

MINISTRY OF HEALTH OF UKRAINE  
NATIONAL O.O. BOHOMOLOTS MEDICAL UNIVERSITY

**GUIDELINES**  
**for practical classes**  
**for students**

Educational discipline: Pediatrics with children's infectious diseases (mandatory component 25)

Field of knowledge: 22 "Health care"

Specialty: 222 "Medicine"

Department of Pediatrics No 2

APPROVED at the meeting of the Department of Pediatrics No. 2 from August 28, 2023, protocol №1

Reviewed and approved by: Center for Pediatric Disciplines

from August 28, 2023, protocol №1

Lesson topic: "Bacterial infections of the newborn"

### Competencies:

1. Ability to collect complaints, history of life and disease and analyze clinical data in newborns with manifestations of bacterial infections.
2. Ability to determine the necessary list of laboratory tests and evaluate their results in bacterial infections of newborns.
3. The ability to establish a preliminary and clinical diagnosis in newborn children with manifestations of bacterial infections.
4. Ability to determine the principles and nature of treatment of local bacterial infections of newborns.
5. Ability to carry out differential diagnosis of purulent-inflammatory diseases of newborns.
6. Ability to diagnose signs of sepsis and septic shock in newborns.
7. The ability to determine treatment tactics for neonatal sepsis.

### The purpose of practical class

Formation of professional competences to achieve the program results of training on diagnosis, treatment, and prevention of bacterial infections of the newborn.

**Equipment:** PC with appropriate information support, reference materials, methodological recommendations, extracts from medical histories, a set of laboratory test results, situational tasks, dummy of a newborn child, gloves, cotton wool, sticks, pipettes, disinfectant solutions approved for the treatment of local infection in children.

### Lesson plan and organizational structure

Stage name	Description of the stage	Levels of assimilation	Timing
Preparatory	<ul style="list-style-type: none"><li>- Organizational issues</li><li>- Learning motivation:</li></ul> <p>Bacterial infections of newborns can manifest in the form of local (conjunctivitis, pustulosis, omphalitis, etc.), systemic (pneumonia, meningitis, osteomyelitis), or generalized (sepsis) lesions.</p>	Introductory	25 min

	<p>The morphological and functional features of natural barriers (skin, mucous membranes) and the immaturity of the immune system of newborns, especially those born prematurely, lead to a significant prevalence of purulent-inflammatory diseases in them and a tendency to generalize infectious processes. Neonatal sepsis is the cause of 15% of newborn deaths in the world. The severity of the course of the disease and the complexity of its treatment lead to a high level of disability among treated children.</p> <p>Timely diagnosis and correct treatment tactics for various manifestations of bacterial infections in newborns are important tasks for both neonatologists and general practitioners.</p> <p>- Control of the initial level of knowledge - test control and oral survey.</p> <p><b>Examples of test tasks:</b></p> <p>1. Which of the following factors determines the risk of early neonatal infection?</p> <p>A. Multiple pregnancy  B. The birth of a child carried forward  <b>C. The duration of the waterless interval is more than 18 hours</b>  D. Fetal hypoxia during childbirth  E. HIV infection of the mother</p> <p>2. Define the most frequent etiological factor of early neonatal sepsis</p> <p><b>A. Streptococcus agalactiae</b>  B. E. coli  S. Pseudomonas aeruginosa  D. Staphylococcus aureus  E. Proteus mirabilis</p> <p>3. The child is 5 days old. On the skin of the face, neck, trunk, there are multiple small blisters with white-yellow content on the background of erythema. The general condition of the newborn</p>	Reproductive	
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	<p>is not disturbed. What diagnosis do these manifestations correspond to?</p> <p><b>A. Vesiculo-pustulosis</b>  B. Pustular melanosis  S. Toxic erythema  D. Sexual crisis, milia  E. Staphylococcal impetigo</p> <p>4. Which of the listed signs is a possible clinical manifestation of neonatal sepsis?</p> <p>A. Apnea  B. Convulsions  S. Temperature instability  D. Lethargy  <b>E. All the above</b></p> <p>5. What antimicrobial therapy is the first line in the treatment of early manifestations of systemic or generalized bacterial infection in newborns?</p> <p>A. Amoxicillin-sulbactam + amikacin  <b>B. Ampicillin + gentamicin</b>  C. Ceftriaxone + amikacin  D. Ceftazidime + metronidazole  E. Flucloxacillin</p>		
Main	<p>Performance of practical tasks:</p> <ul style="list-style-type: none"> <li>- demonstration of a thematic patient or review of extracts from medical histories of newborns with purulent-inflammatory diseases;</li> <li>- evaluation of the results of laboratory studies;</li> <li>- establishment of a preliminary clinical diagnosis on the basis of anamnesis, clinical examination data and laboratory test results;</li> <li>- determination of factors and pathogenetic mechanisms of disease development;</li> <li>- determination of tactics and nature of treatment for bacterial infections of newborns;</li> <li>- training on "counseling the mother on the treatment of a local infection of a newborn" with a demonstration of actions on a dummy of a newborn child.</li> </ul>	<p>Introductive</p> <p>Reproductive Creative</p> <p>Reproductive Creative</p> <p>Reproductive Creative</p>	140 min
Final	<p>Control of the final level of preparation (Clinical cases):</p> <p>1. During the patronage of a newborn baby on the 7th day of life, the family doctor noticed the</p>	Creative	30 min

