4. Representativeness of the sample.

5. Principle of randomization.
6. Mechanical selection.
7. Typological (typical) sample.
8. Serial (nest) selection.
9. Method of directed selection.
10. Descriptive research.
11. Analytical research.
12. Case-control study.
13. Supervisory study.
14. Experimental research.
15. Scientific (special) research.
16. Routine research.
17. Retrospective study.
18. Prospective study.
19. Simultaneous (cross-sectional) studies.
20. Dynamic (longitudinal) study.
21. Field research.

III. Formation of professional skills and abilities. Practical works (tasks) performed in class

1. To learn the theoretical foundations, modern principles, regularities and legal principles of evidence-based medicine in the context of preserving and strengthening the health of the population.
2. Interpret the basic definition of evidence-based medicine.
3. Develop measures to organize the family doctor's activities with the resources of evidence-based medicine and ways to improve it.

4. To be able to fill out basic accounting medical documentation and analyze reporting forms of the medical service.
5. Develop preventive management solutions based on evidence aimed at strengthening and preserving the health of people of all ages.
6. To understand the content of market transformations in the practical activities of medical institutions and individual practitioners for the best selection of treatment for various pathologies.
7. Develop management solutions to meet the needs of the population in medical care.

Know:

- definition of the term "evidence-based medicine" as a subject of teaching, its significance for health care practice;
- prerequisites for the emergence of evidence-based medicine;
- leading principles of evidence-based medicine;
- tasks of evidence-based medicine;
- Classification of epidemiological studies;
- Comparative characteristics of various types of research, evaluation of the degree of evidence and their results;

– epidemiological research design: empirical and experimental studies;
- retrospective and prospective studies;
– empirical studies (descriptive and analytical);
– descriptive epidemiology: description of an individual case and a series of cases;
- Analytical epidemiological studies: case-control, cohort, randomized clinical studies;
– concepts of randomization and stratification;
- Gold standard research;
– research ethics;
- Types of design;
- Types of control;
- "blindness" of the study;
- Required sample size;
- Selection of the object and research unit;
– inclusion and exclusion criteria.

Topic content:

Design, methods of conducting and organizing research - these terms are synonymous with the term structure.

Under the design of an epidemiological studyunderstand all the specifics of conducting a specific study provided for in its plan. These features are denoted by numerous terms, and only their combination makes it possible to see all the characteristic features of the study. The variety of species and differences in the organization and conduct of epidemiological studies are shown in the table. 1.

Solid research. Comprehensive epidemiological studies are studies conducted in the scope of the general population, which in epidemiology is more often denoted by the term population. In the general case, the object of observation, which represents the totality of all units of observation, is called the population which have certain signs their often are called signs of inclusion / exclusion in the population.

Table 1

Basic concepts characterizing certain features of epidemiological studies

Classification sign	Name of the study
The purpose of the study	
- Describe the incidence or other phenomenon that refers to the subject area of epidemiology - Explain established manifestations of morbidity, etc.	- descriptive - analytical (case-control study and cohortresearch)
General scientific method	
- observation - experiment	- supervisory - experimental (randomized field and clinical trial)

The scope of the phenomenon being studied	
- all phenomenon (generaltotality) - a specially selected part of the phenomenon	- continuous - selective
Type of cognitive activity	
- scientific (special) - daily	- scientific (special) - routine
The presence of the events being studied at the beginning of the study:	
- the event has already happened - the occurrence of events is predicted - events took place butthe occurrence of new events is predicted	- retrospective - prospective - combined
Time of research	
- a certain moment - a certain period of time	- single moment (transverse) - dynamic (longitudinal)
Place of research	
- in a clinic or other medical and preventive facilities - outside the clinic	- clinical - field

In epidemiology, as mentioned earlier, these signs refer to signs time, mclaimant and "persons".Idea carrying out continuous researchassociated with the desire to obtain comprehensive information about the studied phenomenon. The size of the population, and therefore the volume of continuous research, in scientific and routine research differ significantly. If we assume that the goal of scientific research is to find out the causes of the occurrence and spread of this disease in general, and not in relation to some territorial group of the population, then the population in such a case should be the entire population that is prone to the risk of the occurrence of this disease.

If the goal of scientific research is to study the causes of diseases only in a given country or city, then the population is the corresponding population of the country or city. The general population in routine analytical studies is even smaller in volume, for example, when investigating an outbreak of a disease in an "organized" group of children. In this case, the population is all children and all staff of this institution or one (several) groups, depending on the initial hypothesis about the cause of this outbreak.

