MINISTRY OF HEALTH OF UKRAINE

DANYLO HALYTSKYI LVIV NATIONAL MEDICAL UNIVERSITY

PEDIATRIC INFECTIOUS DISEASES DEPARTMENT

GUIDELINES

FOR PRACTICAL CLASSES FOR 6th YEAR STUDENTS

SPECIALTY "GENERAL MEDICINE"

PROFILE COURSE OF CHOISE **" OBSTETRICS AND GYNECOLOGY"**

«DIFFERENTIAL DIAGNOSTICS OF ACUTE INTESTINAL INFECTIONS (SALMONELOSIS, SHIGELLOSIS, ESHERICHIOSIS, YERSENIA ENTEROCOLITICA INFECTION, ROTAVIRUS INFECTION) IN CHILDREN. SYNDROMES OF TOXICOSIS AND DEHYDRATATION. TREATMENT»

LVIV-2021

These guidelines are made according to the working curriculum on children's infectious diseases for students of the second (master's) level of higher education in the field of knowledge 22 "Health" specialty 222 "Medicine"

Guidelines were prepared by teachers of the Department of Pediatric Infectious Diseases of LNMU Danylo Halytsky: H. Lytvyn (PhD) Associated Professor, O.Hladchenko (PhD) Assistant of the Department, A. Orfin Assistant of the Department.

Reviewed by: D. Dobriansky, Doctor of Medical Sciences, professor, Danylo Halytskyi Lviv National Medical University

M. Shumylo Senior lecturer, of the Department of Latin and Forein Languages, Danylo Halytskyi Lviv National Medical University

The editor-in-chief –A.Nadraga (MD, PhD), Professor, the Dean of The Medical Faculty №2 Danylo Halytskyi Lviv National Medical University ; Y. Varyvoda (PhD), Associated Professor, the Dean of The Medical Faculty of the International Students Danylo Halytskyi Lviv National Medical University

Guidelines were approved at the meeting of the Department of Pediatric Infectious Diseases Danylo Halytskyi Lviv national medical university.
№229 dated June 22, 2021.

Guidelines were approved at the meeting of the methodical commission on pediatric disciplines of the medical faculty № 2 Danylo Halytskyi Lviv national medical university № 3 dated September 7, 2021

Guidelines to lesson for students of the 6th year

(practical classes – 6 hours)

«Differential diagnostics acute intestinal infections (salmonelosis, shigellosis, esherichiosis, yersenia enterocolitica infection, rotavirus infection) in children. Syndromes of toxicosis and dehydratation. Treatment.»

I

Aim: to know diagnostic criteria`s of intoxication and of dehydration syndrome in children, determine its type, period and phase, perform differential diagnosis, and treatment.

Professional motivation: Intoxication and dehydration are generalized answer on infectious agent or its products in case of massive toxins' income in blood with development of toxemia. Main pathologic processes in organism are connected with development of dehydration and loss of electrolytes. Progress of these processes leads to impairment of blood circulation, hypoxia of tissues, metabolic acidosis, toxic shock syndrome, and polyorganic insufficiency. All this requires from the doctor to know diagnostic criterions, duration, treatment and prevention of this pathology.

1. To know how to ask complaints, history of the disease and life in children with acute intestinal infections (propaedeutic pediatrics, children infectious diseases).
2. To perform clinical examination of the child with acute gastrointestinal disease (propaedeutic pediatrics, children infectious diseases).
3. To diagnose intoxication with dehydration after clinical, laboratory and instrumental examination of the child (children infectious diseases, propedeutic pediatrics).
4. Management of intoxication with dehydration (pharmacology, infection diseases).

II. Primary aims of the study

A student should know:

1. Etiology, epidemiology, the main links in the pathogenesis of acute intestinal infections in children

2. Differential diagnosis of AII, with a description of the main symptoms and syndromes

3. Features of the clinic and the course of AII in children of the first year of life.

4. Types of toxicosis and dehydration, pathogenesis of their occurrence, clinical characteristics

5. Clinical characteristics of degrees of exsiccosis

6. Syndrome of toxicosis, neurotoxicosis and dehydration in AII in children

7. Toxic-septic condition, hemolytic-uremic syndrome

8. Laboratory and instrumental research methods to confirm the diagnosis of AII, and interpretation of indicators that reflect the pathological state of the body in AII

9. Complications that may accompany AII and occur as a result of the disease

10. Principles of therapy of toxicosis, dehydration, ITS and HUS in AII

11. Principles of AII prevention, including terms and rules of preventive vaccinations.

student should be able:

1. To follow the basic rules of work with a bed patient with Salmonelosis, Shigellosis, Esherichiosis, Yersenia enterocolitica infection, Rotavirus infection.

2. To take anamnesis with the estimation of epidemiology information (taking into account seasonality, origin of febricities, polymorphism of clinical signs of illness).

