**Ministry of Health of Ukraine**

Bogomolets National Medical University

# GUIDELINES

to practical classes for students

Educational discipline: EQ 25 Pediatrics children's infectious diseases.

Field of knowledge: 22 "Health care"

Specialty: 222 "Medicine"

Pediatrics Department № 2

**APPROVED**

at the meeting of Pediatric Department № 2 of 26.08 2024, protocol №1

Reviewed and approved by Cycle Methodical Commission on

Pediatric Disciplines 29.08.2024 Protocol №1

**Topic**: **Cough in children. Differential diagnosis. Doctor's tactics**.

**Competences.**

The student ***should know:***

- The subject field of pediatrics (prevention, diagnosis and treatment of diseases in children of various ages) and to understand professional activity (GC4): causes, mechanisms of development, diagnosis and provision of care for children of various ages with respiratory diseases.
- examination methods and management tactics for children of different ages with cough syndrome.

The student ***should be able:***

- Collect data on the patient's complaints, medical history, and life history according to the standard patient survey scheme, according to the established algorithms, conduct and evaluate the results of physical examination of children of various ages with respiratory pathology. (PLO1)

- Evaluate information about the diagnosis, applying a standard procedure based on the results of laboratory and instrumental studies of children of various ages with respiratory pathology. (PLO2)

- Identify the leading clinical symptom or syndrome. Establish the most likely or syndromic diagnosis of the disease. Assign a laboratory and/or instrumental examination of a sick child. Carry out differential diagnosis of diseases of respiratory organs and other organs and systems. To establish a preliminary and clinical diagnosis in children of various ages with pathology of the respiratory organs. (PLO3)

- Determine the principles and nature of treatment of respiratory diseases in children of different ages. Differential use of medicines for cough in children. (PLO4)

***The student must be able to:***

- Ability to collect medical information from children of various ages with respiratory pathology and analyze clinical data (PCS1)
- Determine the necessary list of laboratory and instrumental studies and evaluate their results in children of various ages with cough syndrome (PCS2)
- Establish a preliminary and clinical diagnosis of respiratory pathology in children of various ages (PCS3)
- Determine the principles and nature of treatment in children with cough syndrome. Differential use of medicines for cough in children (PCS4)

**The student must demonstrate:**

- Ability to apply knowledge in practical situations (GC3). 2-3
- Ability to work in a team (GC7).
- Interpersonal skills (GC8).

**The student must have the following skills:**

- Collect medical information about the patient and analyze clinical data (PCS1).
- Provision of emergency medical care in outpatient and inpatient settings (PCS8)

- Performing medical manipulations (PCS10)
(Note: GC - general competences; PCS - professional competences of the specialty
PLO – program learning outcomes)

**Didactic purpose:**

- To ensure that students learn the etiopathogenesis, diagnosis and differential diagnosis of diseases of the respiratory organs.
- To monitor the degree of assimilation of the algorithm for providing medical care for cough syndrome in children.
- Form students' skills and abilities to assess the child's condition; determination of cough treatment tactics; appointment and follow-up.

**Equipment:** dolls, phantoms, documentation (stories of an inpatient f.003, history of child development, f.112), medicines, instructions, tools for parenteral administration of medicines, textbooks, manuals, handbooks, methodical recommendations, algorithms for performing practical skills. Academic journal, student's workbook.

**Lesson plan and organizational structure**

| **The name of the stage** | **Description of the stage** | **Levels of assimilation** | **Time, 5.5 ac.h** |
|---|---|---|---|
| **1. Preparatory** | 1.1. Organizational issues.<br>1.2. Individual oral survey.<br>1.3. Formation of motivations<br>1.4. Control of the initial level of knowledge:<br>Testing;<br>checking home preparation for classes, workbooks; pre-auditory<br>independent work of students | B<br><br>B | **15-20%**<br>**40min** |
| **2. Basic** | 2.1. demonstration of the thematic patient by the teacher;<br>2.2. independent work - curation of patients (collection of anamnesis, objective observation, identification of symptoms, formation of syndromes, putting forward and working out hypotheses regarding the preliminary diagnosis, drawing up an examination and treatment plan);<br>2.3. clinical examination of the patient with the participation of the teacher. Differential diagnosis, evaluation of clinical data, results of laboratory and instrumental studies, treatment. | C<br><br>C | **60-65%**<br>**170min** |

| | | | |
|---|---|---|---|
| | 2.4. Acquisition and practice of practical skills. | C, D | |
| **3. The final stage** | 3.1. control and correction of the final level of training (situational, problematic tasks)<br>3.2. general evaluation of the student's educational activity, work analysis.<br>3.3. Informing students about the topic of the next lesson, detailing homework: repetition of topics from the subject and materials of interdisciplinary integration; tasks from the workbook for independent work. | C | **20%**<br>**40min** |

