

MINISTRY OF HEALTH OF UKRAINE
NATIONAL O.O. BOHOMOLET'S 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: "Diabetes in children"

Competencies:

1. Ability to collect complaints, history of life and disease and analyze clinical data in children with diabetes mellitus (DM).
2. Ability to determine the necessary list of laboratory tests and evaluate their results in diabetes in children.
3. The ability to establish a preliminary and clinical diagnosis of diabetes in children.
4. Ability to determine the principles and nature of treatment of diabetes in children.
5. The ability to determine the nature of nutrition in the treatment and prevention of diabetes in children.
6. The ability to determine physical load in the treatment and prevention of diabetes in children.
7. Ability to diagnose emergency conditions: diabetic ketoacidosis, hypoglycemia, hypoglycemic coma in children with diabetes.
8. Ability to carry out a differential diagnosis of acute complications of diabetes in children.
9. Ability to determine tactics and provide emergency medical care for diabetic ketoacidosis, hypoglycemia, hypoglycemic coma in children.

The purpose of practical class

Formation of students' professional competencies for achieving program learning outcomes on diagnosis, treatment, and prevention of DM and its acute complications in children.

Equipment: PC with appropriate information support, reference materials, methodological recommendations, extracts from medical histories, a set of laboratory test results, situational tasks, syringes - pens, dummies, a glucometer and test strips for it, indicator test strips for determining glucosuria and ketonuria.

Lesson plan and organizational structure

Stage name	Description of the stage	Levels of assimilation	Timing
Preparatory	- Organizational issues - Learning motivation: The prevalence of diabetes among children is constantly increasing in the world. DM is one of	Introductory	25 min

	the most common chronic diseases among people under 18 years of age (1:350). The total number of hospitalized children with diabetes is increasing every year. DM is "getting younger": the prevalence of the disease among children under the age of 6 years is increasing. Diabetes mellitus occupies the largest specific weight in the structure of primary disability due to diseases of the endocrine system in children. At the same time, the quality of life of children with diabetes and the risks of developing its complications depend on the level of disease management, which is the subject of learning. - Control of the initial level of knowledge - test control and oral survey. <i>Examples of test tasks:</i> 1. An obese teenager (BMI - 95th percentile for this age) complains of weakness, frequent urination, and thirst for a month. Fasting plasma glucose is 10.8 mmol/l. Which of the following signs will make it possible to establish a diagnosis of type 1 diabetes? A. The onset of the disease in the pubertal period B. High level of C-peptide C. The presence of diabetic autoantibodies D. Acanthosis nigricans E. Presence of obesity 2. The boy is 7 years old, suffers from T1DM. Which statement is correct when counseling a family about diet therapy? A. Limit the use of carbohydrates as much as possible B. Eliminate foods containing sucrose C. Limit consumption of saturated fatty acids and trans fats to 10% of the energy value of food D. The amount of fat should be significantly less than the norm for healthy children of this age E. Total caloric intake and carbohydrate intake should be adjusted according to insulin doses prescribed by the physician	Reproductive	
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	3. The girl is 5 years old. He has been suffering from type 1 diabetes for 1,5 years. Often hospitalized due to severe hypoglycemia. What consequences of such a course of the disease can be expected in a child? A. Violation of memory and concentration of attention B. Early manifestation of peripheral polyneuropathy C. Disorders of vegetative regulation D. Insufficient weight E. Growth retardation 4. When and how often is it recommended for a child with type 1 diabetes to measure the blood glucose level to achieve the optimal target level of glycemia? A. 2 times a day (in the morning after waking up and before going to bed) B. 3 times a day before each large meal C. 4-5 times a day (2 hours after each large and additional meal) D. 5-6 times a day (in the morning, 2 hours after each large meal, and before bed) E. 6-10 times a day (before meals and snacks; 2-3 hours after meals, during intense physical exercise, before sleep, at night when waking up, during illness or stress) 5. The girl is 12 years old, she has been suffering from diabetes since the age of 6, hospitalized with worsening condition. Which of the symptoms is characteristic of DKA? A. Increased sweating B. Increased muscle tone, tremor C. Frequent deep breathing, almond smell of exhaled air D. Sudden onset and rapid progression of symptoms E. Feeling of hunger		
Main	Performance of practical tasks: - demonstration of a thematic patient or review of extracts from medical histories of patients with diabetes;	Introductory	140 min

	- evaluation of the results of laboratory studies; - on the basis of anamnesis, data of a clinical examination and the results of laboratory studies, the establishment of a preliminary clinical diagnosis - determining of factors and pathogenetic mechanisms of disease development; - appointment of treatment and management of the disease; - practicing medical manipulations to determine the level of glycemia, glucosuria, ketonuria and evaluating the results of research.	Reproductive Creative Reproductive Creative Reproductive Creative	
Final	Control of the final level of preparation (Clinical cases): 1. A mother and a 5-year-old boy are at a family doctor's appointment. According to the mother, during the last few weeks, the boy has been urinating often during the day and waking up at night due to urinary incontinence. His appetite is increased, and he drinks a lot but the mother claims that the boy has lost a lot of weight. Objectively: Height 108 cm, weight 17.5 kg; T-36.9°C, HR 108 in 1 min, RR 26 in 1 min, BP 92/76 mm Hg. The child is inactive, irritable. The integuments are pink, the skin is dry, there are bites in the corners of the mouth. Visible mucous membranes without features. Physical examination revealed no pathological changes in the internal organs. Blood plasma glucose (by glucometer) is 12.8 mmol/l (he had breakfast 2.5 hours ago). An indicator test strip reveals glucose "++", ketone bodies "-" in the urine. 1. Determine the preliminary diagnosis. 2. Determine the doctor's tactics? 3. What studies should be done to establish a clinical diagnosis? 4. What are the tactics of treatment? Answer standard: 1. DMT1 first detected 2. Urgently refer to a pediatric endocrinologist at the secondary level of medical care 3. Fasting plasma glucose, HbA1c, diabetic antibodies (GAD, IA2, IAA, ZnT8), fasting C-peptide level, CBC, urinalysis. Assess for	Creative	30 min

