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Е. А. Каразей, Е. С. Алексеева, Е. В. Рылатко

ОСТРЫЙ БРОНХИТ И ПНЕВМОНИЯ

ACUTE BRONCHITIS AND PNEUMONIA

Учебно-методическое пособие

Минск БГМУ 2026

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Алексеева Елена Сергеевна
Рылатко Елена Викторовна

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На английском языке

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Компьютерная вёрстка А. В. Янушкевич

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LIST OF ABBREVIATIONS

ABX — antibacterial drugs
BCP — blood chemistry test
BP — blood pressure
CAP — community-acquired pneumonia
CBC — complete blood count
COPD — chronic obstructive pulmonary disease
CRP — C-reactive protein
DBP — diastolic blood pressure
ECG — electrocardiogram
HR — heart rate
ICD-10 — International Statistical Classification of Diseases and Related Health Problems, Tenth Revision
ICU — intensive care unit
MV — mechanical ventilation
PaO_2 — partial pressure of oxygen in arterial blood
PCR — polymerase chain reaction
RF — respiratory failure
RR — respiratory rate
SBP — systolic blood pressure
SpO_2 — blood oxygen saturation level

MOTIVATIONAL CHARACTERISTICS OF THE TOPIC

The teaching aid «Acute bronchitis and pneumonia» is designed for the lesson on the topic of «Acute Bronchitis and Pneumonia».

Total lesson duration: 6 academic hours.

This aid addresses current issues in the diagnosis, differential diagnosis, treatment, and rehabilitation of patients with acute bronchitis and pneumonia in outpatient settings.

Acute bronchitis and pneumonia remain among the most common and socially significant respiratory diseases, making them highly relevant in the training of future healthcare professionals. These diseases affect children, people of working age, and, most critically, the elderly and those with comorbid conditions (chronic obstructive pulmonary disease (COPD), diabetes, heart failure), for whom they are more severe and associated with a high risk of complications.

Acute bronchitis is one of the leading causes of outpatient care. In the autumn and winter, this condition occurs in 15–50 % of patients. Community-acquired pneumonia is the most common lower respiratory tract infection

requiring hospitalization. These conditions cause significant economic losses due to temporary disability, treatment costs, and potential hospitalization.

The relevance of this topic is also due to the similarity in the initial clinical manifestations of acute bronchitis and pneumonia (both diseases can present with cough, fever, and symptoms of intoxication), despite fundamentally different prognoses and treatments. General practitioners are required to conduct differential diagnoses daily and make decisions about patient management. This requires a confident mastery of physical examination methods, the ability to interpret routine diagnostic data, and knowledge of the criteria for prescribing antibacterial therapy.

Therefore, a comprehensive study of the topic «Acute Bronchitis and Pneumonia» in the training of future qualified general practitioners will enable students to develop a systematic approach to patients with lower respiratory tract infections: from epidemiology and pathogenesis, differential diagnosis, to evidence-based treatment principles, considering current clinical guidelines and approved clinical protocols.

The purpose of the lesson: to familiarize students with the concepts and strategies for diagnosis, treatment, and prevention of acute bronchitis and pneumonia, as well as the assessment of temporary disability for these conditions.

Objectives of the lesson: to develop students' scientific knowledge regarding the provision of medical care, treatment strategies, indications for hospitalization, principles of primary and secondary prevention, and rehabilitation of patients with acute bronchitis and pneumonia in outpatient settings.

To acquire practical skills in differential diagnosis, interpretation of examination data, formulation of a clinical diagnosis, preparation of medical documentation, and assessment of temporary disability.

Basic knowledge requirements: to fully master the topics in the «Human Anatomy», «Normal Physiology», and «Pathological Physiology» sections, students must review the anatomy and functions of the respiratory system, as well as the pathophysiological mechanisms of inflammation, cough, and broncho-obstructive syndrome.

Questions from related disciplines:

1. Anatomy of the lungs and heart.
2. Physiology of the respiratory system.
3. Pathophysiological changes in bronchitis and pneumonia.
4. Laboratory methods for testing blood, urine, and sputum, and electrocardiogram (ECG) in respiratory diseases.

Questions on the topic of the lesson:

1. The concept of acute bronchitis and its etiology.
2. Clinical presentation, complications of acute bronchitis, and patient examination plan.

3. Treatment of acute bronchitis, indications for antibacterial therapy, indications for hospitalization, and prevention.

4. Concept and etiology of pneumonia.

5. Pathogenesis, classification, clinical presentation, complications of pneumonia, patient examination plan.

6. Treatment tactics, indications for hospitalization of a patient with pneumonia.

7. Medical monitoring of patients who have had pneumonia.

Assignments for independent student work:

1. Review the anatomy and physiology of the respiratory system, the pathophysiology of inflammation, cough, and broncho-obstructive syndrome.

2. Familiarize yourself with the clinical symptoms and diagnostic signs of acute bronchitis and pneumonia, and the methods of examination for these diseases.

3. Study the mechanisms of action, indications and contraindications, and dosages of medications used for acute bronchitis and pneumonia.

4. Complete the test tasks posted in the electronic educational and methodological complex.

DEFINITIONS

Acute bronchitis is an acute or subacute inflammation of the lower respiratory tract, primarily of viral etiology. The leading clinical symptom is a cough (usually productive) lasting no more than 2 weeks (possibly up to 4 weeks) combined with characteristic signs of a lower respiratory tract infection (wheezing, chest discomfort, shortness of breath) without the possibility of an alternative explanation within the context of an acute or chronic process (pneumonia, chronic bronchitis, COPD, bronchial asthma).

Cough is the protective response that helps restore airway patency and remove foreign particles, microorganisms, or pathological bronchial secretions, thereby clearing the bronchi.

Respiratory failure (RF) is a syndrome in which normal oxygen and carbon dioxide tension in arterial blood is not maintained (achieved through increased respiratory work, leading to a decrease in the body's functional capacity, or maintained artificially).

Pneumonia is a group of acute infectious (primarily bacterial) diseases with varying etiologies, pathogenesis, and morphological characteristics, characterized by focal lesions of the respiratory regions of the lungs with the obligatory presence of intraalveolar exudation.

Community-acquired pneumonia (CAP) is pneumonia that develops outside of a hospital setting, including that diagnosed within the first 48 hours of hospitalization.

Hospital-acquired pneumonia (synonyms: nosocomial) is pneumonia that develops after 48 hours of a patient's stay in a hospital or within 48 hours of discharge from a hospital.

