Communicable diseases I.

Global epidemiology of communicable diseases
Basic definitions of communicable diseases and epidemics
MD tasks in case of detecting infectious disease
Global epidemiology of communicable diseases

Most important recent communicable diseases

- Malaria
- HIV/AIDS
- Hepatitis B
- Cholera
- Tetanus
- TB (TB-MDR)
- EEC
- Viral hemorrhagic fever
Leading causes of lost years of life in 2013

GLOBAL BURDEN OF DISEASE STUDY & THE LANCET, 2014
At least 38% caused by communicable diseases (mostly in developing countries)
Millennium Development Goals (MDGs)

To combat Malaria, HIV and other diseases is one of the Millennium Development Goals (MDGs) that were established following the Millennium Summit of the United Nations in 2000.

Target 6A: Have halted by 2015 and begun to reverse the spread of HIV/AIDS

Target 6B: Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it

Target 6C: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases
Malaria

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected mosquitoes. In 2013, malaria caused an estimated 584,000 deaths, mostly among African children. 198 million cases of malaria were reported in 2013. Malaria mortality rates have fallen by 47% globally since 2000, and by 54% in the WHO African Region.
Trends in reported malaria incidence, 2000–2012

Trends in malaria incidence
- Not applicable or malaria-free
- On track for ≥75% decrease in incidence 2000–2015
- 50%–75% decrease in incidence projected 2000–2015
- <50% decrease in incidence projected 2000–2015
- Progress in reducing cases sub-nationally where interventions have been intensified OR Country has recently expanded diagnostic testing
- Insufficiently consistent data to assess trends
- Increase in incidence 2000–2012

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
World Malaria Report 2013
Map Production: Global Malaria Programme
World Health Organization
HIV-AIDS

Human Immunodeficiency Virus

- HIV-1 is more common worldwide (pandemic)
- HIV-2 is found in West Africa, Mozambique, and Angola
- HIV-2 is less easily transmitted and less pathogenic

Since the beginning of the epidemic (1981), almost 78 million people have been infected with the HIV virus and about 39 million people have died of HIV.
HIV-AIDS - Global situation and trends

Globally, 35.0 million people were living with HIV at the end of 2013.

An estimated 0.8% of adults aged 15-49 years worldwide are living with HIV, although the burden of the epidemic continues to vary considerably between countries and regions.

Sub-Saharan Africa remains most severely affected, with nearly 1 in every 20 adults living with HIV and accounting for nearly 71% of the people living with HIV worldwide.
Change in AIDS trends in the USA

Stage 3 (AIDS) Classifications, Deaths, and Persons Living with HIV Infection Ever Classified as Stage 3 (AIDS) 1985–2010—United States and 6 Dependent Areas

Note. All displayed data have been statistically adjusted to account for reporting delays, but not for incomplete reporting. Deaths of persons with HIV infection, stage 3 (AIDS) may be due to any cause.
Estimated adult and child deaths from AIDS, 2013
By WHO region

Estimated number of deaths by WHO region

- Eastern Mediterranean: 16 000 [11 000–22 000]
- Western Pacific: 56 000 [40 000–81 000]
- Europe: 61 000 [52 000–74 000]
- Americas: 77 000 [65 000–110 000]
- South-East Asia: 190 000 [160 000–220 000]
- Africa: 1 100 000 [1 000 000–1 300 000]

Total: 1 500 000
[1 400 000–1 700 000]

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Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization

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Tuberculosis (TB)

ranks as the second leading cause of death from a single infectious agent (after HIV)

9 million new TB cases in 2013 (including 1.1 million cases among people living with HIV)

In 2013, 1.5 million people died from TB, including 360 000 among people who were HIV-positive.