**Test tasks for independent processing of the topic**

**Task №1.** A 7-year-old boy is in the doctor's office with complaints on cough, that is lasting for 3 weeks. The cough appeared after couple of days of nasal congestion, rhinorrhea, mild fever, which was lasting 2 days. He has all vaccinations according to schedule. Cough is wet, worsens in the morning. Boy has normal appearance, active. Skin color is normal. There is leakage on the posterior wall of the pharynx. Respiration rate 22 per minute, heart rate 100 per minute. Percussion tone is clear, pulmonary, vesicular respiration, wheezing or rales are not found. Choose a management?

A Spirometry with beta-2-agonist test, bronchodilatating therapy
B X-ray,
C X-ray, antibiotics
D Watchful waiting

**Proper answer: D**. Watchful waiting, as the history of disease reliably shows previous respiratory viral infection, and now there is postviral cough, that is caused by postnasal drip. X-ray, antibiotics (B, C), spirometry (A) are not indicated, as here boy does not have chronic cough or signs of respiratory distress, and bronchodilatating therapy (A) are helpful only in suspicion of asthma.

***References:*** Nelson Textbook of Pediatrics, 2-Volume Set, 20th Edition, 2016 by Robert M. Kliegman, Bonita M.D. Stanton, Joseph St. Geme and Nina F Schor, 5315 p.

**Task №2.** 5-year-old girl is in the doctor's office with complaints on cough that is lasting for 3 month. The cough appeared after a girl moved to live in the village, for summer period. She is living there in a private house, house is old, and there are home and farm animals. Atopic dermatitis during first year of life. She has all vaccinations according to schedule. Cough is dry, worsens at night. At the time of examination, the child is active, not calm. Respiration rate 25 per minute, heart rate 110 per minute. Percussion tone is clear, pulmonary, vesicular respiration, wheezing or rales are not found. Choose a management?

A Spirometry with beta-2-agonist test, if signs of asthma - bronchodilatating therapy, dexamethasone
B X-ray, bronchoscopy, antitussives
C X-ray, skin prick tests, antibiotics, expectorants
D Spirometry with beta-2-agonist test, if signs of asthma – ICS, salbutamol, skin prick tests

**Proper answer: D.** Spirometry with beta-2-agonist test, if signs of asthma – ICS, salbutamol, skin prick tests, as the history of disease shows allergic condition, which can be cough predominant asthma variant. Dexamethasone (A) is not recommended as it does not correspond to stage of severity, antibiotics, expectorants (C) and bronchoscopy, antitussives (B) are not recommended, because they lack proven benefit, increase the cost of care, and may have adverse effects. X-ray, antibiotics are indicated only if there is evidence of a coexisting bacterial infection. This approach is consistent with that of the American Academy of Pediatrics, the National Institute for Care Excellence, and other professional organizations. Chest radiographs are not necessary in the routine evaluation of asthma (B, C).

**References:** Nelson Textbook of Pediatrics, 2-Volume Set, 20th Edition, 2016 by Robert M. Kliegman, Bonita M.D. Stanton, Joseph St. Geme and Nina F Schor, 5315 p.

**Task №3.** A mother of 4-years old girl complains on cough, that is dry, present mostly during the day, is lasting for 2,5 month. 6 month ago a girl started visiting day care center. Cough worsens when child is anxious or attention is focused; improves with distraction or suggestion. Girl received budesonide by nebulizer, salbutamol 7 days, amoxicillin 7 days, ambroxol 7 days, without prominent improvement. History – non atopic. She has all vaccinations according to schedule. Examination – skin color is normal, breath rate 27\minute, HR 120\minute. Percussion tone is clear, pulmonary, vesicular respiration, wheezing or rales are not found. Choose a management?

A Spirometry, salbutamol, fluticasone, prednisolone
B Foreign body aspiration, bronchoscopy
C Tuberculin test, consultation of phthisiatrician
D X-ray, antibiotics macrolides and expectorants
E Referral to a child psychologist

**Proper answer: E-** referral to a child psychologist, - because tic cough (habit cough) may be suspected. She is not atopic and asthma is not considered, as she did not improve with asthma treatment (A). There is no history for foreign body aspiration (B) and the age is not typical, and there are no signs of infection (C, D), so tuberculin test, consultation of phthisiatrician and X-ray, antibiotics are not indicated.

**References:** Nelson Textbook of Pediatrics, 2-Volume Set, 20th Edition, 2016 by Robert M. Kliegman, Bonita M.D. Stanton, Joseph St. Geme and Nina F Schor, 5315 p.