3. To examine a patient and reveal the basic clinical signs of illness.

4. To represent information of anamnesis and objective inspection in a hospital chart and formulate the preliminary diagnosis.

5. 5. To carry out differential diagnosis of AII among themselves and with other pathological conditions.

6. To diagnose emergencies that may occur on the background of AII

7. Make a plan for examination of the patient and appoint laboratory and / or instrumental studies.

8. Justify the clinical diagnosis by determining the degree of toxicosis and exicosis.

9. Assign the necessary diet, diet, etiotropic and pathogenetic therapy for AII

10. To be able to carry out correction of pathological losses of liquid at a dehydration syndrome against AII

11. Be able to provide emergency care in case of threat to the patient's life (hyperthermia, convulsions)

12. Be able to write prescriptions for basic drugs for the treatment of AII.

III. Educational aims of the study

- to form the deontological presentations, skills of conduct with the patients
- to develop deontological presentations, be able to carry out deontological approach to the patient
- to develop the presentations of influence of ecological and socio-economic factors on the health condition
- to develop sense of responsibility for the time of illness and loyalty of professional actions
- to be able to set psychological contact with a patient and his family.

IV. Interdisciplinary integration

Table 1

Subjects	To Know	To Know How
Human Anatomy	The main anatomic characteristics of GIT	
Physiology	Function of GIT	To explain a variety of clinical signs and laboratory abnormalities
Pathological Physiology	Pathogenesis of disease	To explain the main symptoms and signs appearance, causes of failure of inadequate therapy
Pathological Anatomy	Pathology	To explain the pathogenesis of complications and causes of death
Microbiology	Etiology (classification, morphologic characteristic of the pathogen, methods of revealing and identification)	To reveal the causative agent
Pharmacology	The main solutions for rehydration and antibacterial agents. Regimens of treatment.	To administer treatment of GIT. To write the scheme of treatment of severe disease.

	Treatment of complicated disease. Significance of supportive care	
Histology	Histological changes typical for disease	Explanation of clinical signs appearance
Propedeutics of Children Diseases	History of disease. Patient's examination.	To gather information about patient's history and chief complaints, to distinguish those, most important for diagnosis. To examine the patient, to reveal the main symptoms and signs of disease. To distinguish the set of diagnostic features of disease. To argue the diagnosis.
Pediatric Diseases	Diarrhea and vomiting	To differentiate with other disorders of GIT
Neurology	Diarrhea, vomiting, altered consciousness	Differential diagnosis with neurological disorders
Clinical immunology and allergology	Immunologic changes as a part of pathogenesis and host defenses	To explain confirmative serologic tests
Epidemiology	The ways of transmission, main sources of infection	Epidemiological history
Themes integration		
Escherichiosis, salmonellosis, shigellosis , viral diarrheas	To know peculiarities of manifestations, laboratory diagnosis, treatment	To differentiate viral and bacterial GIT with other infectious diseases with similar symptoms

V. The contents of the theme

Acute gastrointestinal disease is a group of different etiology (viral, bacterial, fungal, parasitic), which are characterized by fecal-oral way of transmission and predominant involvement of gastrointestinal tract.

According to WHO classification all diarrheal human disease is divided into infectious and non-infectious. Infectious diarrheas are further divided into invasive (inflammatory, bloody) and secretory (non-inflammatory, watery).

Secretory diarrheas are caused mainly by viruses and some bacteria producing enterotoxin. The causative agents of secretory diarrheas are first of all rotaviruses, noraviruses, adenoviruses (serotypes 40 and 41), enteroviruses, astroviruses, coronaviruses, reoviruses, as well as such bacteria as cholera vibrion, enteropathogenic and enterotoxigenic Escherichia coli. Besides, secretory diarrhea can be caused by some protozoa.

Invasive diarrhea is caused by shigella, salmonella, enteroinvasive and enterohemorrhagic escherichia, intestinal yersinia, campylobacter, clostridia, staphylococcus and some other enterobacteria. Besides bacteria, invasive diarrhea can be caused by amoeba hystolytica.

Currently the following mechanisms of development of diarrhea syndrome at acute GIT infections are described:

1. *Osmotic.* At majority of viral diarrhea, the villous intestinal epithelium is damaged; on the surface of this epithelium synthesis of disaccharides occurs (lactase, maltase, sucrose). Their insufficient synthesis leads to accumulation of disaccharides in intestinal lumen and increase in osmotic intra-intestinal pressure, which prevents water absorption. Besides, at viral diarrhea the activity of K-Na-ATPase is decreased in enterocytes, resulting into decreased sodium and glucose transportation inside intestinal cells; these chemicals are conductors of water.

Osmotic mechanism of diarrhea predominates at viral GIT infections.

2. *Secretory.* Under the influence of enterotoxins, activation of enzyme adenylate cyclase occurs in enterocyte membrane; this enzyme promotes synthesis of cyclic nucleotides (cAMP and cGMP) with participation of ATP. Accumulation of the latter stimulates specific phospholipases which regulate cell membrane permeability and increase water and electrolyte secretion into intestinal lumen.

