

**Ministry of Health of the Republic of Belarus
Education Institution
"Gomel State Medical University"**

Department of Pediatrics with the course of the Faculty of Advanced Training and Retraining

Author:

L.V. Krivitskaya, Associate Professor, Candidate of Medical Sciences.

O.A. Zaitseva, assistant

I.V. Belomytseva, assistant

METHODOLOGICAL GUIDELINES

for a practical exercise
by a teacher with students
6th year of the Faculty of foreign students,
trainees in speciality 1-790101 in the discipline of pediatrics

Topic: Sepsis. Toxicoses in children of early age.

Time: 7 hours

Approved at the meeting of the Department of Pediatrics with the Course of the Faculty of Advanced Training and Retraining
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2022

LEARNING AND EDUCATIONAL GOALS, MOTIVATION FOR MASTERING THE TOPIC

Educational objective:

- To form students' basic professional competence in the study of the discipline of pediatrics according to the curriculum
- To study the etiopathogenesis of septic conditions, the main clinical syndromes of sepsis, methods of diagnosis and differential diagnosis, modern treatment regimens, organization of complex preventive measures; to teach students to correctly interpret the results of laboratory and instrumental methods of investigation used in this pathology, correctly formulate a detailed clinical diagnosis.

To study the main symptoms and stages of infectious-toxic shock, as well as emergency care depending on the severity of the patients.

Educational Objective:

- Fostering in students a sense of professional responsibility of the future worker of medicine;
- Formation of professionally significant and socially-psychological qualities of the doctor's personality in the system of doctor-nurse-patient relations;
- formation of students' responsible attitude to their future professional activity.
- Formation of academic and work discipline, discussion of disciplinary issues (attendance of lectures and practical classes, unexcused absences, tardiness, debts on missed classes).

Objectives:

As a result of the class the student should **know**:

- Anatomical and physiological features of the nervous and cardiovascular system in children;
- Frequency of sepsis morbidity, its specific weight in the morbidity and mortality in children;
- Risk factors for the development of sepsis and infectious-toxic shock;
- Pathogenesis of septic conditions;
- classification of septic conditions;
- Principles of diagnosis and differential diagnosis of sepsis;
- Modern approaches to the diagnosis and treatment of sepsis;
- types of shock in children and the mechanism of their formation;
- clinical manifestations of the various stages of infectious-toxic shock.

As a result of the lesson the student should **be able to**:

- Purposefully collect the anamnesis in order to identify risk factors for the development of sepsis;
- Examine the patient to identify signs of infection and the entrance gate of infection;
- prescribe an examination plan and interpret laboratory data;
- correctly formulate a clinical diagnosis (primary, concomitant, complications);
- prescribe rational treatment;

- assess the severity of the condition and the stage of infectious-toxic shock, make an algorithm of therapeutic measures.

know:

- methods of objective (palpation, percussion, auscultation) and additional (measuring, laboratory, instrumental, histological, immunological, etc.) examination
- communication skills with patients of different age and their parents, medical personnel.

Motivation for mastering the topic:

- Obtained knowledge and skills during the study of the discipline of pediatrics allows to motivate students to improve theoretical and practical knowledge for timely diagnosis of life-threatening conditions in children, providing adequate emergency care for children; diagnosis of septic conditions and prescribing treatment appropriate to the severity of the disease

MATERIAL EQUIPMENT

Tables on the theme of the lesson, medical charts of hospital patients, a set of hemograms, hemostasiograms, biochemical blood tests, urinalysis, electrocardiograms; a bank of tasks for independent work; selection of thematic patients in the hospital departments.

CONTROL QUESTIONS FROM RELATED DISCIPLINES

1. Microbiological characterization of coccus and conditionally pathogenic gram-negative flora.
2. Mechanisms of immunological disorders in infectious and inflammatory processes (sepsis).
3. Pathogenesis of inflammation and the role of inflammatory mediators.
4. Antibacterial chemotherapeutic agents; classification, mechanism of action, pharmacodynamics in infants.
5. Mechanism of circulatory insufficiency; mechanisms of blood pressure regulation.

