# ACUTE INFECTIOUS DIARRHEAL DISEASES IN CHILDREN

# Introduction

Acute infectious diarrheal diseases are the second worldwide regarding their frequency, following the acute respiratory illnesses. In children under 5 years diarrhea appears 2-3 times per year in developed countries, whereas in developing countries in can have a frequency of 10-18 episodes per year. In Asia, Africa, and Latin America diarrhea is a leading cause of morbidity and mortality in children.

# Definition

Diarrhea is defined as passing 3 or more watery stools, or one or more bloody stools per day.

The average stool weight is 100 g per day, whereas diarrhea is defined as at least 200 g of stool per day.

# Classification

Regarding its duration diarrhea can be classified as:

- Acute (lasts up to 14 days)
- Persistent (lasts 14-30 days)
- Chronic (lasts above 30 days)

Infectious diarrhea is caused by:

- Viruses
- Bacteria
- Parasites
- Fungi

# Etiology

| Bacteria | Virus | Parazites |
|---|---|---|
| *Shigella* | *Rotavirus* | *Cryptosporidium* |
| *Salmonella* | *Adenovirus* | *Giardia lamblia* |
| *Escherichia coli diareegenă* | *Enterovirus* | *Entamoeba histolytica* |
| *Clostridium difficile* | *Coronavirus* | *Isospora beli* |
| *Bacillus cereus* | *Calicivirus* | *Microsporidium* |
| *Campylobacter (coli, jejuni)* | *Cytomegalovirus* | |
| *Klebsiella* | *Astrovirus* | |
| *Staphylococcus aureus* | | |
| *Yersinia enterocolitica* | | |
| *Vibrio cholerae* | | |

- **Acute diarrhea** - an episode of diarrhea lasts less than 14 days.

  Acute watery diarrhea causes dehydration and contributes to malnutrition. The death of a child with acute diarrhea is usually due to dehydration.

- **Persistent diarrhea** - the diarrhea lasts 14 days or more.

Up to 20% of episodes of diarrhea become persistent, often causes nutritional problems that contribute to deaths in children who have diarrhea.

# Mechanisms of diarrhea

- **Watery diarrhea**

(*non-inflammatory*)

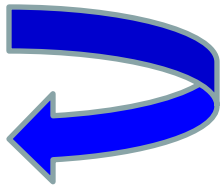
- **Invasive diarrhea**

(*inflammatory*)

- **Osmotic diarrhea**

# Mechanisms of diarrhea

- Certain species ad here to intestinal mucosa without invading and produce enterotoxins. These toxins impair intestinal absorption and cause secretion of electrolytes and water by stimulating adenylatecyclase, resulting in **watery diarrhea**:
  - ***is affected the proximal small bowel***
  - ***the stools are watery***
  - ***stool findings: no fecal leukocytes***



- Other bacteria invade the mucosa of the distal small bowel or colon and produce microscopic ulceration, bleeding, exudation of protein-rich fluid, and secretion of electrolytes and water. The resulting diarrhea contains mucus and sometimes blood, (dysenteric, bloody mucopurulent) – **invasive diarrhea**.

  - ***Stool findings: fecal polymorphonuclear leukocytes***

Viruses are the most common cause of gastroenteritis. They infect enterocytes in the villous epithelium of the small bowel. The result is transudation of fluid and salts into the intestinal lumen; sometimes, malabsorption of carbohydrates worsens symptoms by causing **osmotic diarrhea**.

- ***Diarrhea is watery***.

# *Epidemiological information*

**The source of infection** –

- human (ill persons or healthy carriers),
- animal (in some cases, for example Salmonella).

**The mechanism of infection** - ***fecal-oral***.

The infection is either transmitted through direct contact with the source of infection, or through contaminated objects (food, water, personal articles). Dirty hands play an important role in the transmission of diarrhea. Vectors such as flies or rodents can transmit the pathogens.

- Diarrhea can be related to travel to undeveloped areas, and produced through the ingestion of contaminated water or food. The most frequent etiologic agent of the traveler's diarrhea is E. coli enterotoxigenic.

- There are certain sites where cases of diarrhea can accumulate: day care centers, hospitals (rotavirus), nurseries for newborns (E. coli enteropathogenic).

- Toxins that are preformed in the food might cause diarrhea - this is the case of **food poisoning**.
- ***Receptivity*** is general, *among the patients with AID, children occupy up to **70 %** of cases,* although children under 5 years are more exposed.
- ***Immunity*** - is type specific. There is no immunity following the infection in most of the cases, a new infection is possible.
- Most cases of diarrhea are **sporadic**, but it can occur in **epidemics, pandemics**.

# Pathogenesis

## Host factors

A great number of microorganisms are ingested with every meal, neutralized by the defense mechanisms of the normal host. The elements of the host defense are:

- *Personal hygiene* (contaminated water, food, arms)
- *Gastric acid* (destroys the majority of pathogens)
- *Normal flora* (the protective effect of normal flora)
- *Intestinal motility* (antimotility drugs should not be prescribed)
- *Immunity* (cellular and humoral: systemic IgM, IgG, and local secretory IgA)
- *Host genotype and age*

# Pathogenesis

## Microbial factors:

- *Inoculum size* (number of microorganisms)
- *Enterotoxin production* (activate the adenilatecyclase enzymes of the enterocytes, activate the water and electrolyte secretion)
- *Cytotoxin production* (inhibit the protein synthesis of intestinal epithelial cells - cells destruction)
- *Adherence* (to the specific receptors)
- *Invasion* (ad here to and invade the intestinal epithelial cells - cells destruction)
- *Penetration* (multiply in the phagocytes found in Peyer's patches or intestinal lymph nodes - produce systemic invasion)
- *Mature epithelial cell destruction* (intestinal villous atrophy and the absorption of the fluids altered)

# Recommendations for anamnesis:

- History of this disease
- Epidemiological data
- Clinical data - basic syndromes:
  - Toxic syndrome
  - Gastrointestinal syndrome
  - Signs of dehydration
  - ...

# Diagnosis of AII established in 2 stages:

- **Preliminary diagnosis**
- **Definitive (final) diagnosis**

# I.Preliminary diagnosis

- **History of disease** (time of appearance and their maximum expression, their duration)
- **Epidemiological data** (epidemiological situation in the zone, collective, seasonality, children's age)
- **Physical examination** (toxic and gastrointestinal syndromes, signs of dehydration, time of appearance and their maximum expression, their duration)

# Toxic syndrome

- ✓ fever,
- ✓ weakness,
- ✓ headache,
- ✓ lost appetite,
- ✓ convulsion syndrome,
- ✓ mental confusion

# Gastrointestinal syndrome

- ✓ abdominal pain
- ✓ vomiting,
- ✓ bloating
- ✓ tenesmus,
- ✓ frequency of stools per day
- ✓ character of stools
- ✓ rectum mucous membrane prolapse

## *CLASSIFICATION TABLE FOR DEHYDRATION*

| | CLASSIFY AS |
|---|---|
| **Two of the following signs:**<br>▪Lethargic or unconscious<br>▪Sunken eyes<br>▪Not able to drink or drinking poorly<br>▪Skin pinch goes back very slowly | **SEVERE DEHYDRATION** |
| **Two of the following signs:**<br>▪Restless, irritable<br>▪Sunken eyes<br>▪Drinks eagerly, thirsty<br>▪Skin pinch goes back slowly | **SOME DEHYDRATION** |
| Not enough **signs to classify as some or severe** dehydration | **NO DEHYDRATION** |

# Clinical manifestations

- Diarrhea can be easily recognized based on the presence of frequent soft stools associated or not with abdominal cramps, tenesmus.
- **However, it is not easy to establish the etiology of diarrhea !!!**

# Preliminary diagnosis can be syndromal:

- **Acute gastritis**
- **Acute enteritis**
- **Acute gastoenteritis**
- **Acute gastroenterocolitis**
- **Acute enterocolitis**

**The enterocolitic syndrome frequently registrered in salmonellosis, shigellosis, campilobacteriosis, acute diarrhea with staphilococci - watery abundent stools with mucus and streaks of blood**

# Diarrhea noninfections

- Acute digestive diseases, chronic diseases in the phase of exacerbation, or congenital ones;
- Food allergy;
- Appendicitis, intestinal occlusion;
- Diarrhoea in case of intolerance of some drugs and food;
- Intoxication with vegetete and industrial toxics;
- Enzymopathy (primary, secondary).