TB mortality rate has decreased 45% since 1990
Global trends in estimated rates of TB incidence, prevalence and mortality 1990-2013

Source: WHO Global tuberculosis report 2014
Estimated TB incidence rates, 2013

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Multidrug-resistant TB

- result of treatment mismanagement

Multidrug-resistant TB (MDR-TB) is caused by bacteria that are resistant to the most effective anti-TB drugs (isoniazid and rifampicin)

MDR-TB results from either primary infection or may develop in the course of a patient's treatment.

Extensively drug-resistant TB (XDR-TB) is a form of TB caused by bacteria that are resistant to isoniazid and rifampicin (i.e. MDR-TB) as well as any fluoroquinolone and any of the second-line anti-TB injectable drugs (amikacin, kanamycin or capreomycin)
Epidemiology of communicable diseases

priority sector of Public Health - science of the communicable diseases (contagions)

Focusing on:

- indicators
- risk factors
- prevention & prophylaxis

of communicable diseases

(Infectology: clinical discipline of infectious diseases)
Goals and functions

1. prevention and surmount of communicable diseases and epidemics

2. enhancement of general resistance of human organism against communicable diseases

one of the victims of 2015’s Ebola epidemic
Goals and achievements of prevention of infectious diseases

**Control** - reduction in the incidence, prevalence, morbidity or mortality of an infectious disease to a locally acceptable level

**Elimination** - reduction to zero of the incidence of disease or infection in a defined geographical area

**Eradication** - termination of all transmission of infection by the extermination of the infectious agent

The Magazine of the WHO, May 1980
Infectious disease - caused by a microorganism and therefore potentially transferable to new individual

Contagious disease - capable of spreading from one person to another

Communicable disease - can be transmitted from one source to another
Definition of communicable diseases

A communicable disease is an illness due to a specific infectious (biological) agent or its toxic products capable of being directly or indirectly transmitted from man to man, from animal to man, from animal to animal, or from the environment (through air, water, food, etc..) to man.
Communicable diseases by their occurrences in time and space

sporadic: scattered, dispersed cases of a communicable disease, without any connections in time and space (e.g.: Lyme-borreliosis)

endemic: permanently or long-lastingly increased presence of a disease in a given area (e.g.: viral haemorrhagic fevers)

epidemic: occurrence in excess of expected occurrence (e.g.: Ebola in West-Africa, 2014-15)

pandemic: diffused spread of a communicable disease on the continents or Earth (e.g.: cholera, influenza)

seasonality: enormous, numerous occurrence of a disease in a given season: (in summer: enteral diseases)

cyclicity: - periodic, systematic recrudescence, return of a communicable disease in determined time- intervals generally represented in increased occurrence (e.g.: diphteria: by 12-13 years)
Clinical forms of the infectious diseases
- Based on symptoms

Inapparent or subclinical infection
- insufficient number of attacking germs
- low virulence of aggressors
- good immunostatus of macroorganism

Abortive infections:
- attenuated, characterless symptoms
- fast recovery

Infections with classical symptoms
- determined time-intervals
- suitable, recognisable symptoms
- incubational (latent) period: from infection to first clinical signs
- prodromal period: aspecific, early symptoms
- classical, characteristic symptoms appear
Clinical course, duration, appearance - forms of communicable diseases

Hyperacute (fulminant):
- complications may appear before classical symptoms
  (e.g.: meningococcal-meningitis: adrenal-insufficiency with skin haemorrhages)

Acute
- marked onset - marked end
- duration no more 6 week (chicken-pox, rubella)

Semi-acute:
- marked onset - long-lasting duration, with more than 6 week (typhoid fever, tularaemia)

Chronic:
- duration: years with exacerbations (Hepatitis B, C, Lyme-borreliosis, TB, syphilis)
Outcomes

Recovery

Recovery with complications
- serious, but reparable alterations
  e.g.: meningococcal-infection: adrenocortical haemorrhage
  mumps: orchitis

Recovery with defect
- permanent organic alterations
  e.g.: poliomyelitis: paralysis
  encephalitis: dysfunctional remains