	<p>presence of serous-purulent discharge from the umbilical wound, infiltration of the umbilical ring and reddening of the skin within 1 cm. The general condition of the child is not disturbed.</p> <ol style="list-style-type: none"> <li>1. Determine the preliminary diagnosis.</li> <li>2. Determine the doctor's tactics?</li> <li>3. Which diseases should be differentially diagnosed in the case of a long-term course of the disease?</li> <li>4. Determine measures to prevent the disease.</li> </ol> <p><b>Answer standard:</b></p> <ol style="list-style-type: none"> <li>1. Omphalitis, a local infection of the navel.</li> <li>2. Wash the umbilical wound with an antiseptic solution (4% chlorhexidine solution) and dry it with sterile gauze swabs, or wash it with boiled water and, after drying, treat it with a 1% alcohol solution of gentian violet from 2 to 4 times a day with compliance with the rules of asepsis and antiseptics. Follow up in 2 days. In case of improvement, continue the treatment at home until the umbilical wound heals. In case of worsening condition or lack of treatment effect, the child should be hospitalized and prescribed treatment for severe navel infection.</li> <li>3. Differential diagnosis is carried out with umbilical fistulas caused by unobliterated urachus (ureteral duct) or yolk (omphalo-mesenchymal) duct.</li> <li>4. Compliance with the requirements for the care of the umbilical cord and the umbilical wound according to the guidelines.</li> </ol> <p>2. The baby boy from the 1st pregnancy, which was complicated by late gestosis, the 1st premature birth at the 30th week of gestation, was born by cesarean section due to premature detachment of the placenta, weighing 1000 g, body length 35 cm, estimated by 6-7 points on the Silverman scale.</p> <p>From birth, the baby was treated with mechanical ventilation through an intubation tube, and infusion therapy through the umbilical</p>		
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	<p>catheter. On the 8<sup>th</sup> day of life, a diagnosis of neonatal sepsis was established based on clinical and laboratory data.</p> <ol style="list-style-type: none"> <li>1. Classify the disease considering the existing risk factors for its development.</li> <li>2. Define the clinical syndromes characteristic of neonatal sepsis.</li> <li>3. What results of laboratory tests can testify in favor of the diagnosis?</li> <li>4. Identify typical pathogens and appropriate etiotropic therapy.</li> <li>5. Define preventive measures</li> </ol> <p><b>Answer standard:</b></p> <ol style="list-style-type: none"> <li>1. Late onset (nosocomial) sepsis</li> <li>2. Cardio-respiratory distress, convulsive, hemorrhagic, edematous, hepato-lienal, meningeal syndromes, manifestations of NEC.</li> <li>3. Positive result of blood culture from 2 vessels, changes in the CBC (number of leukocytes, ratio of immature to total number of neutrophils &gt; 0.2, anemia, thrombocytopenia), increase of CRP, procalcitonin, cytosis of cerebrospinal fluid, results of microbiological examination of cerebrospinal fluid.</li> <li>4. Coagulase-negative Staphylococcus epidermidis, Pseudomonas aeruginosa, E.coli, etc. 2nd line antibiotics: Ceftazidime + gentamicin or amikacin, in the presence of NEC + metronidazole.</li> <li>5. Immunization of women with a conjugate vaccine against streptococcal infection. If the woman is unvaccinated and a carrier of group B streptococci, antimicrobial prophylaxis before or during delivery. Careful compliance with the sanitary-epidemic regime by the staff at all stages of the child's medical care: hand hygiene, compliance with manipulation standards, infection control of care products and medical equipment, rational use of antimicrobial drugs.</li> </ol> <p>- General evaluation of the student's educational activity during the class</p>	Reconstructive and creative	
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## Recommended Books