Secretory mechanism of diarrhea is seen at ABI caused by enterotoxin-producing microbes. Classical examples are cholera and enterotoxic escherichiosis.

3. *Exudative or inflammatory.* At invasion of some microbes into intestinal wall there develops inflammation which is accompanied by synthesis of inflammatory mediators (kinins, prostaglandins, histamine, serotonin, cytokines). It is accompanied by direct damage of cellular membranes, increase of their permeability, disturbances in GIT mucosa microcirculation and increase of its motility. Inflammatory mediators can directly activate adenylate cyclase. A large amount of exudate containing mucus, protein and blood is secreted into intestinal lumen at invasive infections. This increases volume of intestinal content and amount of fluid in it.

Exudative mechanism develops in invasive diarrheas.

Diarrhea Classification

Table 2

Diarrhea's type	Diagnostic's criteria	Severity	Main clinical syndrome
Invasive (bacterial)	Watery feces with pathological admixture (mucus,purulence, greenness color, blood)	Mild Moderate Severe	• Primary intoxication (neurotoxicosis) • Intoxication with dehydration I, II and III degree • Toxic shock • Hemolytic-uremic syndrome (HUS)
Secretory (enterotoxigenic, enteropethogenic e.coli)	Watery feces, massive, without pathological admixtures		
Prolonged	Long-lasting diarrhea (more 2 weeks) with pathological admixtures		
Osmotic (viral)	Watery, frequent feces		

Criteria of the Diarrhea Severity

Table 3

Criteria	Mild current	Moderate current	Severe current
Local manifestations	regurgitation, vomiting 1-2 times per day, feces less than 7-8 times per day, changed nature with small amount of mucus, but with increase of stools,	multiple vomiting, as a rule after receiving the food, feces to 15 times per day, watery, with much mucus, can be bloody mucus, metheorism	multiple vomiting not only after receiving the food, but also independent, can be with bile, sometimes - as coffee lees, feces - more 15 times per day,

	moderate metheorism		sometimes - with each diaper, much mucus, there is blood, sometimes - an intestinal bleeding
General manifestations	General condition mild moderate, loss appetite, body temperature is normal or subfebrile, decreases of the body weight, visible signs of intoxication and dehydration are absent	General condition is moderate, malaise or excitement, loss appetite, poor sleeping, moderate signs of intoxication and dehydration, body temperature is 38-39º C, body weight decreases	General condition is severe, changes in all organs and systems, quite often - sopor, loss of the consciousness, seizures, severe intoxication and dehydration, body weight decreases

For the best evaluation clinical severity of acute gastrointestinal disorders, we recommend to use modern Vesikari Score.

Modified Vesikari Score

Table 4

Points	**0**	**1**	**2**	**3**
Diarrhea duration (hr)	0	1-96	97-120	≥ 121
Max no. Of diarrheal stools/24 hr period (in the course of the	0	1-3	4-5	≥ 6

disease)				
Vomiting duration (hr)	0	1-24	25-48	≥ 49
Max no. Of vomiting episodes/24 hr period (in the course of the disease)	0	1	2-4	≥ 5
Max recorded fever	< 37.0°C	37.1-38.4 °C	38.5-38.9°C	≥ 39.0°C
Future healthcare visit	0	-	Primary Care	Emergency Dept.
Treatment	None	Rehydration	Hospitalization	-

Points: NaN

- **Less than 11 points** – mild form
- **11 -15 points** – moderate form
- **16 and more points**– severe form

VI. Planning of the lesson

Table 5

	The main stages of a lesson, their contents	**The methods of control**	**Methodical equipment**	**Time in % from total time of a lesson**
10-20 %				
1	Organization stage			
2	Purposes of a lesson		Relevance of the Theme. Tutorial goals of a lesson	1-3min
3	Basic knowledge and skills control	Control questions	The list of control questions	10-15 min
	1.Etiology, epidemiology, classification of disease	Test-control (first grade)	Tests of the first level	
	2. Manifestations in connection with pathogenesis	Methods of the second grade: Individual questioning in oral and writing form. Standard task's solution. Second grade test-control	Questions Clinical cases (tests of the second grade) Theory tasks for writing answers. Second grade tests	
	3. Treatment	Methods of the third grade: 1. Solution of	Third grade questions and tasks Third grade tests	

		complicated tasks. 2.Third grade test-control		
	4. Prevention			
70-80 %				
1	Professional skills formation	Patients with studied disease and similar diseases, patient's histories, medical cases.		
	To master the skills of: a) Diagnosis b)Laboratory confirmation c) Treatment	Llaboratory data of the patients, antibacterial drugs and drugs for supportive care		
	Independent work with patients	Patients, patient's histories, medical cases.		
	Differential diagnosis	Drawing schemes of pathogenesis and clinical course of disease; making up a differential diagnosis table and list of prescriptions for intensive care.		
10 %				

	Teacher's control, recommendations, the task for the next lesson		10-15 min

Students' independent study program.