Severe CAP is a specific form of the disease characterized by severe acute respiratory failure and/or sepsis.

Atypical pneumonia is pneumonia caused by atypical pathogens: Mycoplasma pneumoniae, Chlamydia pneumoniae, and Legionella pneumophila.

Slowly resolving/non-resolving CAP is the absence of radiographic resolution of focal infiltrative changes in the lungs within 4 weeks or their progression, often accompanied by a slower resolution of clinical symptoms of CAP with a delayed achievement of clinical stability.

Shortness of breath (dyspnea, respiratory discomfort) is a subjective uncomfortable or unpleasant sensation of one's own breathing or awareness of difficulty breathing, often accompanied by a change in its frequency, depth and rhythm, duration of inhalation and exhalation with the participation of additional muscles of the upper shoulder girdle and diaphragm.

ACUTE BRONCHITIS

Acute bronchitis accounts for over 40 % of all bronchopulmonary diseases, with an annual incidence rate reaching 40 %. The incidence of acute bronchitis varies significantly. Its incidence is directly related to seasonality (peaking in the fall and winter months) and the epidemiological situation, particularly the rise in influenza.

ETIOLOGY

Acute bronchitis usually develops against the background of an existing acute respiratory infection (viral or bacterial) or immediately after one. Its key distinguishing feature is the predominant localization of inflammation in the trachea and bronchi.

A viral infection is usually a potential trigger for acute bronchitis. The spectrum of pathogens includes influenza A and B viruses, parainfluenza viruses, coronaviruses (including SARS-CoV2), and respiratory syncytial virus. Less commonly, acute bronchitis is associated with adenovirus, enterovirus, and rhinovirus infections. These viruses are transmitted by airborne droplets and

cause inflammation and irritation in the bronchial tree, ultimately leading to the characteristic symptoms of acute bronchitis.

The proportion of bacterial acute bronchitis cases is small, accounting for approximately 10–15 %. The main pathogens in this group include *Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis, Bordetella pertussis, Bordetella parapertussis*, and atypical bacteria — *Mycoplasma pneumoniae and Chlamydophila pneumoniae.* Atypical pathogens *(Mycoplasma and Chlamydophila pneumoniae)* account for 5–7 % of cases of acute bronchitis. The incidence of Bordetella pertussis reaches 5–10 %.

In some cases, the disease is non-infectious in origin, beginning with chemical or physical damage to the bronchial mucosa (e. g., by vapors, dust, hot or cold air). The resulting tissue damage is often complicated by infection.

Risk factors for acute bronchitis include:

– the presence of foci of chronic infection in the oropharynx;
– acute respiratory infections;
– allergic diseases;
– smoking (including passive smoking);
– air pollutants (dust, smoke, exposure to inhaled chemical agents, living in areas with increased environmental pollution), as well as intoxication due to pathological conditions;
– climatic, weather, and physical factors (hypothermia, excessively dry, hot, or cold air);
– elderly or childhood;
– immunodeficiency states;
– hereditary predisposition to respiratory diseases.

Pathogenesis

Exposure to infectious or toxic substances leads to the development of inflammatory edema of the tracheobronchial mucosa, mucus hypersecretion, and dysfunction of mucociliary clearance. This contributes to the accumulation of cellular debris and mucopurulent exudate in the bronchial lumen, sometimes leading to obstruction.

Classification

Classification of acute bronchitis according to the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10):

J20.0 Acute bronchitis due to Mycoplasma pneumoniae
J20.1 Acute bronchitis due to Haemophilus influenzae
J20.2 Acute bronchitis due to streptococci

J20.3 Acute bronchitis due to coxsackievirus
J20.4 Acute bronchitis due to parainfluenza virus
J20.5 Acute bronchitis due to respiratory syncytial virus
J20.6 Acute bronchitis due to rhinovirus
J20.7 Acute bronchitis due to Echovirus
J20.8 Acute bronchitis due to other specified agents
J20.9 Acute bronchitis, unspecified.

Classification of acute bronchitis based on the etiologic factor:

1. Acute bronchitis of infectious origin (viral, bacterial, caused by viral-bacterial association).
2. Acute bronchitis due to inhalation exposure to chemical or physical factors.

Classification of acute bronchitis based on the nature of the inflammatory process: catarrhal, purulent, purulent-necrotic.

By course: acute (2–3 weeks); protracted (up to 1 month); recurrent (up to 3 or more times per year).

Clinical picture

The disease is characterized by an acute onset. The clinical manifestations of acute bronchitis consist of symptoms of respiratory tract damage and intoxication of varying intensity.

Symptoms of acute bronchitis caused by respiratory tract damage:

1. Cough is the main clinical manifestation of the disease. Initially, it is usually dry, painful, and labored. Often, the cough is accompanied by unpleasant subjective sensations in the chest, such as a scratchy or sore feeling behind the sternum or between the shoulder blades, which intensify during coughing efforts. Subsequently, the cough becomes productive, producing a small amount of mucous, and sometimes purulent, sputum.
2. Chest discomfort.
3. Shortness of breath and other signs of broncho-obstructive syndrome — these develop in severe cases with damage to the distal small bronchi and bronchioles.
4. Associated symptoms of upper respiratory tract infection (rhinorrhea, obstructed nasal breathing, oropharyngeal hyperemia, hoarseness, etc.). In some cases, these symptoms have specific characteristics determined by the specific pathogen.

Intoxication syndrome: increased body temperature (usually to subfebrile values); headache; general weakness; myalgia.

Diagnosis

Acute bronchitis is a diagnosis of exclusion. It is established upon detection of characteristic clinical signs of acute bronchial damage, confirmed by laboratory and instrumental examination data after ruling out chronic bronchopulmonary pathology, as well as acute infection involving the lung parenchyma (pneumonia).

The initial stage of diagnosing acute bronchitis includes an assessment of current complaints and a complete medical, epidemiological, and occupational history.

The clinical criteria for acute bronchitis are an acute cough lasting up to 14 days, accompanied by at least one of the following symptoms: sputum production, shortness of breath, wheezing on auscultation, or chest discomfort.

Physical Examination. All patients with acute bronchitis should undergo a general examination, including measurement of vital signs (respiratory rate (RR), heart rate (HR), blood pressure (BP), body temperature, and blood oxygen saturation (spo2)), and a detailed chest examination. Palpation and percussion abnormalities are usually normal. Auscultatory findings are characterized by harsh breath sounds (with prolonged expiration), most pronounced in the interscapular region, and often dry rales. The nature of auscultatory findings depends on the level of bronchial tree involvement: with proximal (large) bronchi involvement, moist medium-bubble rales may be heard, often changing in character after coughing. Distal involvement is characterized by diffuse dry wheezing and buzzing rales. The patient may have a combination of different types of wheezing, but their absence does not rule out a diagnosis of acute bronchitis.