CONTROL QUESTIONS ON THE TOPIC OF THE CLASS

1. Sepsis: definition, systemic inflammatory response syndrome, etiology, pathogenesis, classification of neonatal sepsis.
2. Clinical forms of sepsis (septicemia, septicopyemia). Septic shock. Diagnosis. Principles of treatment.
3. Hemolytic-uremic syndrome (Gasser's toxemia). Hepato-cerebral encephalopathy (Ray's toxicosis): pathogenesis, clinic, differential diagnosis. Emergency medical care.
4. Infectious-toxic shock: etiopathogenesis, clinic, diagnosis. Emergency medical care.

PROCESS OF THE STUDY

Theoretical part

Sepsis - a disease characterized by acyclic, generalized course of bacterial infectious processes caused by multiresistant to various antibiotics, usually hospital

strains of opportunistic pathogenic microbes, arising from the penetration of large numbers of bacteria in the blood with a defect in the natural barriers or mixed infection, against reduced or perverted immunity. In sepsis there is a peculiar course of bacterial infections with severe metabolic disorders, with hematogenous reproduction of pathogens, and therefore lost the initial dependence on a single purulent focus. [4]

Shock is an acutely developing, life-threatening pathological process characterized by a progressive decrease in tissue perfusion, severe disturbances in CNS activity, blood circulation, respiration, and metabolism.[6]

Infectious-toxic shock can occur in patients with meningococcal infection, especially often in the lightning form of meningococcosis, staphylococcal and fungal sepsis, as well as in other acute infectious diseases with a severe course (diphtheria, scarlet fever and others). [7]

Practical part.

The students are instructed, attention is paid to the rules of internal order, the peculiarities of work in the departments of children's hospitals. The selection of patients is carried out in accordance with the theme of the lesson. During the practical work the student must carry out:

- collection of complaints and anamnesis of the disease,
- clinical examination of the child,
- making a preliminary diagnosis and drawing up an examination plan,
- interpretation of the results of laboratory and instrumental methods of investigation,
- Formulation of the final clinical diagnosis,
- Formulation of a treatment and rehabilitation plan,
- writing prescriptions for medications.
- Control of assimilation of the topic

1. Solution of tasks on the topic of the class:

Task №1.

Examine an inpatient patient with sepsis. To do this:

- a) analyze the medical history, and identify the risk factors for sepsis;
- b) identify the leading pathological syndromes;
- c) establish the severity of the child's condition;
- d) what diseases should be differential diagnosed with, identify the main diagnostic criteria for sepsis.

Justify your conclusions.

Task № 2.

Examine the newly admitted child. To do this:

- (a) Gather a medical history, paying special attention to the association of this disease with risk factors for sepsis;
- b) perform an objective examination of the patient, establish the leading pathological syndrome;
- c) formulate a preliminary diagnosis based on the anamnesis and objective data;
- d) make a plan of examination and treatment, substantiate your prescriptions.

Task №3.

Analyze the case history of an inpatient with infectious-toxic shock. To do this:

- (a) Analyze the correctness of the preliminary and final clinical diagnosis, the adequacy of the assessment of the severity of the condition;
- b) evaluate the proposed therapy and make suggestions;
- c) Evaluate the scope of proposed examination and make your own corrections.

Task №4.

Draw up a treatment algorithm according to the scheme given:

Stages of treatment	The treatment used for this disease	Treatment of this patient
Mode Diet Etiopathogenetic therapy Symptomatic therapy		

Task №5.

Make up an algorithm for recognizing the disease according to the proposed scheme:

Stages of diagnosis	Signs of the disease theoretically possible with this nosology
Complaints Past medical history Past medical history Objective examination Laboratory examinations Instrumental examinations	

METHODOLOGICAL RECOMMENDATIONS FOR ORGANIZING AND PERFORMING THE CSR

Students use the time allotted for independent work for:

- working through the topics (issues) assigned for independent study;
- problem solving;
- carrying out research and creative assignments;
- preparing thematic reports, presentations;
- completing practical assignments;
- designing information and demonstration materials (stands, posters, charts, tables, newspapers, etc.);
- compilation of thematic selection of literary sources, Internet sources;
- duty in health care organizations;
- making a review of scientific literature on the issues of the class.