Despite the study of the phenomenon in its entirety, one should not think that the results of a continuous study are a priori more accurate than a selective one. The accuracy of data from a continuous study depends on many factors. For example, if a continuous study is large-scale, then a lot of employees participate in its implementation, whose qualifications are quite difficult to standardize, this will affect

the results of the study. The main disadvantages of continuous research are the large expenditure of time, effort and resources, often the impossibility of conducting them.

Selective research, which is the main special tool of many sciences, allows to overcome the shortcomings of continuous.

Selective studies. Sample epidemiological studies are based on data obtained during the study of the incidence of a relatively small part of the population - a sample. Based on them, they draw conclusions about the peculiarities of the studied phenomenon in the entire population (general population), from which the specified sample was formed. Thus, the purpose of sample studies is to obtain representative information that could be extrapolated to the entire population.

The correctness of the data directly depends on the representativeness of the sample, which, first of all, is determined by the correct choice of the general population. Subsequently, a part of observation units is selected from the general population. At the request of the researcher, the general population can be limited by various characteristics (time, territory, age, profession, and other social and biological characteristics of people).

In addition, the representativeness of the sample is ensured:

• the required number (volume, size) of the sample;

• untilby the principle of randomization.

The size of the sample depends on many components, and primarily on the nature of the study. If the purpose of the study is to estimate the incidence of the disease among the population, then it is necessary:

• choose (set) the degree of reliability of measuring morbidity, i.e. the amount of possible deviation of the sample data from the population study data;

• approximately know the frequency of diseases that can be established.

If the population size is unknown, the sample size is calculated using the formula:

$$= \frac{T2 \times (I \times q)}{\Delta^2}$$

If the population size is known, the sample size is calculated using another formula:

$$= \frac{I \times q \times t2 \times N}{(N \times \Delta 2) + (I \times q \times t2)}$$

where (for both formulas)

n – sample size;

N – population size;

t – probability criterion (most often equal to 1.96); I is the expected frequency of diseases;

q = R – I, where R is the dimension of the indicator I that is used;

Δ is the chosen maximum allowable error of the indicator, which is usually no more than 25% of the indicator I.

Suppose that in city N it is planned to conduct a simultaneous sample study with the aim of studying the frequency of new cases of arterial hypertension among men aged 20-29 years. The number of this population group in city N is 15,400. According to a study conducted several years ago, the frequency of new cases of arterial hypertension in this group of men in city N was about 70.0‰ (I = 70.0‰). Therefore, Δ will be 25% of 70.0, i.e. Δ = (25 x 70.0) / 100 = 17.5‰. Δ2 = 306.2‰. As a result

$$= \frac{(70.0 \times (1000 - 70.0) \times 22 \times 15{,}400)}{(15{,}400 \times 306.2) + (70.0 \times (100{,}000 - 70.0) \times 22)} = 806$$

Thus, to obtain sample data corresponding to the required reliability, 806 people should be examined out of 15,400 people aged 20-29.

The second condition for achieving representativeness of the sample is the principle of randomization (from the English Random - case). Randomization provides a random selection from among individuals representing the general population. In other words, randomization is an equal chance for each unit of observation from the general population to get into the sample, which reduces the danger of unintentionally distorting the composition of the sample, but cannot completely exclude the dishonesty of the researcher during its formation.

Adherence to the principle of randomization is ensured by various methods of sample formation. The choice of method depends on:

- from research design;
- expected accuracy of results;
- the volume of the general population;
- the possibility of using the most accurate method and other objective and subjective reasons.

Currently, the ideal principle of randomization is considered to be the use of tables of random numbers or similar computer programs for sampling observation units. This method ensures random selection, in which the unit of observation is selected from the general population only once. This approach is mandatory for the formation of experimental and control groups when conducting most RCTs of various means and methods of treating patients. This contributes to the observance of the principle of research impartiality and the minimization of unintentional distortion of the composition of groups. And to a large extent, if the study design is followed, it provides

reliable conclusions. However, it should be remembered that no design can completely exclude the dishonesty of a particular researcher.

The following methods are based on a certain planning in the selection of observation units, which naturally reduces compliance with the principle of randomization.

Mechanical selection. First, observation units are placed in order based on some random feature: medical history number, ambulatory card, first letter of last name, etc. Then it is necessary to determine the interval through which observation units will be mechanically selected from the list of the general population (for example, every fifth). To determine the interval, the number of the general population should be divided by the number of the required sample.