1. Nelson Textbook of Pediatrics, 2-Volume set, 21-th edition. By Robert M. Kliegman, Bonita M.D. Stanton, Joseph St. Geme and Nina F Schor. – Philadelphia, PA : Elsevier Inc., 2020 - 4264 p. (pp. 996-1013, 1450 – 1455, 1529 – 1532, 1552–1555)

ISBN-10 : 032352950X ISBN-13 : 978-0323529501

2. Pediatrics : textbook / O. V. Tiazhka, T. V. Pochinok, A. M. Antoshkina [et al.] ; edited by O. Tiazhka. – 3 rd edition, reprint. – Vinnytsia : Nova Knyha, 2018. – 544 pp. (pp.151–162) : il. ISBN 978-966-382-690-5

## Information sources:

1. Neonatal infection: antibiotics for prevention and treatment. NICE guideline [NG195]2021  
<https://www.nice.org.uk/guidance/ng195/chapter/Recommendations#risk-factors-for-and-clinical-indicators-of-possible-early-onset-neonatal-infection>
2. Muhammed Ershad, Ahmed Mostafa, Maricel Dela Cruz, David Vearrier Neonatal Sepsis 2019 doi: [10.1007/s40138-019-00188-z](https://doi.org/10.1007/s40138-019-00188-z)
3. Neonatal sepsis <https://www.pedscases.com/neonatal-sepsis>
4. Management of Late-Preterm and Term Neonates at Risk for Early-Onset Sepsis DOI: [10.1542/hpeds.2019-0005](https://doi.org/10.1542/hpeds.2019-0005)
5. Neonatal sepsis: a systematic review of core outcomes from randomised clinical trials Pediatr Res 2022\$ 91 (4): 735-742 doi: [10.1038/s41390-021-01883-y](https://doi.org/10.1038/s41390-021-01883-y)

## Questions for student self-preparation for practical classes

1. Morphological and functional features of the skin of newborns, features of the immune response to infection.
2. Conjunctivitis of a newborn: etiology, clinic, diagnosis, treatment.
3. Bullous impetigo: clinic, diagnosis, treatment.
4. Staphylococcal scalded skin syndrome: clinic, diagnosis, treatment.
5. Necrotic phlegmon of newborns: clinic, diagnosis, treatment.
6. Omphalitis: classification, clinic, diagnosis, treatment.
7. Sepsis: definition, classification.
8. Risk factors and etiology of early neonatal sepsis.
9. Risk factors and etiology of late neonatal sepsis.
10. Pathogenesis of neonatal sepsis.
11. Clinical manifestations of neonatal sepsis.
12. Laboratory criteria for diagnosing neonatal sepsis.
13. Principles of neonatal sepsis therapy, features of antimicrobial therapy.

#### 14. Prevention of neonatal sepsis.

Methodical guidelines have been created

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