Recovery with post-disease (sequelae)
- after the recovery and passed an asymptomatic period
- appearance of a characteristic non-communicable disease
  e.g.: 2 weeks after the scarlet fever: glomerulonephritis, carditis

Death
Epidemic

occurrence of cases of some communicable disease in a community or region (or outbreak) clearly in excess of expected occurrence

number of cases, indicating presence of an epidemic - vary according to
- infectious agent
- size and type of population exposed
- previous experience or lack of disease
- time and place of occurrence
- usual frequency of the disease in the same area among specified population at the same season of year
Immediate report recquired

to the local and central health authority

- two cases of the same disease, associated in time and space, notably in case of high-emergence communicable diseases
- sufficient evidence of transmission to be considered EPIDEMIC

- a single case of a communicable disease long absent from a population

- or the first invasion by a disease
Basic mathematical models of infectious diseases

Damped oscillations of the SIR model
Why do we need mathematical models in infectious diseases epidemiology?

- A mathematical model integrates knowledge and data about
  - natural history of the infectious disease
  - transmission of the pathogen between individuals
  - epidemiology

- in order to
  - better understand the disease and its population-level dynamics
  - evaluate the impact of interventions
    (for ex: vaccination, antibiotic or antiviral treatment, quarantine)
“Modeling can help to ...

- Modify vaccination programs if needs change
- Explore protecting target sub-populations by vaccinating others
- Design optimal vaccination programs for new vaccines
- Respond to, if not anticipate changes in epidemiology that may accompany vaccination
- Ensure that goals are appropriate, or assist in revising them
- Design composite strategies, ... ”

Walter Orenstein, former Director of the National Immunization Program in the Center for Diseases Control (CDC)
**Attack rate** - (cumulative incidence used for particular groups and under special circumstances) - the proportion of those who became ill after a specified exposure

E.g: gastroenteritis among attendees of a corporate picnic, 99 persons ate potato salad, 30 of whom developed gastroenteritis.

"Food-specific attack rate" = \( \frac{30}{99} \times 100 = 0.303 \times 100 = 30.3\% \)

Attack Rate is used: during the outbreaks of disease; in hypothetical predictions and to project the number of victims to expect during an epidemic

**Secondary attack rate** - is the proportion of those exposed to the primary case that develop disease as a result of the exposure
Case fatality rate (CFR)

CFR is the proportion of deaths within a designated population of "cases" (people with a medical condition), over the course of the disease.

\[
CFR = \frac{\text{number of deaths}}{\text{number of cases}}
\]

CFR is conventionally expressed as a percentage and represents a measure of risk. CFRs are most often used for diseases with discrete, limited time courses, such as outbreaks of acute infections.
**Incubation period**: the time interval between invasion by an infectious agent and the appearance of the first sign or symptom of the disease (time from exposure to development of disease)

**Latent period**: the period between exposure and the onset of infectiousness (this may be shorter or longer than the incubation period)
Primary (index) case: the person who comes into and infects a population (first case of a disease)

Secondary cases: infected by a primary case
Further spread is described as "waves" or "generations "

[Diagram of a tree-like structure showing the spread of a disease from a primary case to secondary cases]
Basic reproduction number

The *basic reproduction number* $R_0$ ("R nought") is a key quantity in infectious disease epidemiology.