Typological (typical) sample. First, the general population is divided into groups based on some typical feature. Most often, various individual characteristics of people are used, such as age, profession, influence of presumed risk factors, illness, etc. Next, the required number of observation units is selected randomly or mechanically from each group. The size of the sample from each group should also be determined in advance, and the ratio of sample sizes (for example, by age) should correspond to the structure of the general population. Such a sample is often called a weighted typological sample. This method is most often used in observational analytical studies.

Serial (nest) selection. Serial (nest) selection is similar to typical. The difference is that during serial sampling from the general population, not individual units of observation are randomly selected, but entire groups of them, which are called series or "nests". "Nests" can be separate institutions, shops, medical wards, departments, wards, etc. Then in each "nest" a continuous study of all observation units is carried out.

Method of directed selection. The method of directed selection involves excluding some factors whose influence is well known from the analytical study even at the stage of determining the general population. For example, the effect of smoking on the risk of lung cancer is well known, but it is not the only factor. Therefore, researchers who set out to identify other additional risk factors for lung cancer should not include in the general population, and therefore, in the sample of people who smoke. The advantage of a sample study over a continuous one is that, with proper organization, reliable data can be obtained by spending much less effort, resources and time. When conducting sample studies due to their smaller volume, it is much easier to control the receipt of unified information and minimize possible errors. At the same time, for objective reasons, many studies study so-called biased samples that are insufficiently representative of the entire population, which should be taken into account when evaluating the conclusions of such studies. Characteristics of some terms defining the design of epidemiological studies.

Descriptive researchinvolves obtaining descriptive epidemiological data, that is, data on morbidity. Such a study can be independent, but the obtained new descriptive

epidemiological data encourage the same or other researchers to continue the study to explain the observed manifestations of the disease. Therefore, a descriptive study is, as a rule, only the first part of a full-fledged epidemiological study, which necessarily includes an analytical part as well.

Analytical researchdedicated to identifying the causes of the occurrence and spread of diseases. The search process corresponds to general scientific ideas about two methods (directions) of identifying connections between the supposed cause and effect. The first method is from effect to cause. When using it, starting from a previous consequence (for example, a disease), they try to find events in the past that could be considered as the causes of this consequence. Another trick is from cause to effect. Focusing on the influence of the alleged cause, they expect the appearance of a causally determined consequence.

According to the methods of finding reasons, two types of analytical studies have been developed: case-control and cohort studies.

A case-control study- an analytical retrospective study, the purpose of which is to identify risk factors for the disease being studied. The main group is selected from people with the disease being studied, the control group consists of people who do not have this disease. The fact of the influence of the studied risk factors is determined by a survey of persons in the compared groups, their relatives, according to archival data. Comparing the frequency of occurrence of individual factors in the main and control groups allows to calculate the ratio of odds (OR), the value of which roughly estimates the presence of a cause-and-effect relationship.

Observational studydoes not involve interference in the natural process of the emergence and spread of diseases. They also include the study of morbidity in situations where intervention has become a mandatory practice. For example, routine study of the incidence of infections managed by immunoprophylaxis.

During the experimental study, on the contrary, provides for a controlled intervention in the natural course of the disease in order to identify its causes. At the same time, the epidemiological experiment must fully meet other general scientific requirements for any experiment. In this regard, the terms "natural" and "uncontrolled epidemiological experiment" used by some authors are incorrect. Since the result of the experiment is to answer the question why it happened as described in the experiment, any experimental research is always analytical.

Scientific (special) researchis organized specifically to receive (confirm) new data.

Any epidemiological study is considered routine, within the scope of official duties. It does not involve obtaining new scientific data, on the contrary, routine research is carried out within the framework of currently existing scientific ideas about the causes of the occurrence and spread of the disease. A typical example is the

investigation of an outbreak of an infectious disease, when the search for the cause of its occurrence is based on the existing scientific understanding of all possible causes of such outbreaks.

A retrospective studybased on the study of information about cases of the disease that occurred at any time in the past, while using the first method of finding cause-and-effect relationships - from the effect to the cause. The main source of information is the existing system of registration and registration of patients. Retrospective research can be both descriptive and analytical.