1. Objectives for students' independent studies.

Student should prepare for the practical class using the existing textbook and lectures. Special attention should be paid to the following:

Differential-Diagnostic Criteria of Diarrheal Diseases

Table 6

Criteria	**Escherichiosis enteroinvasive (EIEC)**	**Escherichiosis Enterohemorrhagic (EHEC)**	**Salmonelosis**	**Shigellosis**
Epidemiological anamnesis	Sporadic diseases of children 3 year old and adult	Sporadic or epidemic outbreaks in children undr 6 y.o.	Sporadic or epidemic outbreaks in children undr 6 y.o.	Both sporadic, and group diseases, (usually children 2-7 y.o, under 1 y/o - rare)
Way of transmission	Food – usually, water - smth	food	(1) Fecal-oral (alimentary, food, water, contact); (2) vertical way	Alimentary, food, water
Source of infections	Saick person, carrier	Sick person	Sick person, sick animals, carriers, contaminated food	Sick person, carriers

Etiology	**Enteroinvasive e.coli**	**Enterohemorrhagic e.coli**	**Salmonellae enteritidis, S.typhimurium**	**Shigellae a)S.dysentariae b)S.flexneri c)S.boydii e)S.sonnei**
Incubation period	1-3 days	3-7 days	8-36 ho – food transm. 5-7 days – contact transm.	6-7 ho.- 7 days
High temperature	Subfebrile or febrile 2-3 days	Febrile on 2^{nd}-3^{rd} day	Febrile 7 and more days	febrile 3-5 days and more
Intoxication	More often moderately 1-3 days,	Severe after 3-5 days	Increase gradually	Different degree, 3-7 days, precedes intestinal manifestations
Dehydration	Not severe	Not severe	Not severe	Not severe
Duration	3-5 days		Acute 30 days Long term-up to 3 mo. Chronic	7 and more days
Feces	Watery, feces stool admixtures with mucus, greenish or blood	Watery diarrhea no admixtures from the beginning than a lot of blood	Dark-green with mucus (“marsh mug”), with blood	Big amount of mucus, - blood and pus - rectal spit
Vomiting	From the beginning of	Not typical	Repeated vomiting	Expressed, is not long-lasting (3-5

	the dis., not long-term			days)
Metheorism	optionally	Severe spastic abdominal pain	Abdomen is spasmatic	Abdomen is sealed
Koprogram	enzyme changes, inflammatory changes, blood	enzyme changes, inflammatory changes, blood	enzyme changes, inflammatory changes (WBC 10-20 per fields), RBC, mucus	Inflammatory changes (WBC 30-40 per fields), RBC, mucus
Liver	not increased	not increased	Increased (septic forms)	Can be increased
Spleen	not increased	not increased	Increased (septic forms)	Not increased
Outcomes			Recovery, carrier	Recovery, carrier

Differential-Diagnostic Criteria of Diarrheal Diseases

Table 7

Criteria	**Escherichiosis enteropathogenic**	**Escherichiosis enterotoxigenic**	**Rotaviral infectious**
Epidemiological anamnesis	Sporadic outbakes among children before 1 year old, (immunocompromised often) more often in hospital	Sporadic outbakes among children before 1 year old, more often in hospital	Both outbreaks and less sporadic diseases, on background of other catarrhal manifestations in the upper respiratory tract
Sourse of infection	Sick person	Sick person	Sick person or carrier

Way of transmission	Contact, food – usually Airway, water - sometimes	Food –usually, water, contact - smth	Fecal-oral
Etiology	**Enteropatogenic e.coli**	**Enterotoxigenic e.coli**	**Rotavirus**
Incubation period	5-8 days	Few ho.-1-2 days	1-5 days
High temperature	Subfebrile or febrile 1-2 weeks	Subfebrile or normal	3-4 days, subfebril, rare - high
Intoxication	Not severe, as a rule not less 7 days,	No symptoms , prevails on diarrhea	No severe, 1-2 days
Dehydration	Often denominated, long-lasting	severe	severe
Duration	2-3 weeks	5-10 days (ETE)	7-10 days
Feces	Watery orange with or without mucus, Smth greenish	No feces stool	Watery, foamy, lightly colored, with small amount of mucus
Vomiting	From the beginning of the dis., can be long lasting	Moderate but optionally	Short (1-3 days), small (2-3 times in day) or, more often, is absent
Metheorism	Always dominate , long-lasting	Optionally	Moderately denominated, short (1-2 days)
Koprogram	enzyme changes, inflammatory changes	Mainly enzyme changes	Enzyme changes, smth mucus a little, WBC 0-1 per field
Liver	(septic forms)	not increased	not increased
Spleen	Increased (septic forms)	not increased	not increased
Otcomes	Recovery, carrying, septic forms	Recovery	Recovery

Dehydration a condition caused by the excessive loss of water from the body,
which causes a rise in blood sodium levels. Since dehydration is mostoften caused by excessiv e sweating, vomiting, or diarrhea, water lossis usually accompanied by a deficiency of electrol ytes. Untreated,
severe dehydration can lead to shock.