$R_0$ - *average number of secondary cases generated by one primary case in a totally susceptible population*

**IF**

- $R_0 < 1 \rightarrow$ number of cases decreases
- $R_0 = 1 \rightarrow$ number of cases is stable
- $R_0 > 1 \rightarrow$ number of cases increases

the bigger the value of $R_0$ the bigger the potential for spread of the infection within the population.
Evaluation of the potential for spread of an infection

$R_0 = 4$
with whole population susceptible

$R_0 = 4$
with 75% population immune (25% susceptible)
$R_0$ depends on

- transmission parameters
- duration of infectiousness
- contact rate (average rate of contact between susceptible and infected individuals)
- community structure
Values of $R_0$ of well-known infectious diseases

<table>
<thead>
<tr>
<th>Disease</th>
<th>Mode of Transmission</th>
<th>$R_0$</th>
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<tbody>
<tr>
<td>Measles</td>
<td>Airborne</td>
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<td>Pertussis</td>
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<tr>
<td>Diphtheria</td>
<td>Saliva</td>
<td>6-7</td>
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<td>Smallpox</td>
<td>Social contact</td>
<td>5-7</td>
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<tr>
<td>Polio</td>
<td>Fecal-oral route</td>
<td>5-7</td>
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<tr>
<td>Rubella</td>
<td>Airborne droplet</td>
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<tr>
<td>Mumps</td>
<td>Airborne droplet</td>
<td>4-7</td>
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<tr>
<td>HIV/AIDS</td>
<td>Sexual contact</td>
<td>2-5</td>
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<tr>
<td>SARS</td>
<td>Airborne droplet</td>
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<tr>
<td>Influenza (1918 Strain)</td>
<td>Airborne droplet</td>
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<tr>
<td>Ebola</td>
<td>Direct contact</td>
<td>1,5-2</td>
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</table>
Evaluation of the potential for spread of an infection

- Vaccination reduces the proportion of susceptibles in the population
- The minimal immunization coverage needed to eliminate an infection in the population ($V$-critical vaccination coverage) is related
- to $R_0$ by the relation $V = 1 - \left( \frac{1}{R_0} \right)$
  (assuming that vaccine effectiveness is 100%)

Source: Thierry Van Effelterre - Mathematical Models in Infectious Diseases Epidemiology
Critical vaccination coverage required to restrain the spread

<table>
<thead>
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<th>Mode of Transmission</th>
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## Vaccination coverage in Hungary

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</table>

**MCV** - Measles-containing vaccine

**WHO vaccine-preventable diseases: monitoring system**

**WHO-UNICEF estimates of MCV coverage**
Herd immunity

Herd immunity occurs when the vaccination of a significant portion of a population provides a measure of protection for individuals who have not developed immunity.
Dynamics of disease transmission (Chain of Infection)

Source or Reservoir → Modes of transmission → Susceptible host
Source of infection

generally a living organism (very rarely inanimate matter) in which the infectious agent harbours, multiplies and leaving it enters to the susceptible hosts by different mechanisms, infecting them

source of infection may be:

1. living organism: humans & animals
2. inanimate, inert matter (climatic device)
Reservoir of an infectious agent

any person, animal, arthropod, plant, soil, substance or their combinations in which an infectious agent naturally lives and multiplies in purposes to reproduce itself to be transmitted to a susceptible host

agent’s survival primarily depends on it

- natural storage-system supports unlimited survival of infectious agent in the nature
- never becomes ill, only stores the agent
- may be transformed to a source of infections
  - for ex.: leptospirosis (rats)
  - tick-born encephalitis (ticks)
Source of infection: persons

- Ill person - with characteristic symptoms

- Healthy, asymptomatic carrier (dangerous!) harbours the agent without any clinical symptoms
  - incubatory carrier (short and long duration) (hepatitis, varicella, morbilli, scarlatina)
  - convalescent carrier (dysenteria, cholera, diphtheria)
  - temporary carrier (short duration-in 1 year)
  - chronic carrier (long duration-after 1 year also) salmonellosis, typhoid fever: Mary Mallon
    - 1400 people had been infected by her
Source of infection: animals

1. Domestic animals
   - dogs, cats, cattle: rabies (lyssa)
   - goats, cattle, swine: brucellosis
   - horse: malleus

2. Wild animals living near the house (rodents, mammals)
   - mouse: salmonella
   - field mouse: tick-borne encephalitis
   - birds: ornithosis, chlamydia
   - hedgehogs: rabies
   - rats: plague
   - monkeys: Marburg- disease, yellow fever
   - rabbits: tularemia