A prospective studyinvolves the study of information as new (fresh) cases of the disease appear that did not exist before the beginning of the study, the study of cause-and-effect relationships is based on the second technique - from cause to effect. At the same time, the study is based on the probability of new cases of the disease (effect) among the population group exposed to the risk factor (cause). Prospective studies are always only analytical.

Simultaneous (cross-sectional) studiescan be both descriptive and analytical. Perhaps, that is why in various epidemiological publications they are sometimes classified as descriptive or analytical studies. In any case, the main goal of these studies is to obtain information about the incidence of a certain disease in a limited period of time, if necessary, such studies can be repeated. Since a simultaneous study involves the identification of all cases of the disease that exist at the moment, it is also called a prevalence (incidence) study, and the results of a simultaneous study are often given in prevalence rates. If the detected cases are associated with the influence of any risk factor, the study can become analytical.

Dynamic (longitudinal) studyinvolves the systematic study of information about morbidity among the same population group. At the same time, the study can be continuous or repeated after short intervals of time. A typical example of a dynamic study is a routine operational and retrospective analysis of population morbidity, conducted by specialists of centers of sanitary and epidemiological surveillance.

Although the concept of "clinical" is related to the place of epidemiological research, it is used only to denote experiments conducted in a clinic to assess the potential effectiveness of medicinal drugs, diagnostic methods, and treatment schemes for patients. Such studies are called RCTs.

Field research is considered to beconducted outside medical and preventive institutions. Its scope is very diverse, from the investigation of a small outbreak to a nationwide investigation.

Field research can be:

- descriptive and analytical;
- supervisory and experimental;
- continuous and selective;

• routine and scientific;
• retrospective and prospective;
• simultaneous and dynamic.

None of the terms listed above can independently reveal all the features of conducting an epidemiological study. For example, the study of an outbreak of any disease is not only observational, but at the same time analytical, most often routine, continuous, one-time, retrospective or combined clinical or field test.

Research organization- is a coordinated, ordered, interconnected set of various actions that lead to the achievement of the intended goal. It consists of several stages:

• preparatory;
• information collection and primary statistical processing;
• statistical and logical analysis of the received information;
• formulation of conclusions (final stage). The preparatory stage includes:
• justification of the relevance (necessity) of the research;
• formulation of final (ultimate) and intermediate goals;
• formulation of a working hypothesis;
• selection of the object and research unit;
• programming;
• drawing up a plan;
• will dodays of the pilot study.

Most epidemiological studies provide for the achievement of an analytical goal, that is, aimed at identifying the causes of the occurrence and spread of the studied pathology. The first component is a descriptive section. No less important are studies devoted to the evaluation of the potential effectiveness of the proposed means and methods of combating the spread of diseases. In practical activity, it is not the potential efficiency that is revealed, but the real quality and efficiency of executive activity. According to the data obtained during the literature analysis, and to the set goal, a working hypothesis is developed - a possible explanation of the studied phenomenon. For example, a hypothesis about the causes of the occurrence and spread of an insufficiently studied disease or (for routine research) a hypothesis about the causes of an outbreak of a disease, but within the framework of possible causes of its occurrence known to science. The working hypothesis determines all subsequent actions and a significant part of the entire research design. In the course of the research, corrections can be made to the working hypothesis, but if this leads to a change in the program, then the research should be started from the beginning.

The object of research (observation) in epidemiological studies is comparison groups, which are called differently in different studies:

• exposed and unexposed;
• sick and healthy;

• main and control;

• experimental and control, etc.

These groups consist of sick and (or) healthy people - observation units, each of which is subject to mandatory registration. It is extremely important both in scientific and practical research to determine the criteria on the basis of which a person will be considered sick, that is, to formulate the symptoms of a standard case of a specific disease already at the preparatory stage. Sick and healthy people (units of observation) are carriers of different signs. Those signs that are supposed to be taken into account (registered) are called accounting.

The research program includes the information collection program and the data compilation and grouping program. The information collection program is a registration document that exists or is specially developed, which contains a list of accounting features necessary to fulfill the intermediate and final goal of the study. Accounting features are used in subsequent stages to group the received data, so they are grouping features. There are different classifications of accounting (grouping) features.

The main epidemiological classification of grouping signs is based on the selection of:

• diagnosis;

• signs of time;

• signs of place (territory);

• signs of "aboutsobi" (individual characteristics).

With the help of such signs, it is possible to divide both sick and healthy people into groups. In addition to the specified classification, accounting features are divided, in particular, into factor (factorial) and effective. Factors are those signs under the influence of which a person's state of health changes. Resultant signs are various assessments of a person's state of health, including test results and a diagnosis.