**Infections diarrhea** is different from noninfections ones by an **acute onset, fever, mucous stools and sometimes with blood streaks.**

# II. Definitive (final) diagnosis

- **Data of specific investigations:**
  - ✓ ***Detect of the causative agen – cultures*** (stool, vomiting, food, blood, urine, CSF)
  - ✓ ***Detect of specific antibodyes***

    (latex agglutination, ELISA tests and PCR)

- **The clinical picture in the course of the disease**

# **Shigellosis** (dysentery) –

is an infectious disease, accompanied by lesion of mucous membrane in the large bowel, especially its distal part, it is clinically manifested by diarrhoea that is frequently bloody.

# Etiology

***Pathogens of shigellosis belong to the genus of Shigella:***

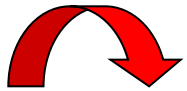
- **A. - *Sh.dysenteriae* (*exotoxin*)**
- **B. - *Sh.flexneri***
- **C. - *Sh.boydii*** } ***endotoxin***
- **D. - *Sh.sonnei***

# Epidemiology

- Shigellosis is present worldwide.
- The source of infection are **patients with acute** or chronic shigellosis and **healthy carriers.**
- The patients with mild and subclinical forms of shigellosis present epidemiological significance because they are not treated and are not isolated.
- The factors of transference are dirty hands, contaminated food and water, flies. Shigella can survive in food, causing food-borne infections.
- Among the patients with shigellosis, children occupy up to **70%** of cases. Morbidity in 1-year-old children is the lowest, and it is the highest among the children from **2 to 7 years of age.**
- Immunity in shigellosis is **typospecific**.

# Pathogenesis

- Infection in shigellosis is **per oral only**.
- The portal of entry is gastrointestinal tract.
- The infectious dose has great importance due to its influence on the duration of the incubation period and severity of the disease course.
- Condition of the body, local function of gastrointestinal tract, common immunity have significance in development of the infectious process.



# Pathogenesis

- On getting into the stomach, the pathogens perish partially due to the influence of proteolytic enzymes and hydrochloric acid in the gastric juice.
- Remaining pathogens get into the small intestine and can stay there for several days, then they get into the large intestine where they reproduce and disintegrate in great quantity, increasing the inflammatory process.

# Pathogenesis

- Endotoxin is the leading factor, determining the character of morphologic lesion, specific of course and severity of the disease. It attacks the whole structure of intestinal wall: enterocytes (cells of mucous membrane), vascular and nervous structures.
- Entering the blood, endotoxin causes common toxic influence on the vascular and nervous systems of the body and its vegetative centers.

# Clinical manifestations

- The incubation period varies from **several hours to 7 days**, more frequently it is **2-3 days**.
- After the onset of the disease vomiting may be present.
- The child becomes restless, loses appetite, complains of headache and abdominal pain.
- Frequently passed **stools contain mucus and blood.**
- In the first hours after the onset of disease stool has stercoral character, but by the end of the day or the second day of the disease stercoral masses disappear completely, stools become poor and contain turbid mucus and blood only.
- Children complain of **abdominal painful** cramps in defecation, drawing pain on the side of the sigmoid colon and anus.
- **Tenesmus** is a typical sign of shigellosis. Tenesmus appears due to the simultaneous spasms of the sigmoid colon and anal sphincters. In frequent tenesmus the rectum mucous membrane prolapse may result.

- The clinical manifestations of the disease reach their peak in the first three days. Symptoms of toxemia, pallor and dryness of the skin, in babies moderate reduction in turgor.
- On abdominal palpation tenderness and hardening are found through the surface immediately over the sigmoid colon.
- Moderate leukocytosis, neutrophilia with the change to the left, insignificant increase of ESR in peripheral blood.
- The pathogen species have a certain influence on typical clinical manifestations, and severity of the disease.

# Clinical type classification of shigellosis

**According to pathogenic agent:**

- **Subgroup A. *Sh. dysentery***
- **Subgroup B. *Sh. flexneri***
- **Subgroup C. *Sh. boydii***
- **Subgroup D. *Sh. sonnei***

**I. Typical**

**II. Atypical:**

- **subclinical**
- **attenuated**
- **dyspeptic**
- **food intoxication**
- **hypertoxic**

# Tipical forms of shigellosis are divided:

- **Mild,**
- **Moderate,**
- **Severe:**
  - ***Type A* - *with the predominance of toxemia***
  - ***Type B* - *with the predominance of severe local lesions***
  - ***mixed***

# Criteria of severity

## General signs:

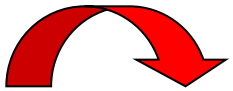
- Neurotoxic syndrome
- Metabolic disorders
- Cardiovascular disturbances
- Degree of deshydration

## Local signs:

- The aspect of stools (astercoral, with mucus and blood streaks)
- Permanent abdominal cramps, tenesmus
- Rectum mucus membrine prolapse,
- Number of stools per day:
  - **Mild form – 5-10**
  - **Moderete form – 10-20**
  - **Severe form – more than 20**

# Peculiarities of shigellosis in 1-year-old babies and small children

- General manifestations don't correspond to colitic syndrom, neurotoxic syndrom is not characteristic;
- Colitic syndrom is not well expressed;
- The onset of the disease is acute, but frecvently is gradual;
- Stools have enterocolitic or dyspeptic character, contain mucus and blood streaks, appear later, on the 3 day from the onset of the disease;
- Tenesmus are replaced by their **equivalents** (restlessness, scream, fase hyperemia during the defecation);



- Sigmoidian spasm in only **1/3** of cases;
- If frequent enterocolitic stools are present, dehydration with hemodynamic disorders
- Complications are more frequent than in adults;
- Frequently is associated with viral, and bacterial infections;
- Deaths are posible;
- Morphological changes with the predominance of **catarrhal inflamation**

# Evolution

- favorable;
- convalescence occurs between the 5-10 day of disease, fever subsides, colic disappeares, tenesmus and dehydrations sighs disappeares;
- stools become stercoral, without blood, mucus disappeares later;
- evolution depends on child's age, personal antecedens, concomitent diseases, late and insufficient therapy;
- clinical convalescence does not correspond with intestinal mucous membrane reparation (it lasts for a longer period from 5 weeks to 2-3 months).

# **Salmonellosis -**

is an infection with bacteria called *Salmonella*. Most persons infected with *Salmonella* develop **gastroenteritis** - diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. *Salmonella* may spread from the intestines to the blood stream, and then to other body sites - **bacteremia**.

# Etiology

Bacteria of the genus Salmonella are divided in many species and subspecies. They can infect humans and animals also. The typhoid Salmonellae (typhi and paratyphi) infect humans only, causing enteric fever. The non-typhoid Salmonellae have a wide range of animal hosts. More than 200 serotypes are pathogenic to humans, causing **gastroenteritis ± bacteremia**.