3. Laboratory animals
   - rats: leptospirosis
   - monkeys: SV 40-viral infection of polio-vaccines
Source of infection - inanimate substance

1. air-conditioner in case of legionellosis exceptionally accepted as source of infection: living, multiplying forms of agent was detected in all cases (legionellosis may not spread from human to human)

2. dead organisms in some cases - Ebola
   most of microorganisms may not survive the death of host
Mechanisms of transmission

any mechanisms by which an infectious agent spreads from a source to a susceptible host

it depends on the ability of microorganism:

- to leave infected (ill) organism on some route
- to survive in the environment
- to penetrate soon a new susceptible host

we can effect on these mechanisms with sterilization and disinfection
Modes of transmission

Contact Transmission

Direct contact (person-to-person) involves close physical contact between the source of the disease and a susceptible host.

Indirect contact involves transmission by fomites (inanimate objects).

Droplet transmission - via droplet nuclei (mucus droplets) in coughing or sneezing, laughing or talking.

Vehicle Transmission - by a medium such as water, food or air

Waterborne

Foodborne

Airborne - pathogens are carried on droplet nuclei in dust for a distance greater than 1 meter.

Vector Transmission

Arthropod vectors carry pathogens from one host to another by both mechanical and biological transmission.
Mechanisms of transmission

1. direct transmission
   spreading without any substances
     - direct contact mechanism
     - perinatal mechanism
     - intranatal mechanism

2. indirect transmission
   spreading with living or inanimate substance
Direct mechanisms of transmission I. Direct contact

1. Touching
2. Handshake
3. Sleeping in common bed
4. Sexual intercourse
5. Closed occupation with animals
6. Biting
7. Direct spray onto the conjunctives and mucous membranes

What kind of diseases may spread this way?

enteral infections (enterobiasis, caliciviral-infections), dermato-infections, STD, Staphylococcus aureus-, streptococcal infections, most of zoonoses (chlamydia, Q-fever, tularaemia, brucellosis, lyssa, leptospirosis)
Direct mechanisms of transmission II. Perinatal

Diaplacentar:
- Congenital infections, acquired intrauterinally (CMV, rubella, chickenpox, toxoplasmosis)

Intranatal:
- Connatal infections (acquired at partus, adopted on natal routes) - Hepatitis B, HIV; pathogen microorganisms existing in delivery routes (herpes simplex, CMV, Chlamydia trachomatis, Neisseria gonorrhoeae)

Postnatal:
- Acquired infections - from environmental sources
Indirect mechanisms of transmission

I. Vehicle-borne

-Air - **aeroplankton**: pathogens absorbed on solid and fluidal drops
  1. direct: (Pflügge), inhalation before sedimentation
  2. indirect: inhalation after sedimentation

- Water - drinking-, bathing-, sewage water

- Soil - infected with faeces, urine (animal and human origin), excretums, sewage-water

- Food - food-born diseases, food-intoxications

- Articles for personal use - bed-chlothes, underwear, door-handles, toys, bedpan etc.

- Medical instruments - needles, syringes, transfusion sets
Indirect mechanisms of transmission

II. Vector-borne

**Mechanical vectors:** mechanical transfer of infectious agents on its body (flies, cockroaches - enteral diseases)

**Biological vectors:** passage of pathogens with infected blood of humans or animals from their body to the blood of host

required multiplication or development of pathogens in their body

- malaria: malaria-mosquito (Anopheles)
- plague: flies of rats
- yellow fever: Haemagogus, Aedes-mosquitos, ticks
- Lyme-borreliosis: ticks
- typhus exanthematicus (louse-borne typhus): body-louses
Example for indirect mechanism of transmission - a waterborne infection