Laboratory Tests. The standard laboratory test for acute bronchitis is a complete blood count (CBC), which should include an assessment of the white blood cell (WBC), red blood cell (RBC), and platelet counts, as well as a differential white blood cell (WBC) analysis. A CBC in acute bronchitis allows one to assess the likely cause of the disease. Viral infections are usually not accompanied by leukocytosis or a left shift in the WBC count. Leukocytosis with an increase in neutrophils and/or a left shift in the WBC count (band neutrophils > 10 %) indicates a bacterial cause. The detection of these markers indicates a high probability of a bacterial infection and requires further investigation to rule out pneumonia. A blood biochemistry panel (BBC) is nonspecific (C-reactive protein (CRP) may be elevated) and is not a mandatory outpatient test.

Microbiological diagnostics are not performed for uncomplicated acute bronchitis, as they do not significantly influence treatment decisions. Sputum culture, rapid tests for influenza and SARS-cov2, PCR testing for respiratory viruses, and immunoserological methods may be used as clinically indicated.

Instrumental examinations. The instrumental diagnostic tools for acute bronchitis include:

1. Imaging methods. Chest radiography in the anterior and lateral projections is performed as indicated and necessary to rule out other pathologies, primarily pneumonia. In acute bronchitis, chest radiography does not reveal any specific signs. Increased pulmonary markings and unclear lung roots may be present.

Indications for chest radiography in acute bronchitis at the outpatient stage (to rule out pneumonia):

– heart rate > 100 bpm;
– respiratory rate > 24 bpm;
– body temperature > 38 °C;
– auscultation of moist rales on the affected side;
– second wave of fever.

2. Pulse oximetry with SpO_2 measurement is performed on all patients to detect respiratory failure.

Types of respiratory failure by pathogenesis:

– hypoxic (pulmonary failure) — gas exchange failure, manifested by hypoxemia;

– hypercapnic (pump failure) — ventilatory failure, manifested by hypercapnia (depression of the respiratory center, mechanical defect of the respiratory tract, fatigue, weakness of the respiratory muscles).

Types of respiratory failure by severity:

– grade I — dyspnea, tachycardia, normal systolic blood pressure (SBP), SpO_2 = 90–94 %;

– grade II — dyspnea, tachycardia, elevated SBP, perioral acrocyanosis and pallor at rest, SpO_2 75–89 %;

– grade III — severe dyspnea, breathing with the use of accessory muscles, dyspnea, tachycardia, pale skin, diffuse cyanosis may develop, systolic blood pressure is decreased at rest, SpO_2 < 75 %.

Types of respiratory failure by the rate of development:

– acute — symptoms worsen over hours or days; compensatory mechanisms do not have time to activate (respiratory acidosis (pH < 7.35) in ventilatory respiratory failure and respiratory alkalosis (pH > 7.45) in parenchymal respiratory failure);

– chronic — symptoms worsen over weeks or months, compensatory mechanisms function (polycythemia, increased cardiac output, normalization of respiratory acidosis due to renal bicarbonate retention), associated with hypoxia and/or hypercapnia.

Acute respiratory failure associated with chronic respiratory failure.

3. Electrocardiography is performed to assess cardiac function in patients with comorbidities or severe shortness of breath.

4. Spirometry is performed if the patient has signs of bronchial obstruction.

Given the clinical manifestations of acute bronchitis, differential diagnosis should primarily include CP. Differential diagnostic criteria are presented in table 1.

Table 1

Differential diagnosis of acute bronchitis and community-acquired pneumonia

Criterion	Acute bronchitis	CAP
Etiology	Mostly viral	Mostly bacterial
Main complaints	Productive cough, chest discomfort. Associated symptoms of upper respiratory tract damage	Productive cough with purulent sputum, chest discomfort. Chest pain that worsens with inhalation/ coughing
Intoxication syndrome	Moderately severe	Severe
Body temperature	Subfebrile (< 38 °C) or normal	Febrile (≥ 38 °C)
Respiratory rate	< 24 beats per minute	Tachypnea (≥ 24 beats per minute
Heart rate	< 100 beats per minute	Tachycardia (≥ 100 beats per minute)
Percussion	Abnormalities are usually absent	Localized shortening (dullness) of the percussion sound
Auscultation	Harsh breath sounds. Diffuse dry or moist rales may be heard, disappearing after coughing	Bronchial breath sounds, moist fine bubbling rales, or crepitations may be heard over the affected area of the lung
Chest X-ray	Normal or increased pulmonary markings	Infiltrative changes (focal, lobar) are detected
Complete blood count	Normal or decreased white blood cell count, relative lymphocytosis (sign of viral infection)	Leukocytosis with a left shift in the white blood cell count, neutrophilia. Neutrophil-to-lymphocyte ratio > 20
Management	Mucolytic agents, symptomatic therapy. Antibiotics are usually not indicated	Antibacterial therapy is mandatory

Treatment

The vast majority of patients with acute bronchitis are treated on an outpatient basis. The goal of treatment is to alleviate the severity and duration of cough and restore ability to work.

General measures include: home confinement during the acute phase of the illness; patient isolation; provision of separate utensils and personal hygiene items for the patient, ventilation of the room; wearing a mask; hygienic cleaning of

the oral and nasal mucosa; drinking plenty of fluids at least 20–30 ml/kg/day per ideal body weight (ideal body weight (in kg) is defined as height in cm minus 100) or actual body weight (the lower of the two).

Drug therapy includes the use of etiotropic and symptomatic agents.

Etiotropic antiviral therapy. Neuraminidase inhibitors (oseltamivir) are recommended for adult patients with acute bronchitis and flu-like symptoms, as well as risk factors (old age, diabetes, chronic heart failure, etc.). Oseltamivir is administered no later than 48 hours after the onset of the first signs of illness at a dose of 75 mg twice daily for 5 days. Very common (≥ 1/10) adverse reactions with oseltamivir include nausea and headache, while common (≥ 1/100 and < 1/10) adverse reactions include vomiting, abdominal pain, and insomnia.

In cases of COVID-19, patients are prescribed etiotropic therapy in accordance with the current order of the Ministry of Health of the Republic of Belarus.