	additional autoimmune conditions soon after the diagnosis of T1DM. 4. Insulin therapy (short-acting insulin, multiple injection regimen, 0.5-0.7 IU/kg/day divided into 3 prandial doses according to consumed bread units of carbs and 2 nighttime doses under glycemic control), diet therapy, physical exercise, according to the Guidelines of treatment of DM in children. Glycemic control 6–10 times a day. Teaching the family to manage the disease in diabetic school. 2. A 9-year-old girl complains of nausea, vomiting, abdominal pain without clear localization. She has been suffering from diabetes since the age of 4, and receives insulin therapy (basal - glargine, prandial - lispro). 3 days ago, she fell ill with SARS, fever during the 1st day of illness (38 °C). Due to the deterioration of appetite, the dose of prandial insulin was reduced without careful control of glycemia. Objectively: T 37.1 °C, HR 88 per min, RR 22 per min. The child lethargic. Her skin is dry, pale with a flushed cheeks. The mucous membrane of the oral cavity is dry, the tongue is coated. Almond-like smell of exhaled air. No pathology was detected in the respiratory and cardiovascular systems. The abdomen is diffusely painful on palpation, the liver protrudes 1.5 cm from the edge of the costal arch. Urination is painless, frequent, with large volumes of urine. The stool is mushy 2 times a day. 1. Determine the preliminary diagnosis 2. Define a plan for additional examinations 3. Define therapeutic tactics 4. What means of self-control of diabetes can prevent the occurrence of this complication? Answer standard: 1. T1DM, DKA 2. CBC, blood biochemistry (glucose, creatinine, BUN), electrolytes (K⁺, Na⁺, Cl⁻), blood ketones, pH, HCO₃⁻; urinalysis, including glucose and ketone bodies.		
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	3. Treatment in the ICU. Initial parenteral rehydration with physiological solution (10 ml/kg), followed by insulin therapy 0.05–0.1 U/kg/h IV against the background of continued infusion therapy; monitoring of the level of glycemia, electrolytes, urea, blood gas composition. Changing the mode and composition of the infusion, the method of insulin administration in dynamics, prevention of infection, DIC syndrome, cerebral edema if necessary (according to the Protocol for the treatment of DKA). 4. Self-monitoring of blood glucose level up to 10 times a day, monitoring of ketonuria and ketonemia. Correction of insulin doses in accordance with changes in appetite and the objective level of glycemia, compliance with the drinking regime. - General evaluation of the student's educational activity during the class		
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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. 3019-3052)
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. 467–489) : il. ISBN 978-966-382-690-5

Information sources:

1. Pediatric Type 1 Diabetes Mellitus Updated: Mar 01, 2022
<https://emedicine.medscape.com/article/919999-overview>
2. Diabetes Mellitus Type 1 In Children. Last Update: June 27, 2022.
<https://www.ncbi.nlm.nih.gov/books/NBK441918/>

3. ISPAD Clinical Practice Consensus Guidelines 2018 : Definition, epidemiology, and classification of diabetes in children and adolescents
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7521365/>
4. Children and Adolescents: Standards of Medical Care in Diabetes—2021
https://diabetesjournals.org/care/article/44/Supplement_1/S180/30606/13-Children-and-Adolescents-Standards-of-Medical
5. ISPAD Clinical Practice Consensus Guidelines 2018: Insulin treatment in children and adolescents with diabetes
https://www.researchgate.net/profile/Tadej-Battelino/publication/326357714_ISPAD_Clinical_Practice_Consensus_Guidelines_2018_Compendium_Insulin_treatment_in_children_and_adolescents_with_diabetes/links/5c3717f8a6fdccd6b5a0a2a8/ISPAD-Clinical-Practice-Consensus-Guidelines-2018-Compendium-Insulin-treatment-in-children-and-adolescents-with-diabetes.pdf
6. ISPAD Clinical Practice Consensus Guidelines 2018: Nutritional management in children and adolescents with diabetes *Pediatr Diabetes*. 2018 Oct;19 Suppl 27:136-154.
<https://onlinelibrary.wiley.com/doi/10.1111/pedi.12738>

Questions for student self-preparation for practical classes

1. Definition of diabetes.
2. Types of glycemia disorders in children with diabetes.
3. Etiology, triggering factors, pathogenetic mechanisms of type 1 DM in children.
4. Stages of development of type 1 DM.
5. Clinical and laboratory manifestations of newly diagnosed type 1 diabetes in children.
6. Features of the clinical course of diabetes depending on age.
7. Diagnostic criteria for type 1 diabetes in children.
8. Differential diagnosis of type 1 diabetes, type 2 diabetes and MODY diabetes in children.
9. Principles of diabetes therapy.
10. Diet therapy of diabetes. The system of bread units in the diet of patients with diabetes.
11. Insulin therapy of type 1 diabetes: groups of insulin preparations, methods of its use, daily need for insulin in children in different periods of the course of type 1 diabetes
12. Self-control of diabetes in children, glycemic targets.
13. Diabetic ketoacidosis and ketoacidosis coma in children. Causes, clinical and laboratory manifestations, principles of therapy.

14. Hypoglycemia and hypoglycemic coma in children. Causes, clinic, diagnosis, emergency care.
15. Differential diagnosis of hypoglycemic and ketoacidosis coma in children and adolescents.
16. Long-term complications of type 1 diabetes in adolescence.

Methodical guidelines have been created

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