# Etiology

- Pathogens of salmonellosis belong to the ***Salmonella*** genus. There are more than **2400 serologic types** *of Salmonellae.* The *Salmonellae* groups are discerned due to the structure of **O-antigen**, which are marked by the letters **A, B, C, D, E** and others, and there are various serotypes in each serogroup as to the structure of **H-antigen** (Kauffman-White's classification), high stability in the environment.

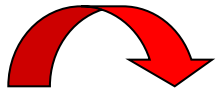
# Epidemiology

**Source of infection**:

- **various animals, as their meat is used for food.**
- **sick people**
- **bacilli carriers** (particularly for the 1-year-old babies).

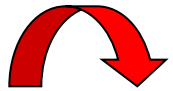
**Route of infection**:

- **alimentary** - food (meat, eggs, fish, milk). Contaminated foods usually look and smell normal.
- **contact route** is the main one, for instance soiled hands of the mother and/or the staff, various contaminated things (dishes, toys, linen, towels).



# Pathogenesis

- In peroral infection much of the living pathogen is destructed intensively in the stomach and small intestine.
- A certain part of the pathogens penetrates into the mesenteric lymph nodes and enterocytes, getting into blood, and causing bacteremia.
- Toxemia leads to gastrointestinal forms of the disease with an endotoxic shock.
- In toxemia with bacteremia typhus-like form develops, if an infectious component is present, then the septic form of salmonellosis develops (in neonates, premature neonates).



# Pathogenesis

- ***Salmonellae*** and their toxins influence the nervous system, causing paralysis of vasomotor centers causing thermoregulation disorders and development of diarrhea. Vomiting and diarrhea cause dehydration of the body with disorders in hemodynamics, electrolyte disbalances, hypoxia and acidosis.

# Morphologic lesions

- Edema and hyperemia of the mucous membrane of the stomach, the small and sometimes large bowels.
- Hyperplastic solitary follicle and Peyer's patches, hyperplasia of mesenteric lymph nodes.
- The thick diphtheritic membrane may be present on the mucous membrane of the large bowel, simulating the lesions which are typical for dysentery. In very acute toxic forms of the disease the morphologic lesions may sometimes be insignificant and not corresponding to clinical severity of the disease.

# Clinical manifestations

- The incubate period has a duration from **2-3 hours** (in the alimentary route) to **5-7 days** (in the contact route).

- Clinical manifestations of salmonellosis are characterized by polymorphism.

# Clinical type classification of salmonellosis

- **Gastrointestinal form** (90 %):
  - gastritis,
  - enteritis,
  - colitis,
  - gastroenteritis,
  - enterocolitis,
  - gastroenterocolitis.
- **Generalizations form:**
  - typhus-like,
  - septic

# Gastrointestinal form (90 %)

- The disease has an acute onset with fever and chills.
- Since the first day of the disease the body temperature increases and keeps high for **7-10 days**.
- Headache, general malaise and weakness.
- Adynamia, striking pallor of the skin.
- Sometimes neurotoxicosis (hyperthermia, mental confusion, convulsions).

- The main symptoms appear on the first day of the disease. Nausea and recurrent vomiting appear. Undigested food is found in the vomit.
- Vomiting is not frequent, but **persistent**.
- The tongue is dry and coated.
- Abdominal pain and diarrhea appear rapidly.
- Stools become more frequent up to 3-5-10 and more times daily (**watery, contain small admixture of mucus**).

- Since the first day of the disease appears **greenish stools**, contain admixture of **mucus, blood and even pus**, which get darker with time ("swampy slime").
- Sometimes the signs of distal colitis are discovered: abdominal cramps, tenesmus, hardening of sigmoid colon.
- Liver may be enlarged.
- The diseases can have a very severe course with metabolic disorders of all forms, especially electrolyte disbalances.
- Duration of the disease is 5-7-14 days, recovery comes rapidly enough.
- Convalescence period may be delayed up to 2-3 weeks.

# **Typhus-like form of salmonellosis** (2-3%)

- duration of fever is 1-2 weeks,
- **toxemia** (headache, myalgia, arthralgia, anorexia),
- enlarged spleen,
- **roseolas or erythematous rash**,
- **cardiovascular system disorders** (bradycardia or tachycardia),
- **gastrointestinal disorders** (vomiting, diarrhea, abdominal distention).
- The disease course may be very severe.

# Septic forms of salmonellosis

- Septic forms of salmonellosis are frequent in **neonates and infants younger than 6 months of age**.
- Septic forms are frequently accompanied by local lesions (meningitis, osteomyelitis, subcutaneous abscesses, arthritis, pyelonephritis).

# **Escherichiosis** -

acute infectious diseases caused by diarrheal strains of Escherichia, clinically characterized by manifestations of gastroenteritis, enterocolitis or extraintestinal localization (meningitis, pyelonephritis, cholecystitis, pneumonia, etc.) and sepsis.

# Classification

1. **Enteropathogenic E. coli (EPEC)** which manifests epithelial adherence and leads to attaching and effacing lesions.
2. **Enteroinvasive E. coli (EIEC)** invading intestinal epithelium;
3. **Enterotoxigenic E. coli (ETEC)** elaborating enterotoxins;
4. **Enterohemorrhagic E. coli (EHEC)** which produces cytotoxins;
5. **Enteroaggregative E. coli (EAEC)** demonstrating a stacked-brick adherence to epithelial cells.

# Enteropathogenic E.coli (EPEC)

- They cause the disease in 1-year-old babies and have antigens **similar to Salmonellae.**
- They reproduce well on the intestinal mucous membrane, causing local inflammation process.

# Enteroinvasive E.coli (EIEC)

- They can reproduce intracellularly in enterocyte cytoplasm.
- EIEC group cause the diseases in children and adults.
- **The disease is similar to dysentery clinically.**

# Enterotoxigenic E.coli (ETEC)

- These pathogens do not have the ability to penetrate intracellular and they do not cause inflammation.
- Enterotoxin causes considerable production of liquid into the lumen of the small bowel.
- **These diseases have likeness with the mild form of cholera.**

# Enteroaggregative E.coli (EAEC)

- Some of them produce a heat stable enterotoxin.
- Children contracting EAEC escherichiosis are in the risk group for developing chronic diarrhea.

# Pathogenesis

- ***E. coli*** enter the child's body through the mouth and then get into the lumen of the gastrointestinal tract. The pathogens reproduce in the small bowel. They produce enterotoxins, remaining on the surface of the mucous membrane.
- Epithelium of the small intestine is affected, and inflammatory changes appear. Besides enterotoxins, endotoxins are liberated due to the pathogen destruction. They enter the bloodstream and lead to severe vascular disorders and an endotoxic shock.

# Pathogenesis

- Endotoxins stimulate an enzyme called adenylate cyclase, increasing the concentration of cyclic adenosinemonophosphate occurs in the cells of intestinal mucous membrane.
- Due to this hyperpermeability of the cell membranes occurs and hypersecretion of water and electrolytes causing dehydratation, increasing toxemia, leading to metabolic and cardiovascular disorders, decreasing the circulation blood volume, resulting in hypoxemia and metabolic acidosis.

# Clinical manifestations

- **EPEC escherichiosis** - occurs in 1-year-old babies.
  - The incubate period is from 3 to 8 days.
  - The disease has an abrupt onset. The body temperature increases, weakness and anorexia appear.
  - **Stools occur frequently, they are watery, yellow or orange, contain transparent mucus.** If such stools occur 5 -7 times daily, may occur dehydration.
  - Toxemia is manifested by restlessness, recurrent regurgitation and vomiting. The disease has a protracted course.