Antibacterial therapy. Since in most cases the disease has a viral etiology, antibacterial therapy for uncomplicated acute bronchitis is not recommended. Antibacterial drugs should be prescribed in the presence of signs of bacterial bronchial infection: cough with the release of purulent sputum and its increase in quantity, the onset or worsening of shortness of breath, worsening signs of intoxication (decreased appetite, malaise, weakness), severe concomitant pathology, changes in the complete blood count (leukocytosis with an increase in neutrophils and/or a left shift in the leukocyte formula — band neutrophils > 10 %) and/or in the biological blood test (CRP > 50 mg/L). In these cases, the drugs of choice may include beta-lactam antibiotics (amoxicillin orally 1500 mg per day for 5 days), macrolides (azithromycin 500 mg orally, once a day for 3 days, or clarithromycin 500–1000 mg per day orally for 5 days). The goal of antibacterial therapy is to relieve clinical symptoms and intoxication syndrome.

Mucolytic therapy. For productive cough with viscous, difficult-to-separate sputum, it is advisable to prescribe mucoactive drugs (acetylcysteine, ambroxol, bromhexine, erdosteine). Acetylcysteine is administered orally at 400–600 mg per day in 2 divided doses; Ambroxol 30 mg orally 3 times daily, bromhexine 8–16 mg orally 3 times daily, erdosteine 300 mg orally 2–3 times daily. Antitussives for bronchitis are not used in combination with mucolytic therapy, as these medications suppress the cough reflex, slow mucociliary transport, and increase the viscosity of bronchial secretions.

Bronchodilators are indicated for confirmed broncho-obstructive syndrome. Their use is justified in situations where, despite non-pharmacological treatments, obstruction and signs of bronchial hyperreactivity (scattered dry, wheezing) persist. In such cases, the following are recommended: salbutamol (100 mcg 1–2 puffs) or

fenoterol (100 mcg 1–2 puffs) via a metered-dose inhaler, or fenoterol or berodual solutions (a combination of iprotropium bromide and fenoterol) via a nebulizer.

Symptomatic therapy. Non-steroidal anti-inflammatory drugs are recommended for patients with fever above 38 °C, as well as muscle and joint pain. Therapy is aimed at achieving antipyretic, analgesic, and anti-inflammatory effects. Oral paracetamol 500–1000 mg three times daily or oral ibuprofen 200–400 mg three times daily are used.

The duration of temporary disability for acute bronchitis depends on the severity of the disease, ranging from 5–7 days for mild cases to 12–14 days for severe cases. In cases of prolonged illness or the development of complications, the duration is determined individually, based on the patient's full recovery and the normalization of clinical and laboratory parameters.

COMMUNITY-ACQUIRED PNEUMONIA

Community-acquired pneumonia (CAP) is a widespread infection. The incidence of pneumonia increases with age: from 1–11.6 % in young adults to 25–44 % and higher in individuals over 65. The outcome of the disease directly depends on two key factors: the patient's age and comorbid conditions. The lowest risk of an adverse outcome (mortality rate of 1–3 %) is observed in young and middle-aged patients without chronic diseases. The highest mortality rate (15–30 %) is recorded in elderly patients with comorbidities (COPD, diabetes, heart disease, kidney disease, liver disease, cancer, etc.).

ETIOLOGY

The etiology of CAP is significantly diverse, encompassing over one hundred different pathogens (bacteria, viruses, fungi, and protozoa). However, the majority of clinical cases are associated with a limited group of pathogens, including Streptococcus pneumoniae, Haemophilus influenzae, Mycoplasma pneumoniae, Chlamydophila pneumoniae, Legionella pneumophila, Staphylococcus aureus, Pseudomonas aeruginosa, enterobacteria, and a number of respiratory viruses (influenza, SARS-CoV-2, etc.). The frequency of their detection, as well as comorbidities and risk factors associated with specific CAP pathogens, are presented in table 2.

Table 2

The structure of pathogens of community-acquired pneumonia, considering risk factors and concomitant diseases

Pathogen	Detection Frequency, %	Associated Comorbidities / Risk Factors
Streptococcus pneumoniae	30–50	COPD/smoking, diabetes mellitus, alcohol consumption, intravenous drug use, immunodeficiency states. Increased risk of severe infection in children and individuals over 65
Haemophilus influenzae	3–10	COPD/smoking, diabetes mellitus, alcohol consumption, intravenous drug use, immunodeficiency states. Increased risk of severe infection in individuals over 65. Most common in children
Mycoplasma pneumoniae	5–50	Most common in congregate settings and among young adults (military personnel, students). Peak incidence occurs in autumn/winter
Chlamydophila pneumoniae	3–10	Congregate settings, young adults, elderly individuals
Legionella pneumophila	3–8	COPD, diabetes mellitus. The significance increases significantly in severe community-acquired pneumonia and in the presence of risk factors: contact with air conditioners, humidifiers, water cooling systems, recent (< 2 weeks) sea travel/hotel stay
Staphylococcus aureus	3–5	COPD/smoking, diabetes mellitus, alcohol consumption, intravenous drug use, immunodeficiency states. Bronchiectasis, cystic fibrosis. Residence in nursing homes/long-term care facilities
Enterobacteria (Klebsiella, Escherichia coli, Serratia)	3–5	Alcohol consumption, intravenous drug use. E. coli is most common in newborns. Klebsiella and Serratia are agents of nosocomial pneumonia
Pseudomonas aeruginosa	3–5	Chronic diseases, immunodeficiency states, cystic fibrosis, bronchiectasis, recent hospitalizations

Pathogenesis

The primary pathogenetic mechanism for the development of CAP is the penetration of microflora normally found in the oropharynx into the lower respiratory tract (aspiration of oropharyngeal secretions). Fine particles are capable of penetrating deepest, reaching the alveoli. In healthy lungs, the lung's defense systems (mucociliary clearance, alveolar macrophage activity, local immunity) effectively eliminate pathogens. However, when these mechanisms malfunction (impaired surfactant production, decreased functional activity of immunocompetent cells, or a deficiency of secretory immunoglobulins), microorganisms adhere to and colonize the mucous membrane, initiating an infectious and inflammatory

response. Much less frequently, infection occurs in other ways: by inhaling contaminated aerosol (aerogenic route), by introducing the pathogen through the bloodstream from distant foci of infection (hematogenous route), or as a result of direct penetration into the lung tissue (for example, during trauma or medical procedures).