Dehydration Types (differential diagnostic features)

Table 8

Symptom, sign	**Hypertonic dehydration**	**Isotonic dehydration**	**Hypotonic dehydration**
Body temperature	Highly increased	Normal, subfebril	subnormal
Thirst	Severe	Moderate	Refuse to drink
CNS reaction	Exiting	Some exiting or depression	Adynamia
Concentration of the sodium in blood	Increased	Normal	Decreased
Loss of body weight	5-10 %	Less than 5 %	More than 10 %
Reflexes	Increased	Normal, seldom - reduced	Reduced
Turgor of the soft tissue and skin elasticity	Noticeably reduced	Noticeably not reduced	Sharply reduced
Skin covers	Sparingly pale, dry, extremities are warm	Pale, sparingly moist, extremities are moist, cool	Gray-ashen color, dry, acrocyanosis
Mucous membranes	Dry, brightly hyperemied, covered by thick mucus (seldom)	Mildly dry, usual coloration	dry, pale, rare - rose, often covered by thick mucus

Breathing	expressed dyspnea	Moderate shortness of breath	moderate dyspnea
Cardiac activity	Tones are weakened	Moderate tachycardia, tones are clean, weakened	Tachycardia, tones are weak, often systolic murmur on the apex
Blood pressure	Increased	Increased	Reduced
Feces	porridge-like or watery (frequent)	Often, dyspeptic	Thick, watery or dyspeptic
Vomiting	absent	Present	Often multiple
Diuresis	Preserved	Preserved	Oliguria
Specific density of the urine	First 1001-1018, afterwards - 1025-1035	Normal or is sparingly increased	First is high (over 1025), afterwards 1010 and less

Clinical features of dehydration

Table 9

Criteria		**Mild current (Ist)**	**Moderate current (IIst)**	**Severe current (IIIst)**
Loss of body weigh	***children under 3 y.o***	3-5%	6-9%	over than 10%
	children 3-14 y.o	less than 3%	less than 6%	less than 9%
General condition		irritation	irritation and sleepiness	weakness, sleepiness

Thirsty	drink greedily	drink greedily	not drink
Fontanale	normal	little reduce	reduce
Eyes	normal	soft	dry
Oral mucus membrane	moisture	little dry	dry
Turgor of the soft tissue and skin elasticity	noticeably reduced	noticeably not reduced	sharply reduced
Blood pressure	normal	increased	reduced
Diuresis	normal	reduce	sharply reduced till 10ml/kg per day

Management of Dehydration

Oral rehydration is prefere in all forms of dehydration (severe form require combination oral /intravascular)

It is performed in 2 stages by glucose-saline fluids:

I — regidrataion perfomed during 4-6 ho. I st – 30-50 ml/kg; for II st. – 60-100 ml/kg

II — during next 6 ho. The patient has to revive as more liquid as he(she) lost during last 6 ho. For children under 2 y.o – 50-100 ml, for children over 2 y.o – 100-200 ml or 10 ml/kg of liquid after every feces.

Oral intakes should be small — 0.5-1 tea spoon every 5-10 minutes, water and saline fluids should be warm and correlation is 1:1, in neonates — 2:1.

Severe form of dehydration requires combined oral and intravenous rehydration.

The most popular calculation of daily needs in liquid is method Holiday Segar

Physiological needs in liquid method Holiday Segar

Table 10

Weigh	**Daily needs**
1-10 kg	100ml/kg
10,1-20 kg	1000ml+50 ml/kg per each kg over 10

More than 20kg	15000 ml+20 ml/kg per each kg over 20

Example of calculation of physiological fluid requirements by method of Holiday Segar: in a child with body weight of 28 kg the daily fluid physiological requirement is: (100 ml X 10 kg) + (50 ml X 10 kg) + (20 ml X 8 kg) = 1660 ml/day.

Adequate rehydration criterions:

- Improvement of the clinical status;
- Progressive decreasing of dehydration;

Peroral rehydration should be stopped when it is ineffective, edema, oliguria develops.

Parenteral rehydration should be performed in case of:

- Severe dehydration with hypovolemic shock;
- Toxic shock syndrome;
- Combination of dehydration with hard intoxication;
- Oliguria, anuria;
- Nonstop vomiting;
- Ineffective peroral rehydration during one day.

Solutions for rehydration should be input in 2 days: 2/3 during the first day, 1/3 — during the second. From the third day – supporting of the hydration.