- preparation of lectures, discussions with mothers on the prevention of diseases of newborn children and the formation of a healthy lifestyle;
- drawing up situational problems on the topic of the class.

The main methods for organizing independent work:

- making a report;
- Study of topics and problems that are not covered in the classroom;
- preparation and participation in active forms of learning.

The list of tasks of the SIW:

- Study of clinical recommendations (protocols for neonatology, on the diagnosis and treatment of children with infectious diseases).
- Case studies on the topic of the class:
 - sepsis in newborns
 - ITS
 - GUS
 - Ray's toxicosis.
- research work on the topic of the class.

METHODOLOGICAL RECOMMENDATIONS ON THE ORGANIZATION AND IMPLEMENTATION OF THE SSR

The recommended forms of GSSS organization are:

1. preparation of essays on proposed topics;
2. solving case problems on the subject of the class.
3. tests on the subject of the class

List of the GSSS tasks:

Prepare an essay on the proposed topic:

1. infectious-toxic shock in meningococcal infection.
2. Candida sepsis in newborns.
3. burn septicemia in children.
4. Congenital malformations of the gastrointestinal tract

2. Solution of situational problems:

Task № 1.

A 12-year-old boy was hospitalized. A history of frequent acute respiratory viral infections and otitis media. At age 9 after sore throat changes in urine were first revealed: traces of protein, microhematuria. After detecting moderate increase in urate excretion, the patient was diagnosed as dysmetabolic nephropathy. Later on, lethargy and headaches appeared. He did not consult a physician.

The patient was admitted to the hospital by an emergency doctor on the seventh day after the beginning of the acute respiratory infection, because of sudden worsening of his condition: abrupt weakness, dizziness, headache, pallor, cold sweat, tremor of hands, vomiting, pastosity of face and legs, BP 150/110 mm Hg, oliguria, macrohematuria. Urinalysis revealed proteinuria 3.3 g/l, erythrocytes covering all fields of vision.

1. Formulate a diagnosis.
2. What are the reasons for the worsening of the condition?

3. Draw up an examination plan.
4. What is the scheme of treatment?

Task № 2

A prematurely born baby, who had received antibiotic therapy for pneumonia for a long time, 's condition worsened at the age of 1 month. At the age of 1 month and 10 days, his condition worsened. Convulsions appeared in the form of paroxysms (monotonous sucking, chewing movements, tongue sticking out), head circumference increased (+6 cm in 1 month and 10 days). Motor activity in the right hand disappeared.

Skin was pale with marbled pattern, papular rash on erythematous background on the buttocks. On the mucous membrane of the oral cavity - hard to remove white plaque. Breathing was puerile, conducted to all sections, no rales. BP - 40 per minute. Boundaries of the heart: right - on the right edge of the sternum, left - +1 cm outward from the midclavicular line. The heart tones were clear and rhythmic. The heart rate was 120 bpm. The abdomen was soft and painless. The liver +3 cm from under the edge of the rib arch, the spleen - +1 cm, stool 2 times a day, mushy. Diuresis was unchanged.

General blood count: red blood cells - $3.5 \times 10^{12}/l$, Hb - 112 g/l, color - 0.89, leukocytes - $10.3 \times 10^9/l$, e - 3%, p/l - 2%, c - 33%, l - 52%, m - 10%, sed rate - 15 mm/hr.

General urinalysis: transparency - turbid, leukocytes - 10-12 in p/z, no protein and glucose, many fungi of the genus *Candida*.

Examination of CSF (obtained from the right and left ventricles by tentorial puncture): CSF - turbid, opalescent, cytolysis - 400/3: neutrophils - 16%, lymphocytes - 62%, monocytes - 22%, protein - 2.08 g/l (normal - 0.49-0.80).

Culture of CSF on bacterial media: sterile.

Culture of CSF on fungi: *Candida albicans* fungi were isolated.

Questions:

1. State the diagnosis.
2. State what factors contributed to the onset of the disease at the age of 1 month. 10 days of age.
3. What method of examination should be repeated to monitor the effectiveness of therapy?
4. What methods of examination are indicated to clarify the etiology of the convulsive syndrome?
5. Prescribe treatment.