Classification

Classification of pneumonia according to ICD-10:
J10–J11 Influenza with pneumonia and other respiratory manifestations
J12 Viral pneumonia, not elsewhere classified
J12.0 Adenovirus pneumonia
J12.1 Respiratory syncytial virus pneumonia
J12.2 Parainfluenza virus pneumonia
J12.8 Other viral pneumonia
J12.9 Viral pneumonia, unspecified
J13 Pneumonia due to Streptococcus pneumoniae
J14 Pneumonia due to Haemophilus influenzae
J15 Bacterial pneumonia, not elsewhere classified
J15.0 Klebsiella pneumoniae pneumonia
J15.1 Pneumonia due to Pseudomonas spp.
J15.2 Pneumonia due to Staphylococcus spp.
J15.3 Pneumonia due to group B streptococci
J15.4 Pneumonia due to other streptococci
J15.6 Pneumonia due to Escherichia coli
J16 Pneumonia due to other infectious agents, not elsewhere classified
J16.0 Pneumonia due to Chlamydia spp.
J16.8 Pneumonia due to other specified infectious agents
J17 Pneumonia in diseases classified elsewhere
J17.0 Pneumonia in bacterial diseases classified elsewhere
J17.1 Pneumonia in viral diseases classified elsewhere
J17.2 Pneumonia in mycoses
J17.3 Pneumonia in parasitic diseases
J17.8 Pneumonia in other diseases classified elsewhere
J18 Pneumonia, unspecified
J18.0 Bronchopneumonia, unspecified
J18.1 Lobar pneumonia, unspecified
J18.2 Hypostatic pneumonia, unspecified.

Clinical classification of pneumonia based on the conditions in which the disease developed:

– community-acquired pneumonia: typical (in which the most common bacterial pathogen is Streptococcus pneumoniae) and atypical (caused by pathogens such as Mycoplasma pneumoniae, Chlamydia pneumoniae, and Legionella pneumophila);

– hospital-acquired or nosocomial pneumonia. A distinction is made between hospital-acquired (non-ventilator-associated) and ventilator-associated (develops in patients on mechanical ventilation (MV)) pneumonia. Ventilator-associated pneumonia can be early (develops within the first 5 days of MV) and late (develops after 5 days of MV).

Classification of pneumonia by clinical and radiographic forms:

– focal (one or more foci of infiltration measuring 1–2 cm);

– focal-confluent (massive infiltration consisting of multiple foci);

– segmental;

– polysegmental (pneumonic infiltration in one or more lung segments);

– lobar (the inflammatory process affects a lung lobe);

– interstitial (pronounced, sometimes predominant, changes in the pulmonary interstitium).

Classification of CAP depending on the patient's immune status:

– pneumonia in patients without significant immune impairment;

– pneumonia in patients with severe immunosuppression.

Classification of CAP based on severity:

– non-severe (includes mild and moderate forms). The criteria for distinguishing between these subgroups are vague, but the scope of medical care is similar;

– severe (severe CAP) is a life-threatening form of the disease characterized by severe intoxication, respiratory and/or cardiovascular failure, and signs of generalized infection. The prognosis for this course is always grave, and treatment requires immediate intensive care (in the intensive care unit (ICU)).

To identify individuals with severe CAP, the American Thoracic Society/ Infectious Diseases Society of America criteria are used, as well as various scales for assessing the severity of CAP, such as the PSI index, the CRB-65 scale, and the SMRT-CO scale, among others.

American Thoracic Society/Infectious Diseases Society of America 2007 Criteria:

1. «Minor» criteria for severe pneumonia:

– respiratory rate of 30 breaths per minute or more;

– impaired consciousness;

– SpO_2 less than 90 % (according to pulse oximetry), arterial oxygen tension (PaO_2) below 60 mmHg;

– SBP below 90 mmHg;
– bilateral or multifocal lung lesions, cavities, pleural effusion;
– uremia (residual blood urea nitrogen ≥ 20 mg/dL). Formula for calculating residual BUN: Residual BUN (mg/dL) = BUN (mmol/L) · 2.8; Residual blood urea nitrogen (mmol/L) = urea (mmol/L) · 2.14;
– leukopenia (leukocytes < $4 \cdot 10^9$/L);
– thrombocytopenia (platelets < $100 \cdot 10^{12}$/L);
– hypothermia (< 36 °C).

2. «Major» criteria for severe pneumonia:
– need for mechanical ventilation;
– septic shock, need for vasopressor administration for 4 hours or more.

Severe CAP is defined as a patient with at least two «minor» or one «major» criterion.

The Pneumonia Severity Index (PSI) can also be used to assess the 30-day mortality risk in adult patients with CAP to determine the optimal treatment location. The patient is awarded points based on demographic data, comorbidities, examination data, and laboratory parameters (table 3).

Table 3

Evaluated criteria in the PSI scale

Category	Criterion	Points
Demographics	Age (men)	= age (years)
	Age (women)	= age (years) – 10
	Nursing home resident	+ 10
Comorbidities*	Neoplasm (Malignancy)	+ 30
	Liver disease	+ 20
	Congestive heart failure	+ 10
	Cerebrovascular disease	+ 10
	Renal disease	+ 10
Physical Examination	Altered mental status (disorientation, lethargy)	+ 20
	Respiratory rate ≥ 30/min	+ 20
	Systolic BP < 90 mmHg	+ 20
	Temperature < 35 °C or ≥ 40 °C	+ 15
	Pulse ≥ 125/min	+ 10
Lab & Radiographic Findings	Arterial pH < 7.35	+ 30
Lab & Radiographic Findings	Blood Urea Nitrogen (BUN) > 9 mmol/L***	+ 20
	Serum sodium < 130 mmol/L	+ 20
	Serum glucose > 14 mmol/L	+ 10
	Hematocrit < 30 %	+ 10

End of the table 3

Category	Criterion	Points
	PaO_2 < 60 mmHg or SpO_2 < 90 % **	+ 10
	Pleural effusion	+ 10

* Chronic disease present prior to the current episode of pneumonia.

** While breathing room air.

*** Blood Urea Nitrogen (mmol/L) = Urea (mmol/L) / 2.14.

The total score determines the Risk Class (from I to V), which correlates with the prognosis and patient management strategy (table 4).