The division of accounting features into factorial and effective should be justified by a working hypothesis about the cause-and-effect relationship of the assumed risk factors and morbidity. Often, all signs are divided into those related to the unit of observation - a sick or healthy person, they are called individual factors, and into the signs of the habitat - environmental factors.

Every registration document should have a "passport" part in addition to the registration marks. It states:

• registration document number (of this surveillance unit);

• Date of completion;

• insurance policy number;

• ID;

• last name of the patient (healthy);

• age and other mandatory data for any research. The signature of the registration document endsom of the person who filled it.

The program for summarizing and grouping data- this is a set of table layouts, which are often called development tables. They are expected to be used in the second stage of the study. They will have registration marks from the registration documents. The layout should be such that the table, after filling, contains all the features of the investigated phenomenon that are expected to be detected. Thus, table layouts should be consistent with the goals and working hypothesis of the study.

Compiling table layouts is not only technical work, but mainly purposeful, well-thought-out actions. The main thing is the choice of characteristics for grouping, which are necessary for building a specific table. All three types of statistical tables are used in epidemiological studies: simple, group and combined.

Research plan- a document that reflects all the main actions necessary to achieve the goals. At the same time, the plan indicates the place and time of the research, the necessary financial and technical means, personnel, the level of their training, the deadlines for the implementation of individual actions, etc. As a result, the design of this epidemiological study is finally determined, which should contribute to the fulfillment of the set goals.

Currently, in the organization of scientific epidemiological studies, great importance is attached to conducting so-called pilot (trial, indicative) studies.

Pilot studies, in particular, allow:

• specify goals and working hypothesis;
• clarify the information collection program and table layouts;
• check methods of information collection and methods of its study;
• assess the preparedness of the staff;
• get an idea of the variability of accounting features;
• estimate the correct oneschoice of research design;
• specify the amount of necessary funds and forces;
• specify the time of the event.

The stage of collecting information and its primary statistical processing is important.

The collection of information is understoodthe process of obtaining the necessary data and filling out registration documents. It is necessary to strictly adhere to the developed information collection program, to prevent violations of the rules for selecting observation units, excluding accounting features, and changing the methods and methods of information collection. In the process of collecting information, its quality is periodically assessed, compliance with established rules is monitored. The collected information is repeatedly aggregated and grouped according to table layouts. Such actions are called primary statistical processing of research data. The duration of the stage, depending on the design of the study, can vary from several hours (outbreak investigation) to several decades (prospective cohort study). In general, data collection

lasts as long as it takes to obtain the necessary amount of information provided by the research program.

The final stage of the epidemiological studyincludes further statistical and logical processing of the received information, organization of the received epidemiological data and description of the study, formulation of conclusions (conclusion).

Further - after compilation and grouping - statistical data processing can be quite diverse and include a significant number of statistical methods. These methods make it possible to comprehensively and reliably describe the dynamics and structure of morbidity, as well as to measure the cause-and-effect relationship of presumed risk factors and morbidity. Despite the variety of statistical methods, the choice of a specific method should be strictly statistically and logically justified. Violation of this rule will inevitably lead to false conclusions.

For study collected information and representation resultsthe so-called organization of epidemiological data, i.e. their tabular and graphic representation, is of great importance for research. During the final stage, new tables are created, in which the results of the statistical evaluation of the differences of the compared values are necessarily indicated.

The graphic display of the received information allows you to demonstrate the features (regularities) of the dynamics and structure of the studied phenomenon present in the table. However, it is necessary to take into account that incorrectly constructed diagrams can significantly or even completely distort the patterns present in the tables.

The description of the research (report) should reflect in detail the entire course of work.

The formulation of conclusions (conclusion) is based on the results of a statistical and logical study of the collected information.

A case-control study. Purpose of the case-control study

- determination of the causes of the occurrence and spread of diseases. In case-control studies, the probability of the existence of a cause-and-effect relationship is justified not by the different frequency of the disease, but by the different prevalence of the presumed risk factor in the main and control groups.

In a case-control study, the search for cause-and-effect relationships goes from the effect to the presumed cause.

A case-control study can only be retrospective, as it is conducted on the basis of archival data. Most often, the source of information in case-control studies is the case histories found in the archives of medical institutions, the memories of patients or their relatives as part of an interview or based on the results of a questionnaire.

