TYPHOID FEVER AND BACCILARY DYSENTERY

General data

- Typhoid fever and bacillary dysentery are human specific infectious diseases, known since the very ancient times.

- The epidemiological process of both the diseases is strongly depending on the social-economical conditions (in lapidary expression “poor population diseases” “diseases caused by unhygienic life style”).

- In Romania and many other world wide countries, 3-4 decades ago, typhoid fever and bacillary dysentery were considered serious diseases, frequently epidemic. Such manifestations are recorded today in some areas from Africa, South Eastern Asia and South America.

- By general prevention, including especially global hygienization and in a small proportion by vaccinoprevention, both diseases are best controlled.

- Both diseases are now characterized by a pronounced epidemiological and clinic atypism.

- The resistance of the etiological agents, the absence of efficient vaccines, the atypism, the dependence of social-economical conditions and the existence of chronic carriers are situating these two diseases among the main concerning for the population health protection.
The characteristics with epidemiological importance of *S. typhi*

*S. typhi* has:

- a complex antigenic structure, with virulence and immunogenicity determinants; but in the vaccines, they don’t determine best specific protective levels in susceptible persons;
- the environment resistance is high, that gives them possibilities for long survival in water, ground, on food, objects, hands, domestic flies etc.;
- the usual chemical decontaminates are efficient in medium and high concentrations (phormole, phenol, sublimate, chloramine, chloric lime);
- the infectious dose for *S. typhi* is variable, being necessary 10-100 microbial cells to survive to the gastric acidity action and to the antimicrobial factors from the first part of the small intestine;
- the resistance to antibiotics and chemical synthesis substances has to be carefully estimated, because *S. typhi* can defeat their action by the means of the “resistance factor”;
- it has been observed the presence in circulation of some *S. typhi* strains resistant to ampicillin, tetracycline, chloramphenicol, streptomycin etc.
The characteristic with epidemiological importance of *Shigella* strains

- *Shigella* with the fourth serogroups (A: *Sh. dysentery*; B: *Sh. flexneri*; C: *Sh. boydii*; D: *Sh. sonnei*) and approximately 30 serotypes, produces extremely polymorphic epidemiological and clinic manifestations;

- the complex antigenic structure is conferring to *Shigella* invasive and toxigenic capacity, but the immunogenicity induced to man is insufficiently protective;

- the environmental resistance and the resistance for usual decontaminates is high, similarly to that of the *S. typhi*, but with notable differences among the fourth serogroup;

- *Shigella* presents various sensibility to antibiotics and chemical synthesis antibacterial substances; they were the first bacteria in which was proven the multiresistance plasmid transmitted; 60-80% of *Shigella* strains are resistant to sulphamides and streptomycin; 10-30% to polymixine, negram, kanamycin, tetracycline, colymycin etc.;

- the infectious dose is low (less than 200 viable *Shigellas*) that promotes the transmission from sources to susceptible persons.
Epidemiological process

I. Sources of pathogenic agent

# The sources of pathogenic agents are:

a. the sick man with typical and atypical forms of disease. The typical ones can reach proportions of 70-80% and are “hidden” sources that are keeping the populational circulation of the two species; in the case of bacillary dysentery, chronic forms are recorded, especially in old people, that present the risk of being Shigella sources for children;

b. the carrier man:

- preinfectious carrier is infectious for 3-7 days before the beginning of the typhoid fever and for 1-3 days in the case of bacillary dysentery; the detecting of these carriers is done among the contacts of the “index” case (the first case of disease);

- healthy carrier present the risk of spreading for 5-10 days, rarely longer; the detecting of these carriers is possible during special actions;

- after-ill carrier:

  1. convalescent carrier with a variable spreading period of time, that can be for days, weeks and months;

  2. chronic carrier spreading many years or for entire life; these carriers are dangerous sources, difficult to detect and neutralizing, so keeping the S. typhi or Shigella’s circulation in the population.

# Depending on the source origin and its evolutionary period, the pathogenic agents spreading is done by faeces that will be gathering through different techniques, and in the case of typhoid fever, for the pre-infectious carriers and the sick people in the first evolutionary period, S. typhi can be found also in the pharyngeal and tracheobronchial secretions, vomiting, urine, bile, blood etc.
II. Modes and ways of transmission

- The direct mode is frequently implicated in the transmission of the two species, a fact suggestively mentioned by the expressions: the typhoid fever and the dysentery in lapidary expression are "diseases of dirty hands"; "faecal – oral transmitted diseases"; "diseases of the unhygienic life style".