Table 4

Patient risk stratification according to the PSI score, prognosis, and management strategy

Risk Class	Total Score	Mortality, %	Treatment Setting
I	No prognostic risk factors present*, age < 50 years	0.1–0.4	Outpatient
II	≤ 70	0.6–0.7	Outpatient
III	71–90	0.9–2.8	Inpatient (short-term hospitalization)
IV	91–130	8.5–9.3	Inpatient
V	> 130	27–31.1	Inpatient (ICU)

* Adverse prognostic factors include all criteria from the «Physical Examination» and «Laboratory and Instrumental Data» sections of Table 3. If none are present and the patient is < 50 years old, they are automatically assigned to Class I without point calculation.

The CRB-65 scale is one of the most convenient clinical tools for rapid outpatient risk stratification of CAP. Its simplicity stems from the use of only four prognostically significant criteria:

– C (Confusion): Impaired consciousness;

– R (Respiratory rate): Respiratory rate ≥ 30 breaths per minute;

– B (Blood pressure): Decreased blood pressure (SBP < 90 mmHg or diastolic blood pressure (DBP) ≤ 60 mmHg);

– 65 (Age): Patient age 65 years or older.

Each presenting characteristic adds 1 point to the total score (from 0 to 4). The score directly correlates with an increased risk of mortality, which determines the patient's management strategy: 0 points — outpatient treatment, 1–2 points — inpatient observation and assessment, 3–4 points — emergency hospitalization.

When using the SMRT-CO Scale, a scoring system is used to evaluate clinical, laboratory, physical, and radiographic signs, determining the probable need for intensive treatment methods, such as respiratory support and vasopressors (table 5).

Table 5

The assessed criteria in the SMRT-CO scale

Criterion	Value	Points
S — Systolic Blood Pressure	< 90 mmHg	2
M — Multilobar infiltration (on CXR)	Present	1
R — Respiratory Rate	> 25/min (age < 50) or > 30/min (age > 50)	1
T — Heart Rate	> 125 bpm	1
C — Confusion (Altered consciousness)	Present	1
O — Oxygenation	SpO_2 < 94 % (age < 50) or SpO_2 < 90 % (age > 50)	2

The risk of requiring mechanical ventilation or vasopressors on the SMRT-CP scale is high with a score of 3 or more.

Pneumonia classification by course:

– acute (lasting up to 6 weeks);

– protracted (more than 6 weeks).

Pneumonia classification by complications:

– pulmonary (atelectasis, lung abscess, bulla, pleurisy, pneumothorax, pyopneumothorax, acute respiratory distress syndrome);

– extrapulmonary (toxic shock, cardiovascular failure, disseminated intravascular coagulation).

Clinical picture

The clinical presentation of CAP is highly polymorphic. ***Typical manifestations of CAP, caused by respiratory tract damage (bronchopulmonary or bronchopulmonary-pleural syndromes),*** include acute cough, shortness of breath, sputum production, and/or pleuritic pain. The immediate development of pneumonia may be preceded by symptoms suggesting upper respiratory tract damage or acute bronchitis.

Typical manifestations of CAP include symptoms of intoxication syndrome: febrile fever, headache, general weakness, and myalgia. Patients report unexplained fatigue, chills, and severe night sweats.

In elderly and senile patients, classic respiratory symptoms are often vague or absent. Their clinical picture is dominated by signs of intoxication syndrome: drowsiness, psychomotor agitation, confusion, food refusal, nausea and vomiting, or symptoms of decompensation of underlying chronic pathologies (diabetes mellitus, chronic heart failure, etc.).

Self-administration of antibacterial drugs can also significantly modify the typical symptoms. In this case, the clinical picture of the disease becomes blurred due to partial suppression of the pathogen.

In severe cases of CAP, these symptoms may be accompanied by septic shock, acute respiratory failure, and signs of dysfunction of other organs. A characteristic feature of CAP in patients with immunodeficiencies is its rapid progression and development of complications.

The course of CAP may also have characteristics associated with the suspected pathogen: pneumococcal CAP is characterized by an acute onset, high fever, and pleural pain; For Legionella, diarrhea and neurological symptoms; for Mycoplasma, myalgia, headache, and signs of upper respiratory tract damage. However, in modern clinical practice, there are no reliable pathognomonic clinical signs that allow for accurate verification of the pathogen without the use of additional laboratory and instrumental diagnostic methods.

Diagnosis

Diagnostic procedures for CAP in outpatient settings aim to verify the diagnosis, assess the severity and prognosis, select a treatment site, detect complications, and identify the pathogen in certain patient categories.

As with acute bronchitis, the initial stage of CAP diagnosis includes an assessment of current complaints and a complete medical, epidemiological, and occupational history.

Physical examination. All patients with pneumonia should undergo a general examination, including measurement of vital signs (respiratory rate, heart rate, blood pressure), body temperature, SpO_2, and a detailed chest examination. Palpation and percussion abnormalities include increased vocal fremitus and a shortened (dulled) percussion sound over the affected area of the lung. The classic auscultatory picture in VP is characterized by the appearance of light bronchial breathing over the affected area, the presence of a focus of fine bubbling rales or crepitations, increased bronchophony, and possible pleural friction noise.

Laboratory tests. A complete blood count (CBC) should include an assessment of the white blood cell (WBC), red blood cell (RBC), and platelet counts, as well as a differential white blood cell count. Characteristic changes in the CBC for CAP include leukocytosis, increased neutrophil levels, and/or a band shift, which indicate a bacterial etiology. Leukopenia and thrombocytopenia are unfavorable prognostic signs in CAP.

A CBC is not a mandatory test for CAP in an outpatient setting and is prescribed based on indications (urea, CRP, total protein and protein fractions, sodium, potassium, calcium, creatinine, aspartate aminotransferase, and alanine aminotransferase). A CBC is mandatory for all hospitalized patients with CAP.

Microbiological diagnosis of CAP is performed to establish the etiology of the disease and determine the susceptibility of the identified bacterial pathogen to systemic antibacterial agents. However, routine microbiological testing does not significantly influence the choice of antibacterial agent and is not recommended for patients with CAP treated in outpatient settings. It should be considered if initial therapy is ineffective or infection with a specific pathogen is suspected, considering clinical and epidemiological factors.