Waterborne infections - main characteristics:
- coincidence of water-supply and diseases
- the cases occurred in enormous number suddenly and at the same time
- the possibility of water-contamination may be detected: the pathogen can be demonstrated from water
- sudden decrease of cases after the water source is locked up

1832-London-cholera epidemic
(1 month-7000 cases of death)
source: in the S oho in London (Broad street) was a well, after removal of handle the epidemic chain wrung, the epidemic process was stopped in 3 days
Susceptible host

Susceptibility:
- property of an organism to adapt an infection
- not possessing sufficient resistance against a pathogen
- depends on the immunostatus

increasing factors: exhaustion, cold, lack of proteins, radiations, pharma preparats (cortison)

-individual susceptibility: person is capable to get an infection

-populational susceptibility: the proportion of not protected against an infection among the population

Susceptibility may be characterized with:

-infectiosity: in how many persons the inf. agent can be detected (from 100 contacts)

-contagiosity: how many persons will be ill (from 100 susceptible exposed to the infection persons)
Secondary driving factors of epidemic process

Not determinant factors in occurrence of epidemics, but influencing their
-frequency
-seriousness
-extension
-duration

1. Natural factors
   - weather
   - disasters
   - climate
   - pollution
   - terrain-configuration
   - water-supply
   - reservoirs, vectors

Marine pollution in the Niger Delta
2. SOCIAL FACTORS
- social system
- poverty
- culture
- education
- problems of sewage-water
- traffic
- public health care
- disaster-management
- nutrition, catering
- working stress

Secondary driving factors of epidemic process

Syria refugee camp
MD tasks in case of detecting infectious disease
Prevention of infectious diseases and epidemics

Arrangements on the source of infections and its environment

- Epidemic observation
- Epidemic isolation
- Quarantine
- Epidemic control
  (carrier state- transient and chronic carrier state)

We can effect on the source of infections and its environment with epidemic arrangements
Control of communicable diseases

General preventive measures - control of patients, contacts and its immediate environment:

1. prompt recognition and identification of a disease (epid. anamnesis, clinical examination, epidemic laboratory investigation)
2. treatment of patients
3. isolation of infectious source
4. early laboratory diagnosis
5. report (cases-epidemics) notification, registration
6. disinfection
7. immunisation, chemoprophylaxis
8. epidemic observation
9. epidemic control
10. quarantine
11. epidemic surveillance
Control of communicable diseases
report of cases and epidemics

Report of cases

It is determined by law regulations which diseases have to be reported as a routine and regular procedure and which reports are forwarded to the next superior jurisdiction.

Generally it is determined what diseases and infectious agents have to be reported immediately by call, fax and online because of their epidemic danger.

From physicians it’s required to report all notifiable illness coming in their attention.

In hospitals a specific officer should be charged with the responsibility for submitting required reports (individual or group-cases).

Report of epidemics
Reportable diseases

Should be reported in written form, online, phone and fax to the national epidemic center and to the county health authority:

- anthrax
- botulism
- cholera
- diphtheria
- febris flava
- febris recurrens
- lyssa
- malleus
- pestis
- poliomyelitis anterior acuta
- SARS
- typhus abdominalis
- typhus exanthematicus
- variola
- viral haemorrhagic fevers

should be reported aggregated occurrence of cases transmitted from humans to humans,
and cases manifesting in unusual form or increased number.

Nosocomial infections reportable with personnel data:
- clostridium difficile infection
- infections caused multi-drug resistant (MDR) bacteria
- sepsis

Reportable without personnel data:
- AIDS
- HIV-infection
- STDs
Control of communicable diseases
report of cases and epidemics

Report of epidemics:

- Any unusual or grouped-expression of illness may be of public-utility
  (To the local health authority by the most expeditious means)

- Is it included or not on the official list of reportable communicable diseases

- Is a well-known identified disease

- Having an indefinite or unknown clinical entity
Local health authorial activity in Hungary in the medical attendance