# Hypokalemic syndrome

- The most severe toxicosis with exsiccosis is noted in hypokalemic syndrome which is the result of a lengthy intestinal dysfunction, repeated vomiting, infusion therapy using diuretic drugs and corticosteroids. Hypokalemia occurs if the potassium level in blood is lower than 3 mmol/1.
- The typical signs for hypokalemia are: ***malaise, adynamia, regurgitation, repeated vomiting, dull heart sounds, systolic murmur, hurried shallow breathing flatulence of intestines due to paresis, stool retention, depressed tendon reflexes***. The ECG show longer P-S segment, flattening and inversion of T wave and a displacement of ST-segment to a higher position.

# EIEC- escherichiosis

- Is similar to that of dysentery. That is why this disease is called “dysentery-like”.
- The incubate period is **2-3 days**. The disease has an acute onset with high temperature,
- **Stools containing mucus and blood**.
- The children complain of **abdominal cramps**.
- Toxemia keeps for **1-2 days**. Tenesmus is absent.
- Acute symptoms may persist for 5-7 days, then the disease has a favorable course and is finished by recovery.
- The diagnosis should be based on laboratory tests only.

# ETEC- escherichiosis

- Occurs in older children and adults.
- These diseases have the typical signs of abrupt gastroenteritis with cholera-like syndrome (metabolic disorders, dehydration).
- The body temperature is usually normal.
- The disease is manifested by **recurrent vomiting, watery stools without mucus and blood.**
- In abdominal palpation tenderness of epigastric area.
- The disease has a short course and is finished by recovery for 3-5 days.

# Clinical Manifestations of rotavirus infection

The clinical spectrum of rotavirus infection ranges from subclinical illness to severe gastroenteritis leading to the development of life-threatening dehydration.

After an incubation period of 1 to 3 days, the illness has an abrupt onset, with vomiting frequently preceding the onset of diarrhea. Up to one-third of patients may have a temperature of 39°C.

Stools become more frequent up to 3-5-10 and more times daily (**watery, white and not contain admixture of mucus**).The gastrointestinal symptoms generally resolve in 3 - 7 – 14 days.

Respiratory and neurologic features in children with rotavirus infection have been reported.

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# Complications

## ❑ Specifically:

- ✓ Rectal prolapse
- ✓ Intussusceptions
- ✓ Hemolytic-uremic syndrome
- ✓ Intestinal perforations
- ✓ Toxic megacolon
- ✓ Shock toxic
- ✓ Metabolic disturbances
- ✓ Leukemoid reaction
- ✓ Toxic encephalopathy
- ✓ Reactive arthritis

## ❑ As a secondary infection:

- ✓ otitis
- ✓ pneumonia
- ✓ stomatitis
- ✓ infection of the urinary tract

# The differential diagnosis

- ***Bacterial diarrhea***
- ***Viral diarrhea***
- ***Toxic diarrhea*** *(intoxication with mushrooms)*
- ***Food allergy***
- ***Intestinal occlusion***
- ***Intussusception***
- ***Diarrhea in helmintiasis***
- ***Appendicitis***
- ***Influenza, enterovirus diseasea, meningoencephalitis***
- ***Chronic inflammatory diseases (ulcerative colitis)***

# Diagnosis

- **The clinical manifestations,**
- **The epidemiological history,**
- **Laboratory examinations:**
  - **bacteriological tests** *(stools, vomiting mass, gastric lovage water, food product, blood, urine, pus from the inflammatory foci is the material for bacteriological tests if there is a suspicion of salmonellosis).*

***!!!!Material for bacteriological tests should be taken before the antimicrobial therapy is started;***

  - **Serological test;**
  - **Latex-agglutination**;
  - **ELISA** (rotavirus, norovirus)
  - **PCR** (stool, blood, CSF, another body fluid)
  - **Immunofluorescence method;**
  - **Coprology examination** (the level of lesion);
  - **General examinations** (blood and urine analyses)

# Criteria of children's hospitalization

- Severe forms, with fever, repeated vomiting, stool with blood;
- Haemocolitis, treated at home for 2 days without any amelioration;
- Persistent diarrhea (more 14 days);
- Concomitants diseases which require hospital conditions;
- Children from asocial families and closed collectives

# Treatment

- Most of the patients with diarrhea are treated at home. Hospital admission is necessary in cases of severe dehydration and certain diseases with epidemiologic risk (shigellosis, cholera, typhoid fever).
- The **diet** is rich in liquids (tea, rice soup, vegetable soup with salt and glucose, plain water). Boiled rice, followed by boiled meat and vegetables. It is advisable **to avoid** milk, juices, vegetables with high cellulose content (beans, peas), potatoes, fruits, sweets, other foods that are not easily digested.
- Breast-feeding should be maintained in infants.

# Treatment

- ***Rehydration*** is the most important therapeutic action. Oral rehydration solutions (ORS) are effective in mild and moderate dehydration. (**Plane A, B)**
- In case of vomiting or in severe dehydration intravenous rehydration is necessary: physiological saline, Ringer's lactate solutions, 5% glucose **(Plane C)**

- **Antibacterial therapy** (5-10 days)**:**

**Gastrointestinal forms (blood in the stool):**

- ✓**Co-trimoxazol;**
- ✓**Amoxicillin;**
- ✓**Nifuroxazid**

**Severe and septic forms:**

- ✓**Ampicillină**
- ✓**Ciprofloxacină**
- ✓**Cloramfenicol**
- ✓**Amoxicilină+Clavulanat de potasiu**
- ✓**Cefotaxim**
- ✓**Ceftriaxon**

***Antipyretic, analgesic, intestinal adsorbents, probiotics, digestive enzymes***

***Antimotility agents*** (such as loperamide) - is contraindicated !!!

# MANAGEMENT OF THE PATIENT WITH DIARRHOE

***USE THIS CHART FOR PATIENTS WITH:***

- loose or watery stools
- loose stools with blood

## FIRST, ASSESS YOUR PATIENT FOR DEHYDRATION

| | A | B | C |
|---|---|---|---|
| 1. LOOK AT: CONDITION | Well, alert | * Restless, irritable * | * Lethargic or unconscious; floppy * |
| EYES | Normal | Sunken | Very sunken and dry |
| TEARS | Present | Absent | Absent |
| MOUTH and TONGUE | Moist | Dry | Very dry |
| THIRST | Drinks normally, not thirsty | * Thirsty, drinks eagerly * | * Drinks poorly or not able to drink * |
| 2. FEEL: SKIN PINCH | Goes back quickly | * Goes back slowly * | * Goes back very slowly * |
| 3. DECIDE: | The patient has NO SIGNS OF DEHYDRATION | If the patient has two or more signs including at least one * sign *, there is SOME DEHYDRATION | If the patient has two or more signs, including at least one * sign *, there is SEVERE DEHYDRATION |
| 4. TREAT: | Use Treatment Plan A | Weigh the patient, if possible, and use Treatment Plan B | Weigh the patient and use Treatment Plan C URGENTLY |

## THEN, FOR OTHER PROBLEMS

**ASK ABOUT BLOOD IN THE STOOL**

**IF BLOOD IS PRESENT:**

- Treat for 5 days with an oral antibiotic recommended for *Shigella* in your area.
- Teach the mother to feed the child as described in Plan A.
- See the child again after 2 days if:
  - under 1 year of age
  - initially dehydrated
  - there is still blood in the stool
  - not getting better
- If the stool is still bloody after 2 days, change to a second oral antibiotic recommended for *Shigella* in your area. Give it for 5 days.