Instrumental examinations. The instrumental diagnostic tools for CAP include:

1. Imaging methods. To confirm the diagnosis, assess severity, and identify complications, all patients with the clinical picture of CAP are recommended to undergo chest radiography in the anterior AP and lateral projections. The key radiographic sign confirming the diagnosis of CAP is focal infiltration of the lung tissue. This change is a localized decrease in the transparency (airiness) of the lung caused by the filling of the alveoli with inflammatory exudate. CAP is characterized by unilateral involvement, most often within one or two segments. The specific radiographic pattern (character of opacification) is variable and depends on the pathogenetic type of infiltration (alveolar, interstitial, mixed) and the stage of development of the inflammatory process. Radiographic resolution of the inflammation is manifested by a gradual decrease in the intensity of the infiltrative shadow until its complete disappearance. The time it takes for infiltration to reverse varies, but on average it is 3–4 weeks. A follow-up examination performed during this period either confirms normalization of the picture or reveals residual changes: localized tissue compaction or deformation of the pulmonary pattern.

2. Chest computed tomography has a higher sensitivity and specificity compared to standard radiography. It is indicated in the following clinical situations: high clinical probability of CAP in the absence of radiographic signs of infiltration; questionable radiographic findings when changes cannot be clearly interpreted as pneumonic infiltration; recurrent pneumonia (repeated episodes in the same area); slowly resolving or non-resolving pneumonia (lack of improvement despite adequate therapy).

3. Pulse oximetry with SpO_2 measurement is performed in all patients with CAP to detect respiratory failure.

4. ECG — performed as indicated (to rule out complications of CP, identify concomitant diseases, and select a safe antibiotic regimen).

5. Video tracheobronchoscopy is used in the diagnostic algorithm when CP is suspected as a differential diagnosis method with other lung and bronchial diseases (such as tumor, tuberculosis, or foreign body).

Diagnostic criteria for CAP. The following are required to establish a diagnosis of CAP:

1. Radiographically confirmed focal pulmonary infiltrates.

2. Presence of at least 2 of 4 criteria:

– acute fever (> 38.0 °C);

– productive cough;

– typical physical findings (rales, crackles, bronchial breath sounds, dullness);

– leukocytosis and/or band shift (> 10 % band neutrophils).

The differential diagnosis of CAP includes acute bronchitis, exacerbation of COPD, and, in cases of protracted, slowly resolving/non-resolving CAP, pulmonary tuberculosis, lung cancer, and pulmonary infarction (complication of pulmonary embolism).

Treatment

According to modern approaches, approximately 30 % of patients with CAP in Belarus (usually young and middle-aged, with a mild or moderate course and without aggravating pathology) can receive treatment on an outpatient basis, with dynamic monitoring by medical workers of an outpatient healthcare organization.

Hospitalization with a confirmed diagnosis of pneumonia, according to the current clinical protocol, is indicated in the presence of at least one of the following signs:

1. Physical examination findings: respiratory rate greater than or equal to 30 bpm; systolic blood pressure less than 90 mmHg, diastolic blood pressure less than or equal to 60 mmHg; heart rate greater than or equal to 125 bpm; temperature less than 35.5 °C or greater than or equal to 39.9 °C; impaired consciousness.

2. Laboratory and radiological data: peripheral blood leukocyte count less than $4.0 \cdot 10^9$/l or greater than $20.0 \cdot 10^9$/l; SpO_2 less than 92 %; serum creatinine greater than 176.7 μmol/l or residual blood urea nitrogen greater than 7.0 mmol/l; pneumonic infiltration localized in more than one lobe; presence of decay cavity(s); pleural effusion; rapid progression of focal infiltrative changes in the lungs (increase in infiltration size by more than 50 % within the next 2 days); hematocrit less than 30 % or hemoglobin less than 90 g/l; extrapulmonary foci of infection (meningitis, septic arthritis, etc.); Sepsis or multiple organ failure.

3. Inability to provide adequate care and follow all doctor's orders at home.

Inpatient treatment of CAP is preferable and may be considered in the following cases:

1. Patient age over 60 years.

2. Presence of comorbidities (chronic bronchitis, COPD, bronchiectasis, malignancies, diabetes mellitus, chronic renal failure, congestive heart failure, chronic alcoholism, drug addiction, severe underweight, cerebrovascular disease).

3. Ineffectiveness of initial antibacterial therapy.

4. Pregnancy.

5. The patient's and/or family members' wishes.

Treatment of CAP is aimed at eradicating the pathogen, eliminating symptoms, normalizing the condition, and preventing complications. It combines general measures, etiopathogenetic, and symptomatic interventions.

General measures for CAP in an outpatient setting include: regular ventilation of the premises; Recommended regimen: bed rest with periodic changes of body position during the period of fever; semi-bed rest (walking and self-care) when body temperature returns to normal; adequate hydration — at least 20–30 ml/kg/day based on ideal body weight (ideal body weight (in kg) is defined as height in cm minus 100) or actual body weight (calculated based on the lower of the two); diet — adequate nutrition appropriate to age.

Etiopathogenetic therapy of CAP includes the administration of systemic antibacterial drugs (ABX) or systemic antiviral drugs to improve the prognosis and outcomes of CAP while minimizing side effects and containing the growth of resistance. Antibacterial therapy regimens are selected based on local data on pathogens and their resistance. In outpatient settings, ABX are prescribed orally.

For CAP caused by the most common pathogens (*Streptococcus pneumoniae, Haemophilus influenzae, Mycoplasma pneumoniae, Chlamydophila pneumoniae*), which should be suspected in outpatients *with non-severe CAP without chronic comorbidities, who have not taken systemic antibiotics in the last 3 months and do not have other risk factors for infection with rare pathogens* (stay in a nursing home or other long-term care facilities, hospitalizations for any reason in the previous 90 days, intravenous infusion therapy or wound care at home in the previous 30 days), *the antibiotic of choice is amoxicillin 500–1000 mg 3 times a day orally for 10–14 days.* An alternative to amoxicillin in case of its intolerance (history of individual hypersensitivity or immediate allergic reactions to penicillins and other beta-lactam antibiotics), or with a high probability of atypical etiology of CAP (caused by Mycoplasma pneumoniae, Chlamydophila pneumoniae) are macrolides (azithromycin orally 500 mg once a day for 3 days, for mycoplasma pneumonia azithromycin is prescribed orally 500 mg once a day, course of 5 days, for chlamydial and legionella pneumonia — the course of treatment with azithromycin is 5–7 days. It is possible to prescribe clarithromycin 500 mg 2 times a day for 10–14 days). Respiratory fluoroquinolones (levofloxacin 500 mg orally 1–2 times a day for 7–10 days or moxifloxacin 400 mg orally 1 time per day for 7–10 days) are also used as an alternative therapy.

