



MEDICAL UNIVERSITY - PLEVEN  
FACULTY OF MEDICINE

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DISTANCE LEARNING CENTRE

**DEPARTMENT OF INFECTIOUS DISEASE, EPIDEMIOLOGY,  
PARASITOLOGY AND TROPICAL MEDICINE**

**LECTURE № 4**

**FOR E-LEARNING IN „INFECTIOUS DISEASE EPIDEMIOLOGY“**

**SIXTH YEAR MEDICAL STUDENTS -  
TRAINEE DOCTORS**

**TITLE: EPIDEMIOLOGY OF AIR-BORNE AND INTESTINAL  
INFECTIONS**

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## EPIDEMIOLOGY OF AIR-BORNE INFECTIONS

### AIR-BORNE EPIDEMICS

**Air-borne epidemics** are the most common form of respiratory infection spreading during autumn, winter and spring. Their appearance is connected with the dynamics of interaction between people and microorganism population. They are characterized by:

- quick rise in the sick rate with critical accumulation of non-immune contingent among population;
- quick fall in the sick rate, because of lack of susceptible hosts.

People immune structure has changed as a result of this sickness. Rising of immune structure leads to the end of epidemic and makes its reappearance impossible in the near future.

**Mode of transmission.** Easy and quick spreading of these epidemics is due to the high efficiency in the mechanism of respiratory infections spreading – air-borne route. Infection is spread by microorganism aerosol. The greatest biological activity appears in its drop phase, when a great microorganism quantity is disjoined (influenza, measles, varicella, etc.)

**Duration of incubation period.** It also influences the speed of epidemical wave spreading. When the incubation period is short (influenza) we find even violent spreading of epidemics, while longer incubation period leads to slower speed of disease growing and protracted character of epidemics (mumps, rubella, etc.)

The speed of air-borne epidemics spreading is also influenced by some social factors as population compactness in regions, number in buildings, close contacts in working groups, transport, etc.

**Epidemical and prophylactic measures.** They are effective with air-borne epidemics in direction to the third link of the chain of infection – establishment and supporting of immunizations.

### AIR-DUST EPIDEMICS

They are air-drop epidemics variety. The sickness is spread by air-dust way – by breathing of bacterial dust or dried drops of bacterial aerosols. Infections can be spread by this way and their etiological agents have bigger drying resistance and sun rays influence (tuberculosis).

Dust phase have slighter infectious potential than drop aerosol because of the smaller concentration of the microorganisms in the dried drops than at the moment of their disjoint. However, microorganisms in the dust phase can be delivered both in the adjacent rooms and in the open at far distances.

Air-dust epidemics can also appear with some zoonosis infections. Their agents are very resistant to drying. There are so called “threshing” epidemics of tularemia, caused by breathing of contaminated dust with rodents'excreta during farm activities. There are analogical epidemics of hemorrhagic fever. Very dangerous is the way of catching the infection in laboratories when working with contaminated experimental animals.

## EPIDEMIOLOGY OF INTESTINAL INFECTIONS

These infections have fecal-oral transmission mechanism, realized via multiple routes of spread and resulting in the occurrence of water, food, contact epidemics and epidemic outbreaks.

### WATER-BORNE EPIDEMICS

Water-borne epidemics are very common form of epidemical process with intestinal infections (typhoid fever, cholera, shigellosis, hepatitis A).

The appearance of water-borne epidemics is closely connected with different way of water supply that also defines their characteristics. Contemporary epidemics are most commonly connected with failures in central water supply as:

- damages in water supply equipments and temporary faeces contamination of the water;
- defects in drinking water purifying and chlorination;
- technical and drain water falling into the water main.

Water-borne epidemics are characterized by the following specific features:

- Outbreak at the beginning, severe course of the illness and quick ending after ceasing the usage of the contaminated water.
- Territorial epidemical restriction among the people that receive water from a certain water reservoir.
- Characteristic disease spreading:
  - massive – when there are failures in the central water supply;
  - cluster-like – when small water reservoirs are used.
- Environmental factors – winter-spring and spring-summer. It is connected with risks of drinking water contamination due to surface water from the pouring precipitations.