The direct mode of spreading S. typhi and Shigella is seen in poor populations, collectivities for the medical-social assistance, barracks, jails, refugees camps etc.

Also, the transmission risk by the direct mode of the two bacteria is created in the case of natural or social disasters.

- The indirect mode: being two resistance species, they can be easily transmitted by water, ground, food, objects, hands, flies etc. contaminated directly from the sources or indirectly by the inter-contamination of the mentioned ways of transmission; the two bacteria are often using associated, in the same transmission process, two or more transmission ways.

III. Receptivity

# Receptivity (susceptibility) to aggression of the two bacteria species is general, excepting the persons that have got infection with S. typhi or, for both diseases, have been recently vaccinated.

- The incidence and severity of the two diseases can be more increased in children, pregnant women, old persons, the convalescents of other infectious diseases, immunosuppresed, person with occupational risk etc.

- The post-infectious immunity is long lasting in the case of the persons that have got the clinical manifested typhoid disease and possible transitory for the atypical manifestations. After bacillary dysentery, immunity is specific for serogroup and serotype and has a reduced intensity and duration.

- The post-vaccinal immunity can be protective for 4-5 years, after a complete scheme of anti-typhoid fever vaccination and for 1-2 years after oral anti-bacillary dysentery vaccination.
Manifestation forms of the epidemiological process

Might have:

- **The sporadic manifestation** is seen in Romania, generally in Europe, in high industrialized countries and in populations with a high social-economical standard allover the world; the clinical atypism, the drastic reduction of the severe manifestations can give “false sporadically” aspects;

- **The endemic manifestation** is seen in the low developed countries, in poor populations of the world, in collectivities with special profiles (medical-social assistance) and areas affected by natural and social disasters;

- **The epidemic manifestation** was characteristic in the past for both the diseases, both in Romania and in other European and world-wide countries. The epidemic of typhoid fever and bacillary dysentery are now especially of a reduced proportion; the natural and social disasters, especially in the underdeveloped countries, can create conditions for the evolution of extensive epidemics (“hydric ones” by contaminated water; “food ones” especially by the contaminated milk and derivatives).

# The epidemiological and laboratory surveillance of the sporadic, endemic manifestations and of the after “epidemic focus” reduces a lot the risk of some typhoid fever or bacillary dysentery epidemics.
Prevention

# General prevention has a great importance for the etiologic, epidemiological and clinic characteristics of the two diseases. The general common prevention measures is following:

- the epidemiological surveillance of the groups, collectivities and areas with a general risk or after the previous affectation with typhoid fever or bacillary dysentery;
- periodic organization of actions for the detecting of the chronic carriers simultaneously with investigation and the attempt of “sterilization” of the listed people;
- periodic investigation of the after-ill persons and their contacts;
- periodic analysis of the morbidity structure by acute diarrheic disease to establish the proportion of the two diseases;
- hygienization, salubrization, decontamination, desinsection, periodic deratization in the human settlements, generally and especially in the risk collectivities;
- analysis of the circulating strains of S. typhi and Shigella particularities;
- population education, differentiated in relation to the exposure to infection risk with the two species.

# Specific prevention is including “the epidemiological necessity” vaccination of the risk population groups (salubrity, medical-social assistance units, endemic areas, building sites, army, the contacts of the chronic carriers, the population of the natural or social calamitated zones).
Control

The control operations will include:

- the epidemiological inquire;
- the detecting of the diseases, including the atypical ones;
- hospital isolation, including nominal report for the typhoid fever and periodic and numerical for the bacillary dysentery;
- until “sterilization” the chronic carriers will be excluded from the units for children, for water supply, the food sector and the sick persons assistance sector;
- the contacts will be epidemiological, clinic and laboratory surveyed for 21 days in case of typhoid fever and for 10 days in case of bacillary dysentery;
- the convalescents will be investigated, including coprocultures at 3, 6, 12 months after leaving the hospital;
- global hygienization actions will be done and also the periodic decontamination with chemical substances;
- the vaccinations and re-vaccinations will be done in relation to the epidemiological situation;
- population education for the promotion of a “hygienic life style”.