**ASK WHEN THIS EPISODE OF DIARRHOEA BEGAN**

**IF DIARRHOEA HAS LASTED AT LEAST 14 DAYS:**

- Refer to hospital if:
  - the child is under 6 months old
  - dehydration is present. (Refer to a child after treatment of dehydration.)
- Otherwise, teach the mother to feed her child as in Plan A, except:
  - give only half the usual amount of milk, or replace mi with a fermented milk product, such as yoghurt.
  - Assure full energy intake by giving 5 meals a day of thick cereal and added oil, mixed with vegetables, pulses, meat, or fish.
- Tell the mother to bring the child back after 5 days:
  - if diarrhoea has not stopped, refer to hospital.
  - if diarrhoea has stopped, tell the mother to:
    - use the same foods for the child's regular diet.
    - after 1 more week, gradually resume the usual animal milk.
    - give an extra meal each day for at least 1 month.

**LOOK FOR SEVERE MALNUTRITION**

**IF THE CHILD HAS SEVERE MALNUTRITION:**

- Do not attempt rehydration; refer to hospital for management.
- Provide the mother with ORS solution and show her how to give it mile/gHe during the trip.

**ASK ABOUT FEVER AND TAKE TEMPERATURE**

**IF THE CHILD IS UNDER 2 MONTHS OF AGE:**

- Rehydrate as necessary. If there is fever (AT C or above) after rehydration, refer to hospital. Do not give paracetamol or an antimalarial.

**IF THE CHILD IS 2 MONTHS OF AGE OR OLDER:**

- If temperature is 39° C or above, give paracetamol.
- If there is falciparum malaria in the area, and the child has any fever (38 °C or above) or history of fever in the past 5 days, give an antimalarial (or manage according to your malaria programme recommendation).

## TREATMENT PLAN A
## TO TREAT DIARRHOEA AT HOME

**USE THIS PLAN TO TEACH THE MOTHER TO:**

Give extra fluid at home the child's current episode of diarrhoea.
Give early treatment for future episodes of diarrhoea.

**EXPLAIN THE THREE RULES FOR TREATING DIARRHOEA AT HOME:**

1. **GIVE THE CHILD MORE FLUIDS THAN USUAL TO PREVENT DEHYDRATION:**
   - Use recommended home fluids. These include: ORS solution, food-based fluids (such as soup, rice water, and yoghurt drinks) and plain water. Use ORS solution for children described in the box below. (Note: If the child is under 6 months old and is not yet taking solid food, give ORS solution or water rather than a food-based fluid)
   - Give as much of these fluids as the child will take. Use the amounts shown below for ORS as a guide.
   - Continue giving these fluids until the diarrhoea stops.
2. **GIVE THE CHILD PLENTY OF FOOD TO PREVENT MALNUTRITION:**
   - Continue to breast-feed frequently.
   - If the child is not breast-fed, give the usual milk.
   - If the child is 6 months or older, or already taking solid food:
     - Also give cereal or another starchy food mixed, if possible, with pulses, vegetables, and meat or fish. Add 1 or 2 teaspoonfuls of vegetable oil to each serving.
     - Give fresh fruit juice or mashed banana to provide potassium.
     - Give freshly prepared foods. Cook and mash or grind food well.
     - Encourage the child to eat, often food at least 5 times a day.
     - Give the same foods after diarrhoea stops, and give an extra meal each day for two weeks.
3. **TAKE THE CHILD TO THE HEALTH WORKER IF THE CHILD DOES NOT GET BETTER IN 3 DAYS OR DEVELOPS ANY OF THE FOLLOWING:**
   - Many watery stools
   - Repeated vomiting
   - Marked thirst
   - Eating or drinking poorly
   - Fever
   - Blood in the stool

**CHILDREN SHOULD BE GIVEN ORS SOLUTION AT HOME, IF:**

- They have been on Treatment Plan B or C.
- They cannot return to the health worker if the diarrhoea gets worse.
- It is a national policy to give ORS to all children who see a health worker for diarrhoea.

**THE CHILD WILL BE GIVEN ORS SOLUTION AT HOME, SHOW THE MOTHER HOW MUCH ORS TO GIVE AFTER EACH LOOSE STOOL AND GIVE HER ENOUGH PACKETS FOR 2 DAYS.**

| Age | Amount of ORS to give after each loose stool | Amount of ORS to provide for use at home |
|---|---|---|
| Less than 24 months | 50-100 ml | 500 ml/day |
| 2 up to 10 years | 100-200 ml | 1000 ml/day |
| 10 years or more | As much as wanted | 2000 ml/day |

- Describe and show the amount to be given after each stool using a local measure.

**SHOW THE MOTHER HOW TO MIX ORS.**

**SHOW HER HOW TO GIVE ORS:**

- Give a teaspoonful every 1-2 minutes for a child under 2 years.
- Give frequent sips from a cup for an older child.
- If the child vomits, wait 10 minutes. Then give the solution more slowly (for example, a spoonful every 2-3 minutes).
- If diarrhoea continues after the ORS packets are used up, tell the mother to give other fluids as described in the first rule above or return for more ORS.

## TREATMENT PLAN B
## TO TREAT DEHYDRATION

**APPROXIMATE AMOUNT OF ORS SOLUTION TO GIVE IN THE FIRST 4 HOURS:**

| Age: * | Less than 4 months | 4 - 11 months | 12 - 23 months | 2 - 4 years | 5 - 14 years | 15 years or older |
|---|---|---|---|---|---|---|
| Weight: | Less than 5 kg | 5 - 7.9 kg | 8 - 10.9 kg | 11 - 15.9 kg | 16 - 29.9 kg | 30 kg or more |
| in ml | 200-400 | 400-600 | 600-900 | 900-1200 | 1200-2200 | 2200-4000 |
| in local measure | | | | | | |

* Use the patient's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the patient's weight (in kg) times 75.

- If the child wants more ORS than shown, give more.
- Encourage the mother to continue breast-feeding.
- For infants under 6 months who are not breast-fed, also give 100-200 ml clean water during this period.

**OBSERVE THE CHILD CAREFULLY AND HELP THE MOTHER GIVE ORS SOLUTION:**

- Show her how much solution to give her child.
- Show her how to give it - a teaspoonful every 1-2 minutes for a child under 2 years, frequent sips from a cup for an older child.
- Check from time to time to see if there are problems.
- If the child vomits, wait 10 minutes and then continue giving ORS, but more slowly, for example, a spoonful every 2-3 minutes.
- If the child's eyelids become puffy, stop ORS and give plain water or breast milk. Give ORS according to Plan A when the puffiness is gone.

**AFTER 4 HOURS, REASSESS THE CHILD USING THE ASSESSMENT CHART. THEN SELECT PLAN A, B, OR C TO CONTINUE TREATMENT.**

- If there are **no signs of dehydration**, shift to Plan A. When dehydration has been corrected, the child usually passes urine and may also be tired and fall asleep.
- If signs indicating **some dehydration** are still present, repeat Plan B, but start to offer food, milk and juice as described in Plan A.
- If signs indicating **severe dehydration** have appeared, shift to Plan C.

**IF THE MOTHER MUST LEAVE BEFORE COMPLETING TREATMENT PLAN B:**

- Show her how much ORS to give to finish the 4-hour treatment at home.
- Give her enough ORS packets to complete rehydration, and for 2 more days as shown in Plan A.
- Show her how to prepare ORS solution.
- Explain to her the three rules in Plan A for treating her child at home:
  - to give ORS or other fluids until diarrhoea stops
  - to feed the child
  - to bring the child back to the health worker, if necessary.