**Task №4**. An 8-year-old girl was admitted to the admission department with cough. She has cough during 5 weeks, cough is wet-moist, during night and day, and recurrent mild fever, 37.5-38, during last week. History – non atopic. She has all vaccinations according to schedule. She received treatment – antitussives for 2 weeks, salbutamol 3 times\day for 1 week, without improvement. At the time of examination, skin color is normal, respiration rate 22 per minute, heart rate 100 per minute. Percussion tone is clear, pulmonary, wheezing and wet rales are heard above the lungs. On X-ray - perihilar bronchial thickening. Choose a most reliable diagnose and management?

A Cough-predominant asthma, spirometry with beta-2-agonist test, bronchodilatating therapy, topical GCS
B Pertussis, antitussives, antibiotics
C Protracted bacterial bronchitis, antibiotics, expectorants
D Bronchiectasis, CT scan, antibiotics based on lower airway cultures
**E** Trachea-bronchomalacia, endoscopy

**Proper answer: C**. Protracted bacterial bronchitis, antibiotics, expectorants, as the history of disease and clinical picture shows signs of bacterial infection, there is absence of symptoms, signs, or laboratory evidence suggestive of an alternative cause of the cough, prolonged course of diseases, but not enough long for trachea-bronchomalacia (E), which is congenital condition with symptoms that should be present after birth, or bronchiectasis (D), and X-ray reveal bronchitis, but not bronchiectasis (D). There are no specific cough pointers for Pertussis (no whooping cough), so antitussives (B) are not recommended, no signs of allergic disease and atopic history, no wheezing (A).

**References:** Nelson Textbook of Pediatrics, 2-Volume Set, 20th Edition, 2016 by Robert M. Kliegman, Bonita M.D. Stanton, Joseph St. Geme and Nina F Schor, 5315 p.

**Task №5** year-old girl was admitted to the admission department with nonproductive cough, that is lasting for 6 month, mostly at night. The disease began gradually. Girl has no fever, no signs of infection, non atopic. She has all vaccinations according to schedule. She received treatment – antitussives for 2 weeks, salbutamol 3 times\day for 1 week, antihistamines for 2 weeks, after that expectorants for 1 week, without improvement. At the time of examination, skin color is normal, the child is active. Respiration rate 25 per minute, heart rate 140 per minute. Percussion tone is clear, pulmonary, vesicular respiration, wheezing or rales are not found. Choose examination?

A Sweet test
B Ciliary studies
C X-ray
D Immunogram test
E Esophageal pH or multichannel intraluminal impedance monitoring

**Proper answer: E**- Esophageal pH or multichannel intraluminal impedance monitoring, as according to the history of disease GERD may be suspected (cough mostly at night). Immunogram test is used in case of suspicion of immunodeficiency (D), and there is no signs of infection (C), sweet test (A) for diagnose of cystic fibrosis, which should be accompanied by

chronic lung infection during the all period of childhood, the same, as primary ciliary dyskinesia (B).

**Clinical task**

**1.** Anya K., 13 years old, was admitted to the clinic on the 3rd day of the disease with complaints of an increase in temperature to 39-40ºC, a dry cough. The disease was caused by severe hypothermia. The disease began acutely in the evening of the same day, dyspnea, high body temperature, and coughing appeared. The child is engaged in sports, rarely suffers from acute respiratory diseases. The situation is dire. The temperature is 38.5ºC. Pale, blush on the cheeks. Cough is infrequent, unproductive. The throat is not hyperemic. Breathing rate - 30 per minute. Percussion - shortening of the percussion tone to the right below the angle of the scapula, weak breathing is heard there, oxygen saturation 90%. The limits of cardiac dullness are not shifted. Heart sounds are sonorous, rhythmic, heart rate is 100 beats per 1 minute. Abdomen is soft, painless. Liver, spleen - not enlarged. Physiological parameters are normal

General blood analysis: leukocytes - 16.0 x 10 9/l, erythrocytes -2%, rod cells -28%, segmentonuclear cells -50%, lymphocytes -18%, monocytes -2%, erythrocyte sedimentation rate - 42 mm/h. X-ray of the chest: on the right, in the lower lobe, there is a homogeneous non-intense darkening, an increased lung pattern. The roots are non-structural. The sinuses are free. Make a diagnosis according to the classification of the disease. Prescribe treatment.