Task № 3

Child from the 2nd pregnancy, 1st delivery. 1 pregnancy was a miscarriage. Mother is 24 years old, single. Registered at an antenatal clinic since 11 weeks. The course of present pregnancy against the background of chronic bronchitis, chronic pyelonephritis, trichomoniasis, threatening to terminate the 1st and 2nd half of pregnancy, for which she received in-patient treatment at 31 weeks of gestation. Preterm delivery at 35 weeks of gestation. Water-free period of 8 hours. Amniotic fluid was green. The boy was born at 2160 g, 46 cm height. Cried out after upper airway sanitation. He was placed on the chest on the second bout. The baby is

lethargic, badly sucking. The weight loss on the third day was 350 grams. It was decided to switch to parenteral nutrition, for which a vein catheterization was made. By the end of the fourth day the child's condition sharply worsened. Temperature was 35.9 °C. Lethargy was intermittently replaced by anxiety, his head was thrown back, his cry was piercing. Her skin was pale and mottled. Dim, copious petechial rash appeared on the face and torso. The extremities are cold to the touch. Pale spot symptom 6 sec. The child was transferred to the hospital. At the time of admission, the child's condition was considered extremely severe, lethargic, adynamic. Great fontanelle was 2.5*2.0, tense, pulsating. Diffuse muscular hypotonia was pronounced. The skin was pale. The face and torso retain a dim, abundant petechial rash. Breathing in the lungs is conducted in all fields, in the upper lobe on the right sharply intensified, rigid, dyspnea up to 64 per minute. Cardiac tones are rhythmic, muffled HR 154 per minute. The abdomen was sharply enlarged in volume, soft on palpation in all parts. Liver +4.0 cm, spleen + 2.0 cm, dense on palpation. Clinical blood count: Hb - 103 g/l, R - $4.1 \times 10^{12}/l$, C.P. - L - $3.1 \times 10^9/l$, myelocytes - 5%, metamyelocytes - 3%, p/a - 40%, c - 17%, l - 32%, m - 3%, sed rate - 2 mm/hr. R-grid of the chest organs: bilateral pneumonia

1. State the diagnosis.
2. What are the laboratory criteria for SSVO?
3. characterize the concept of septicemia and septicopyemia.
4. Prescribe the treatment.
5. Write a prescription for meropenem.

3. test control:

1. Which of the following is not characteristic of the initial phase of shock (hypovolemic or septic) in the newborn?
 1. Weak tone, tachycardia
 2. Decreased arterial pressure
 3. A bluish-pale coloring of the skin
 4. Metabolic acidosis
 5. Oligoanuria
2. Which combination of antibiotics do you consider irrational?
 1. Penicillin + cephalothin
 2. Penicillin + ristomycin
 3. Penicillin + erythromycin
 4. Penicillin + lincomycin
3. What are the main clinical symptoms characteristic of umbilical sepsis:
 1. discharge from the umbilical wound
 2. abdominal bloating
 3. early epithelialization of the umbilical wound
 4. liquefaction or increased frequency of stools
 5. prolonged jaundice in the newborn
4. What are the main mechanisms of action of albumin solutions?
 1. oncotic action;

2. detoxification;
3. provision of protein in parenteral nutrition.
5. Which combination of antibiotics do you consider irrational?
 1. penicillin + cephalothin;
 2. penicillin + ristomycin;
 3. penicillin + erythromycin;
 4. penicillin + lincomycin.
6. Which drug combination do you consider irrational?
 1. penicillin + gentamicin;
 2. penicillin + ascorbic acid;
 3. penicillin + nicotinic acid.
7. Which of the following is not characteristic of the initial phase of shock (hypovolemic or septic) in a newborn?
 1. Weak tone, tachycardia
 2. Decreased arterial pressure
 3. A bluish-pale coloring of the skin
 4. Metabolic acidosis
 5. Oligoanuria

Answers: 1 - 2; 2 - 3; 3 - 1,2, 4, 5; 4 - 1,2; 5 - 3; 6 - 2; 7 - 2.

Forms of control of GSSS performance:

1. checking and evaluating the abstract on the given topic;
2. checking and evaluating the correctness of solving situational tasks;
3. test control.

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ELECTRONIC DATABASES

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