In connection with a lot of etiological factors that can fall into the water, spreading of water-borne epidemics can be preceded of diarrhea rising in this region. In such mixed microorganism flora we can observe succession in disease rising from different diseases. This is connected with the incubation period duration (for example shigellosis appears on the 4-5<sup>th</sup> day after drinking contaminated water, cholera appears on the 6<sup>th</sup> day and typhoid fever on the 14-21<sup>st</sup> day, etc.)

Water-borne epidemics are accompanied by wide spectrum of clinical forms and this is in close connection with massiveness of water contamination caused by pathogenic microorganisms. Very often the diseases are in its atypical form. This is because of high degree of microorganism diluting in water and so the dose of the pathogenic agent is smaller.

After epidemical ceasing the remained among the people infectious sources (carriers and cases) spread the disease by contacts with other people and this last phase of the epidemic is the so called “epidemical tail” with water-borne epidemics.

Characteristic feature of the water-borne epidemics is its lack among the babies, because they drink only boiled or mineral water. This can be used as an early finding of water-borne epidemics.

There are also the so called “ship” epidemics. Their water supply sometimes is from ports where they stay.

Water-borne epidemics are observed with some zoonosis infections such as leptospirosis, when people bathe in small rivers that are contaminated with rodents' excrements.

There are also the so called “chronic water-borne epidemics”, when the contamination continues for a long time or the reason was not found on time.

Epidemical and prophylactic measures with water-borne epidemics are mainly of sanitary-hygiene and sanitary-technical character. They aim to eliminate the factors for infection spreading.

### **FOOD-BORNE EPIDEMICS**

Food-borne epidemics appear after consuming contaminated with pathogenic microorganisms food products. There is a great variety in the course of the epidemics, depending on:

- biological characteristic of the agents;
- food products origin and quality – factors for delivery and processing conditions;
- sanitary-hygiene level and population food customs.

A lot of diseases can be caused by food products:

- antroposis intestinal infections – shigellosis, typhoid fever, hepatitis A.
- zoonosis – salmonellosis, brucellosis.
- sapronosis – botulism, cholera.

Food products of animal origin (meat, fish, eggs, milk) can be contaminated for life by ill animals and birds. They can also be contaminated in processing, transport and realization.

Food and vegetables are of great importance for intestinal infections spreading. They are contaminated by the soil and watering. There is a great risk of infection when they are consumed without thermal processing because they can be contaminated during transportation and carrying with dirty hands.

There is also risk when they are not properly preserved.

Main reservoirs can be chronic and healthy carriers of some intestinal infections: typhoid fever, dysentery.

Epidemical outbreaks of **food toxic infections** are of great problem. They are a form of intestinal infections. These are severe infectious diseases when there are toxin pathogenic microorganisms in a product (salmonella, staphylococci, etc.). When the conditions for preserving or processing are inappropriate (moisture, temperature) then some toxins can appear in the product. So besides pathogenic microorganisms toxins with high concentration enter into the organism. The diseases are characterized by:

- short incubation period (hours)
- unexpected beginning
- toxic-infectious and gastroenteritis syndrome.

Despite differences in food-borne epidemics there some common characteristics:

- they happen usually in summer;
- contaminated food product;
- cluster topographic spreading, according to the outbreak appearing;
- outbreaks because of simultaneous consuming the product from big groups of people.

Epidemical and prophylactic measures with food-borne epidemics are connected with sanitary and vet control, hygiene at all stages of production and realization of food products and health education activity among the population.

## CONTACT EPIDEMICS

They refer to habits of life, associated with poor hygiene, such as contaminated hands, insects, toys. Additionally, classical intestinal infections occur as nosocomial infections.

Epidemical and prophylactic measures with contact epidemics are connected with sanitary and insect control, sanitary-hygiene and sanitary-technical measures and health education activity among the population.