Accounting of the Fluids for Rehydration (in ml) per 1 kg of the Body Weight (by Dennis)

Table 11

Dehydration stage	**Fluid deficit , %**	**Before 1 year old**	**1-5 years**	**6-10 years**
I	5 %	130-150	100-125	75-100

II	5-10 %	170-200	130-170	100-110
III	> 10%	200-230	170-200	110-150

Correlation of IV fluids (water to saline):

- In case of isotonic dehydration — 1:1;
- In case of hypertonic dehydration — 2:1 or 3:1;
- In case of hypotonic dehydration — 1:2.

Start fluids:

- In case of hypertonic dehydration — 5 % glucose;
- In case of hypotonic dehydration — 0,9 % NaCl;
- In case of isotonic dehydration — 10 % glucose.

In case of nonstop vomiting during 4-6 hours' fluids should be intake only parenterally, its' amount may be 70-80 % of need. The speed of the infusion is: 25 drops per minute during first hour, 20 drops per minute during second hour, then — 10-15 drops per minute.

Correction of the electrolytes:

- Na, Cl deficit – by 0,9 % NaCl not more 100 ml/kg,
- K deficit – 4 % KCl 2-5 ml/kg, or 1-2 ml/kg 7,5 % KCl(1 ml of which is adequate to 1 mmol/l K)
- Mg deficit – 25 % $MgSO_4$ 0,75-1,0 ml/kg.

Correction of the intoxication:

- Oral rehydration in case of intoxication and dehydration I and II st.;
- Lytic suspension 0,1 ml/kg, seduxen 0,3 mg/kg, prednisone 2-3 mg/kg, dehydration – lasix 1-2 mg/kg (in case of neurotoxicosis);
- Infusion therapy (intoxication and dehydration II and III st.);
- hormones IV 5-20 mg/kg per day in 2-4 takes (by prednisone), albumin 5-15 ml/kg, rheopolyglucin 10-20 ml/kg, trental 0,1-0,2 ml/kg, contrical 1000 U/ kg, heparin 100-200 U/ kg (toxic shock syndrome);
- hemodyalis (in case of HUS).

Etiotrope treatment for 5-7 days: – for mild forms – without antibiotics, but furazolidon 10 mg/kg day in 4 doses, or ercefuril (niphuroxazide) may be used; for moderate,

severe (nosocomial) cases – Cefotaxim 100-150 mg/kg/day, Ceftriaxon 100mg/kg/day, or ciprophloxacin 10-20 mg/kg per day in 2 equal doses. Specific bactheriophage: Children before 6 months – 10 ml per day; 6 months – 36 months – 20 ml; older than 36 months – 50 ml 5-7 days.

Pathogenetical therapy: - probiotics for 2-3weeks; enterosorption during 5-7 days; diet; enzymes.

Symptomatic therapy: antipyretics, multivitamins.

Diet.

Clinical nutrition is a permanent and important component of diarrheal diseases management on all stages of the disease. Principal important point in sick children feeding is abandoning of water-and-tea interval, as it was proved that even at severe forms of diarrhea the digestive function of largest part of intestine is preserved, whereas starvation intervals slow down the processes of reparation, decrease intestinal tolerance to food, promote disturbances of digestion and considerably decrease protective mechanisms of the body.

Breast feeding must continue in spite of diarrhea. It is justified by the fact that breast milk lactose is well tolerated by children with diarrhea. Besides, breast milk contains epithelial, transformed and insulin-like growth factors. These factors promote rapid recovery of intestinal mucosa in children. The regimen of breast feeding is similar to that before the disease.

Formula fed children in acute phase of gastroenteritis should decrease the daily volume of meals on 1/2-1/3, at colitis on 1/2-1/4. The frequency of meals can be increased till 8-10 times per day for infants and till 5-6 per day for older children, especially with retching. At the same time the most physiological is considered to be early gradual restoration of feeding. Returning to qualitative and quantitative contain of food typical for given age is performed in the shortest possible terms after rehydration and disappearance of dehydration signs. It is considered that early recovery of normal meals pattern together with oral rehydration promotes decrease of diarrhea and more rapid intestinal reparation.

Important method influencing the duration of watery diarrhea is exclusion of disaccharides from food, if possible. In acute phase of viral diarrhea in infants usual adapted milk formula are recommended to be substituted by for low-lactase formula. Duration of low-lactase diet is

individual and depends on the child's condition. Usually it is given for acute period of the disease and is immediately stopped after appearance of more solid stool.

Children receiving additional food besides milk are recommended to be given milk-free cereals. It is recommended to suggest pectin-rich food (baked apples, banana, apple and carrot sauce). The latter are mostly indicated at GIT infections with colitis syndrome.

Prophylaxis of acute gastrointestinal diseases:

- Epidemiological control.
- Isolation and sanation of ill person and carriers.
- Reconvalescent may be discharged from hospital after one negative feces culture (taken 2 days after stop of antibiotic therapy).
- Dispensarisation of reconvalescents for 3 months.
- Feces culture in contacts, carriers.
- Looking after contacts for 7 days without quarantine.
- Disinfection in epidemic focus.