## USE OF DRUGS
## FOR CHILDREN WITH DIARRHOEA

- ANTIBIOTICS should ONLY be used for dysentery and for suspected cholera cases with severe dehydration. Otherwise, they are ineffective and should NOT be given.
- ANTIPARASITIC drugs should ONLY be used for:
  - Amoebiasis, after antibiotic treatment of bloody diarrhoea for *Shigella* has failed or trophozoites of *E. histolytica* containing red blood cells are seen in the faeces.
  - Giardiasis, when diarrhoea has lasted at least 14 days and cysts or trophozoites of *Giardia* are seen in faeces or small bowel fluid.
- ANTIDIARRHOEAL DRUGS and ANTIEMETICS should NEVER be used. None has proven practical value. Some are dangerous.

## TREATMENT PLAN C
## TO TREAT
## SEVERE DEHYDRATION QUICKLY

**FOLLOW THE ARROWS. IF ANSWER IS "YES", GO ACROSS. IF "NO", GO DOWN**

START HERE

**Can you give intravenous (IV) fluids immediately?**

**YES →**

- Start IV fluids immediately. If the patient can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's Lactate Solution (or, if not available, normal saline), divided as follows:

| Age | First give 30 ml/kg in: | Then give 70 ml/kg in: |
|---|---|---|
| Infants (under 12 months) | 1 hour * | 5 hours |
| Older | 30 minutes * | 2 1/2 hours |

* Repeat once if radial pulse is still very weak or not detectable.

- Reassess the patient every 1-2 hours. If hydration is not improving, give the IV drip more rapidly.
- Also give ORS (about 5 ml/kg/hour) as soon as the patient can drink - usually after 3-4 hours (infants) or 1-2 hours (older patients).
- After 6 hours (infants) or 3 hours (older patients), evaluate the patient using the assessment chart. Then choose the appropriate Plan (A, B or C) to continue treatment.

**NO ↓**

**Is IV treatment available nearby (within 30 minutes)?**

**YES →**

- Send the patient immediately for IV treatment.
- If the patient can drink, provide the mother with ORS solution and show her how to give it during the trip.

**NO ↓**

**Are you trained to use a naso-gastric (NG) tube for rehydration?**

**YES →**

- Start rehydration by tube with ORS solution: Give 20 ml/ kg/hour for 6 hours (total of 120 ml/kg).
- Reassess the patient every 1-2 hours:
  - If there is repeated vomiting or increasing abdominal distension, give the fluid more slowly.
  - If hydration is not improving after 3 hours, send the patient for IV therapy.
- After 6 hours, reassess the patient and choose the appropriate Treatment Plan.

**NO ↓**

**Can the patient drink?**

**YES →**

- Start rehydration by mouth with ORS solution, giving 20 ml/kg/hour for 6 hours (total of 120 ml/kg).
- Reassess the patient every 1-2 hours:
  - If there is repeated vomiting, give the fluid more slowly.
  - If hydration is not improving after 3 hours, send the patient for IV therapy.
- After 6 hours, reassess the patient and choose the appropriate Treatment Plan.

**NO ↓**

**URGENT: Send the patient for IV or NG treatment**

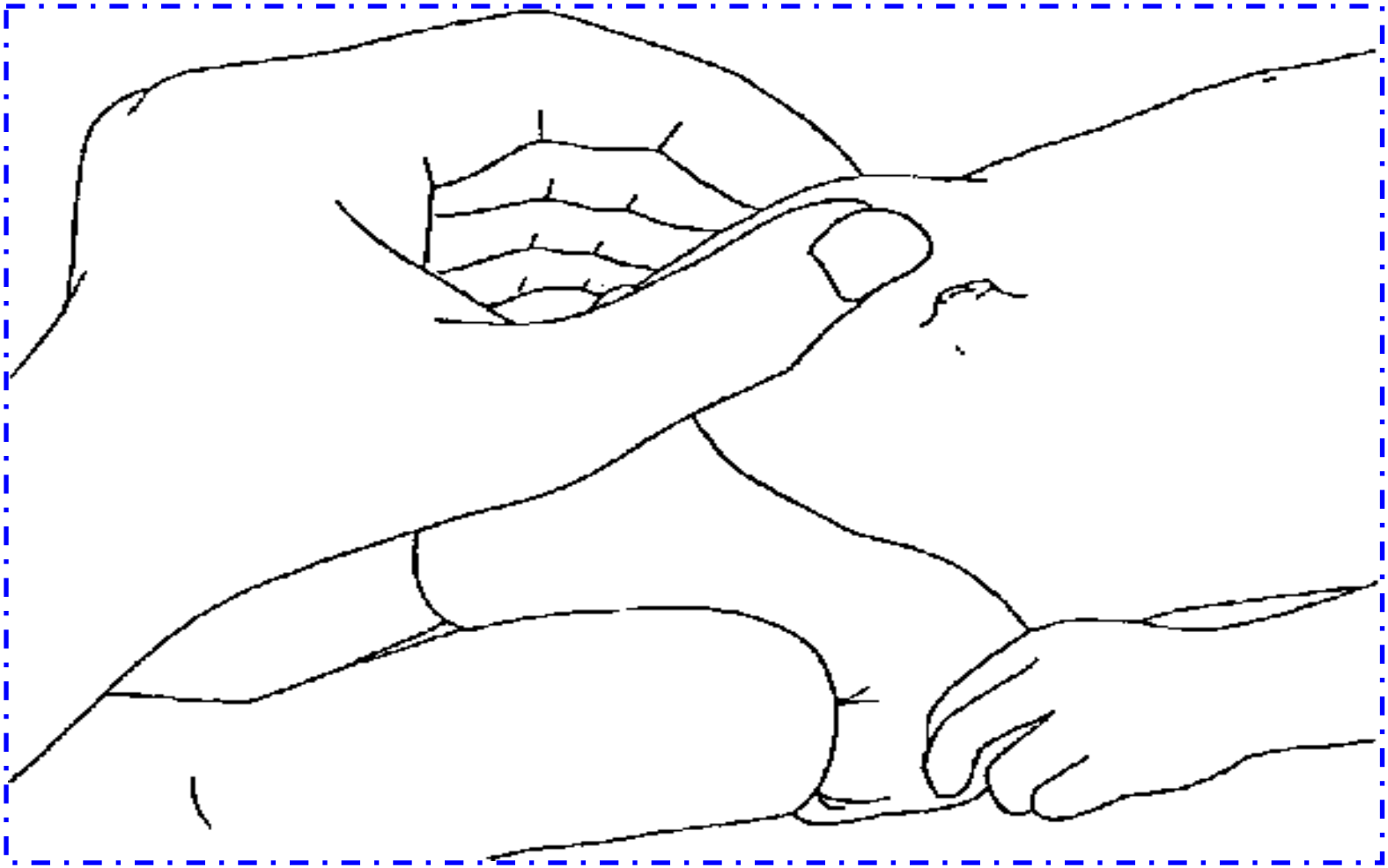
**NOTES:**

- If possible, observe the patient at least 6 hours after rehydration to be sure the mother can maintain hydration giving ORS solution by mouth.
- If the patient is above 2 years and there is cholera in your area, give an appropriate oral antibiotic after the patient is alert.