This type of research can be conducted as a preliminary study of cause-and-effect relationships between the presumed risk factor and a specific disease. In the future, this problem can be studied in cohort studies.

Cross-sectional studies(prevalence studies, simultaneous studies). The purpose of a cross-sectional (simultaneous) study is to describe the relationship between a disease (or other health conditions) and factors that exist in a certain population at a specific time and have both a favorable and a negative effect on people. Simultaneous research often forms the basis for solving issues of operational management in health care. This

is due to the possibility of constant updating of data on the state of health of individual contingents through the study of small population groups.

This study is performed at a certain point in time, but the collected facts may refer to events in the past (for example, the study of outpatient charts of patients in order to study how often blood pressure was measured in the last 6 years). As part of a cross-sectional study, the prevalence of disease cases and the prevalence of risk factors are assessed, as well as their combination.

Analytical studies. In medicine, analytical research is necessary to identify the quantitative assessment of the causes of the occurrence and spread of diseases of various etiologies. The results of these studies are used in the development of preventive measures aimed at eliminating or reducing the degree of influence of factors that lead to illness or other consequences.

Analytical studies have made a significant contribution to the development of modern medical science and practice by identifying the leading risk factors for the development of many diseases. For example, a link was established between lung cancer and tobacco smoking, a higher prevalence of stroke among people with hypertension, a direct link between rubella in pregnant women and birth defects in children, a causal link between arterial hypertension, smoking, high blood cholesterol and coronary heart disease, etc.

Analytical studies are included in the group of observational studies, the main condition of which is non-interference in the natural course of the processes of occurrence and spread of diseases (in contrast to experimental studies).

At the stage of organization of any scientific research, a working hypothesis is formed, which implies the prediction of the result for which this research is organized. In analytical studies, the working hypothesis implies the difference between the experimental group and the control group, that is, it is assumed that the studied factor has a cause-and-effect relationship with the studied effect result, for example, a disease. There is an alternative to the working hypothesis - the null hypothesis, which experts disprove during the research. According to the null hypothesis, the studied groups of people do not differ from each other or the differences between them are statistically insignificant, and the presumed risk factor or etiological factor is not.

William Farr (1807-1883) - an English scientist, one of the founders of medical statistics, singled out the characteristics of a person, place and time, according to which systematization and analysis of data obtained in research are carried out. Thus, analytical research should answer a number of questions:

- why does someone get sick more often, and someone less often?
- why do some people get sick more often, and somewhere less often?
- why do people sometimes get sick more often, and sometimes less often?

The question "Why?" implies the search for a cause for a known investigation or the determination of an investigation from a known cause: in any case, the task is to establish a cause-and-effect relationship between a cause and an effect.

The final result of an analytical study is the determination of the cause or the probability of the existence of a given cause with a known effect.

Causes and consequences. David Hume (1711-1776), a Scottish philosopher, defined a cause as "an event which is followed by another, and when all events like the

first are followed by an event like the second." According to this reasoning, the cause always precedes the investigation, it is a necessary condition for its occurrence. However, cases are known in medicine when the action of any pathogenic factor does not always lead to the occurrence of the disease.

Supervisory analytical epidemiological studies. The main advantage of such studies is the simplicity of conducting them. This is due to the fact that they usually use official data of registration of diseases and their consequences and official information about possible risk factors. For example, data on the state of the external environment, on the economic status of various population groups, their individual characteristics.

Cohort studies. The purpose of cohort studies is to determine the causes of the occurrence and spread of diseases. This is the most direct way to identify the etiology of diseases and quantify the risk of exposure to causal factors. The name of the study comes from the word "cohort" (a group of people). In various areas of human activity, the concept of "cohort" has its own characteristics:

- a military unit, the tenth part of a legion in ancient Rome, numbering 360-600 people (one cohort, as a rule, included 3 manipula);
- figuratively - a united group of people, associates;
- in medicine - a sample of people united by common signs of a state of health, in which it is expectedoccurrence of disease cases.

In any cohort study, the identification of the relationship between the causes of various outcomes occurs in the direction from the presumed cause to the consequence, most often from the risk factor to the disease.

A cohort study can be based on three types of information:

- retrospective (archive) data (medical histories, questionnaires, survey results of participants, etc.). Such cohort studies are called reprospective or historical;
- prospective data expected to be obtained during the study. Such cohort studies are called prospective (parallel) cohort studies;
- mixed data (prospective and retrospective) - combinated cohort studies.