Differential-Diagnostic Criteria of Diarrheal Diseases

To table 6

Criteria	**Escherichiosis enteroinvasive (EIEC)**	**Escherichiosis Enterohemorrhagic (EHEC)**	**Salmonelosis**	**Shigellosis**
Epidemiological anamnesis				
Way of transmission				
Source of infections				
Etiology				
Incubation period				
High				

temperature				
Intoxication				
Dehydration				
Duration				
Feces				
Vomiting				
Metheorism				
Koprogram				
Liver				
Spleen				
Outcomes				

Differential-Diagnostic Criteria of Diarrheal Diseases

To table 7

Criteria	Escherichiosis enteropathogenic	Escherichiosis enterotoxigenic	Rotaviral infectious
Epidemiological anamnesis			
Sourse of infection			
Way of transmission			
Etiology			
Incubation period			
High temperature			

Intoxication			
Dehydration			
Duration			
Feces			
Vomiting			
Metheorism			
Koprogram			
Liver			
Spleen			
Outcomes			

Dehydration Types (differential diagnostic features)

To table 8

Symptom, sign	**Hypertonic dehydration**	**Isotonic dehydration**	**Hypotonic dehydration**
Body temperature			
Thirst			
CNS reaction			
Concentration of the sodium in blood			
Loss of body weight			
Reflexes			
Turgor of the soft tissue and skin elasticity			
Skin covers			

Mucous membranes			
Breathing			
Cardiac activity			
Blood pressure			
Feces			
Vomiting			
Diuresis			
Specific density of the urine			

Clinical features of dehydration

To table 9

Criteria	**Mild current (Ist)**	**Moderate current (IIst)**	**Severe current (IIIst)**

Loss of body weigh	***children under 3 y.o***			
	children 3-14 y.o			
General condition				
Thirsty				
Fontanale				
Eyes				
Oral mucus membrane				
Turgor of the soft tissue and skin elasticity				
Blood pressure				
Diuresis				

Tasks and assigments for self-assessment

1. What is the most frequent route of transmission of shigellosis caused by Sh. sonnei in children older than 3 years of age?

A. Water

B. Parentheral

C. Food

D. Transmissible

E. Contact

2. What laboratory method of investigation should be used at shigellosis during the first day of the disease for correct etiological diagnosis?

A. Coprologic investigation

B. Bacteriologic investigation of feces

C. Reaction of direct hemagglutination

D. Blood culture for sterility

E. Nasopharyngeal mucus culture

3. What sign is not typical for neurotoxicosis?

A. Seizures

B. Loss of consciousness

C. Oliguria

D. Focal signs

E. Neutrophilic cytosis in CSF

4. What is the antibiotic of choice at ABI with hemocolitis?

A. Ceftriaxone

B. Penicillin

C. Erythromycin

D. Amikacin

E. Gentamycin

5. What clinical form of salmonellosis is predominantly seen in 1st month of age children?

A. Gastrointestinal

B. Typhoid-like

C. Low-grade

D. Flu-like

E. Septic

6. Which escherichiosis can be accompanied by hemolytic-uremic syndrome?

A. Enteropathogenic

B Enteroinvasive

C. Enteroaggregative

D. Enterohemorrhagic

E. Enterotoxigenic

7. Fever at escherichiosis caused by EIEC typically is seen during:

A. 1-2 days

B. 4-5 days

C. 1 week

D. 2 weeks

E. More than 2 weeks

8. What is typical form of coronaviral infection?

A. Prominent seasonality

B. Affects only children

C. Affects only adults

D. Combination of rhinitis and pharyngitis

E. Development of anemia

9. Which part of gastro-intestinal tract is affected at rotaviral infection?

A. Stomach

B. Small intestine

C. Large intestine

D. Distal part of large intestine

E. All the questions are correct

10. What distinguishes shigellosis from rotaviral gastroenteritis?

A. Presence of enteritis

B. Presence of hepatolienal syndrome

C. Presence of hemocolitis

D. Absence respiratory syndrome

E. Presence of lymphadenopathy

Test answers

1-C, 2- B, 3-E, 4-A, 5-E, 6- D, 7-A, 8- D, 9-B, 10-C.

Cases

1. A child of 1-year-old developed acute illness: the body temperature rises to 38.7^0C, vomiting occurred once, diarrheal stools (6 times per day). On the 2^{nd} day of the disease, the child`s condition was moderately severe: paleness, reduced turgor of

tissues, heart sounds dull. The abdomen moderately flatulent, stools with the admixtures of mucus and blood, almost without fecal masses. The anus gaping, the surrounding skin hyperemic.

Questions: what the primary diagnosis? What laboratory investigation can verify the diagnosis? What changes hemogram are characteristic of this disease?

2. One-year-old boy was admitted for abdominal pain. Diarrhea with large amount f mucus, 4 times per hour. The boy temperature rose to 38.8 ^{0}C. During the last defecation, blood and cloudy mucus in the feces.