# FIRST, ASSESS YOUR PATIENT FOR DEHYDRATION

| | A | B | C |
|---|---|---|---|
| 1. LOOK AT: CONDITION | Well, alert | * Restless, irritable * | * Lethargic or unconscious; floppy * |
| EYES | Normal | Sunken | Very sunken and dry |
| TEARS | Present | Absent | Absent |
| MOUTH and TONGUE | Moist | Dry | Very dry |
| THIRST | Drinks normally, not thirsty | * Thirsty, drinks eagerly * | * Drinks poorly or not able to drink * |
| 2. FEEL: SKIN PINCH | Goes back quickly | * Goes back slowly * | * Goes back very slowly * |
| 3. DECIDE. | The patient has NO SIGNS OF DEHYDRATION | If the patient has two or more signs including at least one * sign *, there is SOME DEHYDRATION | If the patient has two or more signs, including at least one * sign *, there is SEVERE DEHYDRATION |
| 4. TREAT: | Use Treatment Plan A | Weigh the patient, if possible, and use Treatment Plan B | Weigh the patient and use Treatment Plan C URGENTLY |

# PINCH WE SKIN OF THE ABDOMEN



# TREATMENT PLAN A
# TO TREAT DIARRHOEA AT HOME

**USE THIS PLAN TO TEACH THE MOTHER TO:**

- Continue to treat at home her child's current episode of diarrhoea.
- Give early treatment for future episodes of diarrhoea.

**EXPLAIN THE THREE RULES FOR TREATING DIARRHOEA AT HOME:**

1. **GIVE THE CHILD MORE FLUIDS THAN USUAL TO PREVENT DEHYDRATION:**
   - Use recommended home fluids. These include: ORS solution, food-based fluids (such as soup, rice water, and yoghurt drinks) and plain water. Use ORS solution for children described in the box below. (Note: If the child is under 6 months old and is not yet taking solid food, give ORS solution or water rather than a food-based fluid).
   - Give as much of these fluids as the child will take. Use the amounts shown below for ORS as a guide.
   - Continue giving these fluids until the diarrhoea stops.
2. **GIVE THE CHILD PLENTY OF FOOD TO PREVENT MALNUTRITION:**
   - Continue to breast-feed frequently.
   - If the child is not breast-fed, give the usual milk.
   - If the child is 6 months or older, or already taking solid food:
     - Also give cereal or another starchy food mixed, if possible, with pulses, vegetables, and meat or fish. Add 1 or 2 teaspoonfuls of vegetable oil to each serving.
     - Give fresh fruit juice or mashed banana to provide potassium.
     - Give freshly prepared foods. Cook and mash or grind food well.
     - Encourage the child to eat; offer food at least 6 times a day.
     - Give the same foods after diarrhoea stops, and give an extra meal each day for two weeks.
3. **TAKE THE CHILD TO THE HEALTH WORKER IF THE CHILD DOES NOT GET BETTER IN 3 DAYS OR DEVELOPS ANY OF THE FOLLOWING:**
   - *Many watery stools*
   - *Repeated vomiting*
   - *Marked thirst*
   - Eating or drinking poorly
   - Fever
   - Blood in the stool

***CHILDREN SHOULD BE GIVEN ORS SOLUTION AT HOME, IF:***

- *They have been on Treatment Plan B or C.*
- *They cannot return to the health worker if the diarrhoea gets worse.*
- *It is national policy to give ORS to all children who see a health worker for diarrhoea.*

**THE CHILD WILL BE GIVEN ORS SOLUTION AT HOME, SHOW THE MOTHER HOW MUCH ORS TO GIVE AFTER EACH LOOSE STOOL AND GIVE HER [illegible] PACKETS FOR 2 DAYS.**

| Age | Amount of ORS to give after each loose stool | Amount of ORS to provide for use at home |
|---|---|---|
| Less than 24 months | 50-100 ml | 500 ml/day |
| 2 up to 10 years | 100-200 ml | 1000 ml/day |
| 10 years or more | As much as wanted | 2000 ml/day |

- Describe and show the amount to be given after each stool using a local measure.

**SHOW THE MOTHER HOW TO MIX ORS.**

**SHOW HER HOW TO GIVE ORS:**

- Give a teaspoonful every 1-2 minutes for a child under 2 years.
- Give frequent sips from a cup for an older child.
- If the child vomits, wait 10 minutes. Then give the solution more slowly (for example, a spoonful every 2-3 minutes).
- If diarrhoea continues after the ORS packets are used up, tell the mother to give other fluids as described in the first rule above or return for more ORS.

# TREATMENT PLAN B
# TO TREAT DEHYDRATION

**APPROXIMATE AMOUNT OF ORS SOLUTION TO GIVE IN THE FIRST 4 HOURS:**

| Age: * | Less than 4 months | 4 - 11 months | 12 - 23 months | 2 - 4 years | 5 - 14 years | 15 years or older |
|---|---|---|---|---|---|---|
| Weight: | Less than 5 kg | 5 - 7.9 kg | 8 - 10.9 kg | 11 - 15.9 kg | 16 - 29.9 kg | 30 kg or more |
| in ml | 200-400 | 400-600 | 600-800 | 800-1200 | 1200-2200 | 2200-4000 |
| in local measure | | | | | | |

* Use the patient's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the patient's weight (in kg) times 75.

- If the child wants more ORS than shown, give more.
- Encourage the mother to continue breast-feeding.
- For infants under 6 months who are not breast-fed, also give 100-200 ml clean water during this period.

**OBSERVE THE CHILD CAREFULLY AND HELP THE MOTHER GIVE ORS SOLUTION:**

- Show her how much solution to give her child.
- Show her how to give it - a teaspoonful every 1-2 minutes for a child under 2 years, frequent sips from a cup for an older child.
- Check from time to time to see if there are problems.
- If the child vomits, wait 10 minutes and then continue giving ORS, but more slowly, for example, a spoonful every 2-3 minutes.
- If the child's eyelids become puffy, stop ORS and give plain water or breast milk. Give ORS according to Plan A when the puffiness is gone.

**AFTER 4 HOURS, REASSESS THE CHILD USING THE ASSESSMENT CHART. THEN SELECT PLAN A, B, OR C TO CONTINUE TREATMENT.**

- If there are **no signs of dehydration**, shift to Plan A. When dehydration has been corrected, the child usually passes urine and may also be tired and fall asleep.
- If signs indicating **some dehydration** are still present, repeat Plan B, but start to offer food, milk and juice as described in Plan A.
- If signs indicating **severe dehydration** have appeared, shift to Plan C.

**IF THE MOTHER MUST LEAVE BEFORE COMPLETING TREATMENT PLAN B:**

- Show her how much ORS to give to finish the 4-hour treatment at home.
- Give her enough ORS packets to complete rehydration, and for 2 more days as shown in Plan A.
- Show her how to prepare ORS solution.
- Explain to her the three rules in Plan A for treating her child at home:
  - to give ORS or other fluids until diarrhoea stops
  - to feed the child
  - to bring the child back to the health worker, if necessary.

# USE OF DRUGS
# FOR CHILDREN WITH DIARRHOEA

- ANTIBIOTICS should ONLY be used for dysentery and for suspected cholera cases with severe dehydration. Otherwise, they are ineffective and should NOT be given.
- ANTIPARASITIC drugs should ONLY be used for:
  - Amoebiasis, after antibiotic treatment of bloody diarrhoea for *Shigella* has failed or trophozoites of *E. histolytica* containing red blood cells are seen in the faeces.
  - Giardiasis, when diarrhoea has lasted at least 14 days *and* cysts or trophozoites of *Giardia* are seen in faeces or small bowel fluid.
- ANTIDIARRHOEAL DRUGS and ANTIEMETICS should NEVER be used. None has proven practical value. Some are dangerous.