The representativeness of the sample is necessary for the extrapolation of the data obtained in the study to the general population. In other words, the results of a sample study should be relevant not only for the sample itself, but also for all people with similar characteristics. As a result of forming a cohort, a group of relatively healthy people appears in the study. This constitutes an important condition of research. Approximately half of the cohort participants are exposed to the risk factor, the rest of the sample is unaffected by the risk factor.

Disadvantages of cohort studies. Cohort studies, like any other study, have strengths and weaknesses that determine the scope of these studies. There are known situations in which cohort studies cannot be used. For example, when studying rare diseases, it is difficult to conduct a cohort study. There is a need to form a cohort of large numbers, so that there is an opportunity to meet cases of a rare disease. The rarer the disease, the greater the physical impossibility of creating the necessary cohort. The peculiarity of a cohort study is that the researcher expects results in groups, having data on such risk factors. In this situation, it is most expedient to study the impact on a

person of rare risk factors, the effect of which experts know for sure. Other significant disadvantages of cohort studies are their high cost and often long duration, for example, the Framingham study lasted 46 years.

Advantages of cohort studies. The possibility of obtaining reliable information about the etiology of diseases, especially in cases where an experiment is impossible.

• The only way to estimate absolute, attributive, relative risk of the disease and to estimate the etiological share of cases associated with the estimatedrisk actor.

• Ability to identify causes that occur occasionally.

• The ability to simultaneously detect several risk factors is one thingth or several diseases.

• The rather high probability of the conclusions is due to the fact that in cohort studies it is much easier to avoid errors in the formation of the main and control groups, since they are created after the identification of the studiedeffects (diseases, deaths, etc.).

A randomized controlled trial.A clinical trial (CRT) is a prospective comparative study of the effectiveness of two or more interventions (therapeutic, preventive, or diagnostic), in which outcomes are compared in groups differing in the intervention used. At the same time, the hypothesis about the effectiveness of the tested method (the impact of the intervention on the result) that arose before the research is usually tested.

When there is a control group (comparison), it is called a controlled trial, and when groups are formed by the method of randomization, it is called a randomized controlled trial (RCD, randomized controlled trial according to the classification of study types in MEDLINE).

Advantages– the results obtained in the RCT better reflect the differences in the results that are important for patients; there are few systematic errors; the most objective for assessing effectiveness and verifying interventions; the results of RCTs performed strictly according to research design are the most reliable.

Disadvantages- it takes a long time to conduct an RCT; they are expensive; are not suitable for the study of rare diseases; these studies have limited generalizability of the results (possibility of transferring the results to the population). The latter limitation should not be overstated, as other types of studies have even poorer generalizability.

For the study, patients are selected from a large number of people with the condition being studied. Then these patients are randomly divided into two groups, comparable on the main prognostic features. One group, the experimental or treatment group, is exposed to an intervention (such as a new drug) that is expected to be effective. Another control group, or comparison group, is in the same conditions as the first, except that the patients included in it are not exposed to the study intervention. The reliability of clinical trials depends on the extent to which the compared groups were able to ensure the same distribution of all factors that determine the prognosis, except for the investigated therapeutic intervention.

Formation of the sample. Among the many reasons for which patients with an investigational disease are not included in the study, the following three reasons are the main ones:

1) Patients do not meet the established inclusion criteria. This is an atypical nature of the disease, the presence of other diseases, a poor prognosis of the disease, a high probability of the patient not complying with the proposed treatment. This limitation increases the reliability of the study: the possibility of cases unrelated to the treatment itself is reduced.

2) In cases of refusal of patients to participate in experiments (clinical trial).

3) Patients who, in the early stages of the trial, showed an inability to strictly follow the proposed treatment method are excluded. This will avoid financial and medical futile efforts and reducedprobability of research.

To study the specific therapeutic effect of an intervention (medicine), it is necessary to assign patients to groups randomly, that is, by randomization. Randomization is the optimal method of treatment selection, which avoids systematic error when dividing patients into groups. Conducting randomization allows patients to be divided into groups mainly with the same characteristics.

If trial participants know who is receiving which type of treatment, there is a possibility of a change in their behavior, which could lead to systematic error. To reduce this effect, a blind method is used. The blind method in clinical trials can be carried out at the following levels:

1) researchers who assign patients to intervention groups do not know which treatment will be assigned to each subsequent patient;

2) patients should not know whichthey themselves receive treatment;

3) doctors should not know which treatment (drug) is prescribed for the patient;

A "single blind method" (patient not informed) or a "double blind method" (both patient and investigator not informed) are used. Thus, the "double-blind method" serves as a type of control to prevent the influence of bias on the results of the study.