Questions: What is the suggested diagnosis? Enumerate objective symptoms most characteristic of this diseases? What laboratory investigation can confirm the diagnosis?

3. A 2-years old boy presents with a 3-day long history of fever, loss appetite, vomiting and diarrhea with mucus and blood up to 8 times a day. The patient`s father was hospitalized one week before a severe hemorrhagic colitis.

Questions: What is the most likely causative pathogen? What is the treatment plan? What laboratory tests should be performed?

4. A 3-years old child develops an abrupt onset of fever, watery diarrhea without of blood and mucus in the stool; vomiting and slightly manifested catarrhal signs preceded diarrheal. There are some more ill children with the same clinical picture were revealed at the child-care center.

Questions: What is the most likely diagnosis? Laboratory tests to confirm diagnosis? The plan of treatment? Whether the antimotility agents have a role in therapy of acute diarrhea in infants and toddlers with gastroenteritis?

5. A child of 1-year-old developed acute illness: the body temperature rose to 38.7^{0}C, vomiting, occurred once diarrheal stool (6 times a day). On the 2nd day of the diseases, the children condition was moderately severe: paleness, reduce turgor of tissue, heart sounds dull. The abdomen moderately flatulent, stools with the admixtures of mucus and blood, almost without fecal masses. The anus gapping, the surrounding skin hyperemic.

Questions: What is the primary diagnosis? What the laboratory investigation can verify the diagnosis? What changes of hemogram are characteristic of this diseases?

6. A 20-month-old child develops hemolytic anemia, anuria, and thrombocytopenia after a bout afebrile bloody diarrhea.

   Questions: What is the diagnosis? What is the most likely cause of this illness? Which laboratory tests should be performed to confirm etiology ant estimate the severity of cases?

7. A child 3 mo. had body temperature 38^0C, frequent vomiting, ant watery stool 10 times a day. She was hospitalized at the end of the second day after the onset of diseases. On the admission: severe condition, pale cyanotic skin, acrocyanosis, cold extremities, loss of weigh reduce tissue turgor, PR 170, dry the mouth mucus, abdomen was somewhat blown up, decrease in urine output – urine was absent during 12 ho ago, stool was watery dark-green colored. She did not want to drink.

   Questions: What is the diagnosis? Which laboratory tests should be performed to confirm the diagnosis? Count clinically similar diagnosis?

8. A 3 years old male presents with a 12-ho history of severe watery diarrhea, sunken eyes, poor skin turgor, dry mouth and anuria. He has no fever, polydipsia or polyphagia.

   Questions: which agents typically cause this syndrome? What is the main mechanism of this watery diarrhea? Which clinical syndrome is the most prominent and urgent for therapy? Why it occurs?

Aids and material tools: Charts "Acute gastrointestinal infections", "Intoxication with dehydration".

Student's practical activities:

I. Curation of patients with acute gastrointestinal infections at the children infectious department.

1. Ask complaints, anamnesis and life history.
2. Examine the patients; find clinical features of acute infection, intoxication and dehydration.
3. Prescribe laboratory investigations to prove the diagnose.

II. To perform the diagnosis:

1. Make previous diagnose due to complaints, disease history, epidemiological anamnesis, clinical objective features.
2. Make complete diagnose due to previous diagnose, laboratory dates, differential diagnosis.

III Provide the treatment (diet, medicine) depending on patient's age, severity of the disease.

IV Prescribe measures in the focus of infection, prevention of the disease.

V Clinical analyzing of the case.

Students must know:

1. Etiology, pathogenesis of intoxication with dehydration.
2. Classification of intoxication with dehydration.
3. Diagnostic criterions of different types of intoxication with dehydration.
4. Differential diagnosis of intoxication with dehydration and neurointoxication.
5. Prehospital and hospital treatment of intoxication with dehydration, prognosis and prophylaxis.

Student should be able to

1. Find diagnostic clinical criterions of intoxication with dehydration during examination of patients.
2. To perform differential diagnosis among diseases which have the same clinical features.
3. To perform prehospital and hospital treatment of children in case of intoxication with dehydration.
4. To prescribe measures in the focus of infection.

References:

1. Kramarev B. B. Pediatric infectious diseases / B. B. Kramarev, O. B. Nadraga. – Kyiv, 2015. – 238 c.

Additional:

1. Long S. S. Principles and Practice of Pediatric Infectious Diseases / S. S. Long, K. L. Pickering, G. C. Prober. – Churhill Livingstone, 2017. – 1618 c. – (Fifth edition).
2. Textbook of Pediatric Infectious Diseases / [J. Cherry, G. G. Demmler-Harrison, S. L. Kaplan та ін.]., 2018. – 1618 c. – (Eight edition).
3. Nelson Textbook Of Pediatrics - Volume 1 & 2 (International Edition) Edition:

eighteenth by Robert M Kliegman Richard E Behrman Hal B Jenson Bonita F Stanton. – 21th Edition. – 2018. – 3250 p.