**Correct answer:** Pneumonia, non-hospital, segmental right-sided, DN2, uncomplicated, since the disease began after hypothermia, acute, objectively, breathing is weakened locally in the lungs, there is also a shortened percussion sound. With community-acquired pneumonia, etiotropic therapy begins with protected penicillins, in hospital conditions with third-generation cephalosporins. Hospitalization is indicated for a child with respiratory insufficiency of the 2nd degree.

Reference: Nelson Textbook of Pediatrics, 2-Volume Set, 20th Edition, 2016 by Robert M. Kliegman, Bonita M.D. Stanton, Joseph St. Geme and Nina F Schor, 5315 p.

**2.** Sashko N., 3.6 years old, was admitted to the children's department with complaints of abdominal pain during breathing, shortness of breath, cough, lethargy, irritability, and temperature. During the week, he received symptomatic treatment at home for an acute respiratory viral disease, simple bronchitis. During the last 3 days, the condition worsened: the temperature rose to febrile values, shortness of breath appeared, and the cough became more frequent. During the last day, abdominal pain, vomiting appeared, "it became difficult and painful to breathe." The condition is serious. The child is fussy, behaves somewhat lethargic, lies on his right side with his legs bent at the knees. Body temperature is 39ºC. The cough is "painful", short. He breathes with croaking, superficial, he cannot breathe deeply because of pain in his right side. Shortness of breath of a mixed nature. Breathing rate - 48 in 1 minute. The skin is pale, cyanosis of the nasolabial triangle, acrocyanosis. Muscle tone is normal. The heart rate is 132 in 1 minute. Arterial pressure - 100/65 mm Hg. Heart tones are muffled. On the right, in the subscapular-axillary area, a significant shortening of the percussion sound is determined, which becomes dull in the lower parts of the right lung. Breathing during auscultation is significantly weakened and is not heard above the area of dull percussion tone. Abdominal palpation reveals tension in the right half. Liver +1 cm. There was no defecation for 2 days. Diuresis is normal. According to the results of the blood gas composition study: PaO2 is 68 mm Hg. st., RaCO2 – 66 mm Hg. Art. What complications can be assumed in this case? What immediate measures do you intend to take?

**Correct answer:** Right-sided exudative pleurisy, respiratory failure of the 2nd degree. For 10 days, the child received only symptomatic treatment for SARS. Objectively, in the lungs, breathing is weakened locally, there is a dull percussion sound, respiratory insufficiency of the 2nd degree. Treatment: Oxygen therapy. Pain relievers (non-narcotic analgesics). Pleural puncture, etiotropic treatment.
Reference: Nelson Textbook of Pediatrics, 2-Volume Set, 20th Edition, 2016 by Robert M. Kliegman, Bonita M.D. Stanton, Joseph St. Geme and Nina F Schor, 5315 p.

**Recommended Literature**

**Fundamental:**


1. Nelson Textbook of Pediatrics, 2-Volume Set (Nelson Pediatrics) 21st Edition by Robert M. Kliegman MD, Joseph St. Geme MD, 2020, 5932 p
2. Ghai. Essential Pediatrics. 9 edition.- 2019.-768 p.
3. Hugh D. Allen, Robert E. Shaddy,Daniel J. Penny. Moss & Adams' Heart Disease in Infants, Children, and Adolescents, Including the Fetus and Young Adult/ 9 Edition. -2016.-Volume 1. 3438p.


***Additional***


1. Causes and Treatment of Coughs in Children .Medically Reviewed by Brunilda Nazario, MD

WebMed on September 20, 2021 https://www.webmd.com/first-aid/coughs

2. Approach to chronic cough in children. Authors: Anne B Chang, MBBS, FRACP, PhD, FAPSR, UpToDate last updated: Aug 30, 2022
https://www.uptodate.com/contents/approach-to-chronic-cough-in-children

3.The Ethics of Treating Cough in the Littlest Kids. Michael L. Ginsberg, MD. Medscape.

September 11, 2015. https://www.medscape.com/viewarticle/850654

4.'Habit Cough' in Children Responds to Behavioral Therapy. Diana Swift
Medscape**.** October 28, 2015. https://www.medscape.com/viewarticle/853348

5. Pediatric Bronchitis Differential Diagnoses.Author: Patrick L Carolan.Medscape.Updated: Oct 11, 2019 https://emedicine.medscape.com/article/1001332-differential


**Questions for student self-preparation for practical training:**

1. Define acute cough.
2. Define chronic cough.
3. In which organs are the cough receptors.
4. Features of cough syndrome in children.
5. What diseases cause acute cough in children.
6. What diseases cause chronic cough in children.
7. Algorithm for examination of children with cough syndrome.
8. Differential diagnosis of diseases accompanied by cough syndrome.
9. Treatment of cough syndrome in children.
10. Classification of medicines for cough syndrome.

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