There are two ways to analyze data in a randomized trial. The first method is an analysis depending on the prescribed treatment, that is, according to the groups formed during randomization; the result serves as a criterion for making clinical decisions. The second method is an analysis depending on the actually received treatment; the result allows judging the biological mechanisms of the intervention.

It is clear that a clinical trial includes averaged observation data for patients who differ from each other. In order to obtain information about a specific patient, clinicians can rely on the results of observations of subgroups of patients or conduct tests on their own patients.

It is possible that treatment that is effective on average for a group of patients may be ineffective in specific patients. Although the results of a reliable clinical trial serve as a sufficient basis for its use in a specific patient, the experience of observing this patient is also important. The method of testing on a single patient is an improved variant of a more general informal process of trial and error. The patient is sequentially prescribed one or another treatment (drug or placebo) in a random order, for a short period (1-2 weeks). At the same time, neither the patient nor the doctor knows which medicine is prescribed. The results are evaluated after each period and subjected to statistical analysis. This method is necessary in cases where the course of the disease is unpredictable, the response to treatment is manifested quickly, and there is no overlapping of pharmacological effects after changing drugs.

The results of blinded randomized controlled trials should be preferred over any other information on treatment effects. However, such tests have limitations: expensive; there may not be a sufficient number of patients with the researched disease; duration of the experiment; misunderstanding of doctors and patients in the need to conduct clinical trials and others. When solving many clinical questions, it is not always possible and practical to rely on the results of randomized clinical trials, so other evidence is also used.

Thus: RCTs remain the "gold standard" of research in medicine. They are characterized by the following features:

- Uniform selection of patients (strict selection criteria maximize the probability of distinguishing the effect and background fluctuations).
- Randomization into experimental and controlled groups (placebo or comparator).
- Blind tests. In double-blind trials, neither the patient nor the doctor (observer) knows, towhich group the patient belongs to.

At the same time, it is necessary to note the problematic aspects of the RCT, including:

- Impossibility of generalization. Strict selection criteria lead to

that test results may not necessarily be applicable to other patients.

- An unrealistic clinical situation is created when patients are observed by highly motivated researchers who do not know exactly which drug (tested or placebo, control drug) the patients are taking.
- Conducting truly blind trials is difficult, because observers, subjects (patients) can recognize the effect of the drug by its pharmacodynamic parameters (for example, a decrease in blood pressure or heart rate when takingand certain classes of drugs).

Summing up.

List of recommended literature

Main:

1. Vinohrad N. O. General epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2017. - 200 p.
2. Vinohrad N. O. Special epidemiology: teaching. manual / N. O. Vinohrad, Z. P. Vasylyshyn, L. P. Kozak. - K.: VSV "Medicine", 2018. - 367 p
3. Epidemiology in schemes: a study guide / M. D. Chemych, N. G. Malysh, O. M. Chemych, N. I. Ilyina. – Vinnytsia: Nova Kniga, 2020. – 256 p.
4. Epidemiology: anti-epidemic measures: study guide / M. D. Chemych, N. G. Malysh, N. I. Ilyina [and others]. – Vinnytsia: Nova Kniga, 2020. – 288 p.
5. Kiselyov S. M. Basic principles of evidence-based medicine: teaching. manual / S. M. Kiselov. Zaporizhzhia: ZDMU. 2018. 117 p.

Additional:

1. Epidemiology: textbook for students. higher med. education institutions / A. M. Andreychyn, Z. P. Vasylishyn, N. O. Vinohrad; under the editorship I. P. Kolesnikova. Vinnytsia: Nova Kniga, 2012. 576 p.: illustrations.
2. Order of the Ministry of Health of Ukraine No. 595 "On the procedure for conducting prophylactic vaccinations in Ukraine and quality control and circulation of medical immunobiological preparations" dated September 16, 2011.

Electronic information resources

1. World Health Organizationwww.who.int
2. Cochrane Center for Evidence-Based Medicinewww.cebm.net
3. Center for Disease Control and Preventionwww.cdc.gov
4. Public Health Center of the Ministry of Health of Ukrainewww.phc.org.ua
5. Ukrainian database of medical and statistical information "Health for all":http://medstat.gov.ua/ukr/news.html?id=203