# TREATMENT PLAN C
# TO TREAT
# SEVERE DEHYDRATION QUICKLY

FOLLOW THE ARROWS. IF ANSWER IS "YES", GO ACROSS. IF "NO", GO DOWN

START HERE

**Can you give intravenous (IV) fluids immediately?**

YES →

- Start IV fluids immediately. If the patient can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's Lactate Solution (or, if not available, normal saline), divided as follows:

| Age | First give 30 ml/kg in: | Then give 70 ml/kg in: |
|---|---|---|
| Infants (under 12 months) | 1 hour * | 5 hours |
| Older | 30 minutes * | 2 1/2 hours |

* Repeat once if radial pulse is still very weak or not detectable.

- Reassess the patient every 1-2 hours. If hydration is not improving, give the IV drip more rapidly.
- Also give ORS (about 5 ml/kg/hour) as soon as the patient can drink: usually after 3-4 hours (infants) or 1-2 hours (older patients).
- After 6 hours (infants) or 3 hours (older patients), evaluate the patient using the assessment chart. Then choose the appropriate Plan (A, B or C) to continue treatment.

NO ↓

**Is IV treatment available nearby, (within 30 minutes)?**

YES →

- Send the patient immediately for IV treatment.
- If the patient can drink, provide the mother with ORS solution and show her how to give it during the trip.

NO ↓

**Are you trained to use a naso-gastric (NG) tube for rehydration?**

YES →

- Start rehydration by tube with ORS solution: Give 20 ml/kg/hour for 6 hours (total of 120 ml/kg).
- Reassess the patient every 1-2 hours:
  - If there is repeated vomiting or increasing abdominal distension, give the fluid more slowly.
  - If hydration is not improving after 3 hours, send the patient for IV therapy.
- After 6 hours, reassess the patient and choose the appropriate Treatment Plan.

NO ↓

**Can the patient drink?**

YES →

- Start rehydration by mouth with ORS solution, giving 20 ml/kg/hour for 6 hours (total of 120 ml/kg).
- Reassess the patient every 1-2 hours:
  - If there is repeated vomiting, give the fluid more slowly.
  - If hydration is not improving after 3 hours, send the patient for IV therapy.
- After 6 hours, reassess the patient and choose the appropriate Treatment Plan.

NO ↓

**URGENT: Send the patient for IV or NG treatment**

**NOTES:**

- If possible, observe the patient at least 6 hours after rehydration to be sure the mother can maintain hydration giving ORS solution by mouth.
- If the patient is above 2 years and there is cholera in your area, give an appropriate oral antibiotic after the patient is alert.

# THEN, FOR OTHER PROBLEMS

## ASK ABOUT BLOOD IN THE STOOL

**IF BLOOD IS PRESENT:**

- Treat for 5 days with an oral antibiotic recommended for *Shigella* in your area.
- Teach the mother to feed the child as described in Plan A.
- See the child again after 2 days if:
  - under 1 year of age
  - initially dehydrated
  - there is still blood in the stool
  - not getting better
- If the stool is still bloody after 2 days, change to a second oral antibiotic recommended for *Shigella* in your area. Give it for 5 days.

## ASK WHEN THIS EPISODE OF DIARRHOEA BEGAN

**IF DIARRHOEA HAS LASTED AT LEAST 14 DAYS:**

- Refer to hospital if:
  - the child is under 6 months old
  - dehydration is present. (Refer the child after treatment of dehydration.)
- Otherwise, teach the mother to feed her child as in Plan A, except:
  - give only half the usual amount of milk, or replace milk with a fermented milk product, such as yoghurt.
  - assure full energy intake by giving 6 meals a day of thick cereal and added oil, mixed with vegetables, pulses, meat, or fish.
- Tell the mother to bring the child back after 5 days:
  - if diarrhoea has not stopped, refer to hospital.
  - if diarrhoea has stopped, tell the mother to:
    - use the same foods for the child's regular diet.
    - after 1 more week, gradually resume the usual animal milk.
    - give an extra meal each day for at least 1 month.

## LOOK FOR SEVERE MALNUTRITION

**IF THE CHILD HAS SEVERE MALNUTRITION:**

- Do not attempt rehydration; refer to hospital for management.
- Provide the mother with ORS solution and show her how to give 5 ml/kg/hr during the trip.

## ASK ABOUT FEVER AND TAKE TEMPERATURE

**IF THE CHILD IS UNDER 2 MONTHS OF AGE:**

- Rehydrate as necessary. If there is fever (38° C or above) after rehydration, refer to hospital. Do not give paracetamol or an antimalarial.

**IF THE CHILD IS 2 MONTHS OF AGE OR OLDER:**

- If temperature is 39° C or above, give paracetamol.
- If there is falciparum malaria in the area, and the child has any fever (38° C or above) or history of fever in the past 5 days, give an antimalarial (or manage according to your malaria programme recommendation).

# *CLASSIFICATION TABLE FOR DEHYDRATION*

| SIGNS | CLASSIFY AS | IDENTIFY TREATMENT<br>(Urgent pre-referral treatments are in bold print.) |
|---|---|---|
| Two of the following signs:<br>▪ Lethargic or unconscious<br>▪ Sunken eyes<br>▪ Not able to drink or drinking poorly<br>▪ Skin pinch goes back very slowly | **SEVERE DEHYDRATION** | ➢ If child has no other severe classification:<br>—Give fluid for severe dehydration (Plan C).<br>OR<br>**If child also has another severe classification:**<br>**— Refer URGENTLY to hospital with mother giving frequent sips of ORS on the way.**<br>**Advise the mother to continue breastfeeding**<br>➢ **If child is 2 years or older and there is cholera in your area, give antibiotic for cholera.** |
| Two of the following signs:<br>▪ Restless, irritable<br>▪ Sunken eyes<br>▪ Drinks eagerly, thirsty<br>▪ Skin pinch goes back slowly | **SOME DEHYDRATION** | ➢ Give fluid and food for some dehydration (Plan B).<br>➢ **If child also has a severe classification:**<br>**— Refer URGENTLY to hospital with mother giving frequent sips of ORS on the way. Advise the mother to continue breastfeeding.**<br>➢ Advise mother when to return immediately.<br>➢ Follow-up in 5 days if not improving. |
| Not enough **signs to classify as some or severe** dehydration | **NO DEHYDRATION** | ➢ Give fluid and food to treat **diarrhea at home** (Plan A).<br>➢ Advise mother when to return immediately.<br>➢ Follow-up in 5 days if not improving. |

# Prevention

- **Nonspecific prevention:**

- Earlier discovery of the patients and their isolation at home or in the hospital.
- The cases are reported to the Public Health Authorities.
- Daily clinical observation of the contacts for 7 days and their bacteriological examination.
- Single bacteriological examination is made in all the patients after 2 days when the antibacterial therapy is finished.
- Observation of the Shigella, Salmonella carriers.
- Rotaviral infections can be prevented by vaccination.

# Exemple of diagnoses:

- ***Salmonellosis thyphimurium (gastroenterocolitis), severe form. Severe dehydration.***
- ***Salmonellosis enteritidis (gastroenteritis), moderate form. Moderate dehydration.***
- ***Salmonellosis enteritidis (gastritis), moderate form. No dehydration.***
- ***Shigellosis Sh. sonnei, moderate form. No dehydration.***
- ***Shigellosis Sh. Sonnei (atipical dyspeptic form), mild. No dehydration.***
- ***Escherichiosis E. coli enteropatogenic O111 (gastroenteritis), moderate form. Moderate dehydration.***
- ***Rotaviral infections, severe form. Severe dehydration.***