To prevent and combat the communicable diseases is necessary to be supplied with

- The capital- and county-governmental magisterial institution
  (As county town public health -special conductive organ)

- Capital- districtial (regional) and areal (township) public health institution
Epidemic arrangements to the patient, suspected having infectious disease:

Epidemic observation

summary of arrangements of public health authority on a patient or suspected having infectious disease to prevent the spread of pathogens to susceptible hosts by any mechanisms of transmission

Epidemic control

any epidemiological activities of health authorities on the pathogen-carriers

Quarantine:

separation of epidemiologically observed people
Isolation
Prevention or restriction of spreading (transmission) of an infectious agent in protection of susceptible persons

Who?
- Ill and suspicious person animal or its contacts

Where?
- On infectious ward of marked county or state-hospital (diseases, prescribed in law and if the patient cannot be separated at home)
- On special place

For how long?
- On time - interval of infectious ability
- Time of isolation: incubational period of disease
- until the end of infectious status (time of deliberation from status)
  or in 48 hours after the general incubational period of disease
If the disease could be enclosed by medical investigations
- Should be discontinued if is it not indicated
Isolation

- separation of infected persons or animals from others
- for the period of communicability-
  in such places and under such conditions

-as to prevent the direct or indirect transmission of the infectious agent from infected persons to those who are susceptible to infection or who may spread the agent to others
CDC guideline for isolation precautions in hospitals

1. **strict isolation** to prevent transmission of highly contagious or virulent infections (spreading by air and contact)
   - private room, use of masks, gowns and gloves for all persons entering the room
   - special ventilation requirements with a negative pressure in the room

2. **contact isolation** - for less highly transmissible and contagious diseases - spread by close or direct contact
   Private room is indicated, but patients with the same pathogen may share a room.
   Indicated: masks, gowns, gloves

3. **respiratory isolation**: private room, but patients with the same pathogens may share a room. Mask indicated

4. **tuberculosis isolation** - for patients with pulmonary TBC with + sputum or chest X-ray with active tuberculosis - private room with spec. ventilation, closed door, mask, gowns are indicated

5. **enteric precautions** - private room, if patient's hygiene is poor - gowns!

6. **drenage/secreton precautions** - cut direct or indirect contact with purulent material or drenage - gowns!
Basic requirements common for all potentially infectious cases

- Hands must be washed after contact with the patient or potentially contaminated articles or before taking care of another patient.

Articles contaminated with infectious material should be appropriately discarded or bagged and labelled before being sent for decontamination and reprocessing.
Epidemic observation

Arrangements of local health authority:
- on the source of infection (ill or suspicious cases)
- on their contacts
to prevent spreading of infection-epidemy

duration: max. incubational period of the given infectious disease

person under epidemic observation is obliged to:
- undergo a medical examination
- provide laboratory with necessary material (by epid. considerations)
- apply the necessary treatment to recovery
- take the physician's advices

during the observation persons may be:
- restricted from work
- jure in personal contacts
- freedom of movement
- will be restricted from work and places where may cause massive infection

the physician may order the epidemic isolation
Quarantine

specific and strict form of epidemic observation on a marked for this reason place, in case of highly contagious diseases with very serious consequences

People isolated in these circumstances cannot leave the place!

deliberating investigations may be: absolute and modified quarantine
-restriction to visit hospital wards
-child-care institutions:

Quarantine examples:
- typhus exanthematicus: 20 day (suspicion+louses)
- febris recurrens: 14 days (susp.+ louses!)
- cholera susp.: 2x3 days - investigations 2x neg!
- malleus: 6 days
- yellow fever: 6 days
- plague: 7 days + tetracycllin, sulfonamid
Databases and useful information sources

WHO centralized information system for infectious diseases - CISID-
http://data.euro.who.int/cisid/

Centers for Disease Control and Prevention https://www.cdc.gov/

European Centre for Disease Prevention and Control