For patients with non-severe CAP and risk factors for infection with rare and/or multidrug-resistant pathogens: concomitant diseases (COPD, diabetes mellitus, chronic heart failure, chronic kidney disease with reduced glomerular filtration rate, liver cirrhosis, alcoholism, drug addiction, exhaustion); intake of systemic antibiotics in the last 3 months; stay in a nursing home or other long-term care facilities; history of hospitalizations for any reason in the previous 90 days; intravenous infusion therapy or wound care at home in the previous

30 days, amoxicillin/clavulanic acid 875 mg/125 mg twice a day orally for 10–14 days in combination with macrolides is recommended as the antibiotic of choice. Alternative antibiotics include respiratory fluoroquinolones or a combination of third-generation oral cephalosporins (cefpodoxime 200 mg twice daily for 14 days) with a macrolide.

The effectiveness of antibacterial therapy is assessed after 48–72 hours. During this period, the effectiveness of antibiotic therapy is assessed by a decrease in temperature, a reduction in intoxication, and an alleviation of CAP symptoms. If initial therapy is ineffective, hospitalization is indicated.

The duration of antibacterial therapy for CAP is individualized. Discontinuation of antibacterial therapy is possible if all of the following criteria are simultaneously met: temperature < 37.2 °C stable for ≥ 48 hours; no symptoms of intoxication; respiratory rate < 20/min (in patients without chronic respiratory failure); no purulent sputum (except for patients with its constant production). Leukocytes < $10 \cdot 10^9$/L, neutrophils < 80 %, juvenile forms < 6 %.

Since radiographic signs of CAP resolve more slowly than clinical symptoms and laboratory parameters, follow-up chest radiography is not used to assess the adequacy of a course of antibiotic therapy.

Symptomatic therapy for mild CAP is no different from that for acute bronchitis, as it is aimed at relieving general respiratory symptoms: cough, intoxication, and pain in the patient.

The duration of temporary disability is determined individually, depending on the type of pneumonia, its severity, the severity of respiratory failure, and the presence of comorbidities. The approximate duration of temporary disability for mild CAP is 12–16 days.

SELF-ASSESSMENT OF TOPIC UNDERSTANDING

1. Which definition of CAP corresponds to modern clinical guidelines:

a) pneumonia developing in a patient on mechanical ventilation;

b) pneumonia developing 48 hours or more after hospitalization;

c) pneumonia developing outside a hospital or diagnosed within the first 48 hours of hospitalization;

d) pneumonia associated with the patient's immunodeficiency state?

2. Which instrumental diagnostic method is primary and mandatory for verifying the diagnosis of community-acquired pneumonia:

a) high-resolution computed tomography of the chest organs;

b) video tracheobronchoscopy;

c) plain chest radiography in two projections;

d) spirometry?

3. What is the main radiographic sign that confirms the diagnosis of pneumonia:

a) increased pulmonary markings;
b) presence of a cavity in the lung tissue;
c) focal infiltration of the lung tissue;
d) mediastinal shift?

4. In acute bronchitis, antibacterial therapy in an outpatient setting is generally:

a) always prescribed from the first days of the disease to prevent complications;
b) not indicated, since most cases have a viral etiology;
c) prescribed only in the presence of a productive cough;
d) is a mandatory component of treatment in smokers.

5. Which of the following is a MANDATORY diagnostic criterion for establishing a definitive diagnosis of community-acquired pneumonia:

a) acute fever > 38.0 °C;
b) leukocytosis > $10 \cdot 10^9$/L;
c) radiographically confirmed focal pulmonary infiltrates;
d) auscultation of moist fine bubbling rales?

6. What is the most common pathogen of community-acquired pneumonia in adults:

a) Mycoplasma pneumoniae;
b) Haemophilus influenzae;
c) Pseudomonas aeruginosa;
d) Streptococcus pneumoniae?

7. In which of the following clinical situations with community-acquired pneumonia is chest computed tomography recommended:

a) routine examination of all patients with non-severe CAP;
b) high clinical suspicion of CAP with normal findings on standard chest radiographs;
c) presence of typical focal infiltrates on chest radiographs;
d) as the method of choice for primary diagnosis in elderly patients?

8. Which of the following is NOT a typical auscultatory symptom in acute bronchitis:

a) harsh breathing;
b) dry, scattered wheezing;
c) localized crepitations over the affected area of the lung;
d) moist rales that change after coughing?

9. According to the 2007 American Thoracic Society/Infectious Diseases Society of America severity criteria for CAP, the «minor» criterion includes:

a) need for mechanical ventilation;

b) respiratory rate of 30 bpm or more;

c) presence of septic shock;

d) patient age over 80 years.

10. What is the main goal of microbiological diagnostics in community-acquired pneumonia:

a) mandatory routine procedure for all outpatients;

b) establishing the etiology of the disease and determining the pathogen's susceptibility to antibiotics;

c) rapid confirmation of the viral nature of the disease;

d) screening for tuberculosis?

Answer key: 1 — c; **2** — c; **3** — c; **4** — b; **5** — c; **6** — d; **7** — b; **8** — c; **9** — b; **10** — b.

LITERATURE

1. *Карпов, И. А.* Антимикробная терапия инфекционных заболеваний различных локализаций : практич. пособие / И. А. Карпов, Ю. Л. Горбич, Н. В. Соловей ; под общ. ред. И. А. Карпова. – Минск : Профессиональные издания, 2023. – 58 с.

2. *Диагностика* и лечение пневмоний : клинический протокол : постановление М-ва здравоохранения Респ. Беларусь от 5 июля 2012 г. № 768 // Министерство здравоохранения Республики Беларусь. – URL: https://minzdrav.gov.by/upload/dadvfiles/CProtokol/КП %20диагностики %20и %20лечения %20пневмоний %20 05.07.2012 %20№ %20768.pdf (дата обращения: 01.12.2025).

3. *Диагностики* и лечения острого и хронического бронхита : клинический протокол : постановление М-ва здравоохранения Респ. Беларусь от 5 июля 2012 г. № 768 // Министерство здравоохранения Республики Беларусь. – URL: https://minzdrav.gov.by/upload/dadvfiles/CProtokol/КП %20диагностики %20и %20лечения %20острого %20 и %20хронического %20бронхита %2005.07.2012 %20№ %20768.pdf (дата обращения: 01.12.2025).

4. *Диагностика* и лечение атипичных пневмоний у детей : клинический протокол : постановление М-ва здравоохранения Респ. Беларусь от 29 апр. 2023 г. № 65 // Министерство здравоохранения Республики Беларусь. – URL: https://minzdrav.gov.by/upload/dadvfiles/CProtokol/КП_Диагностика_лечение_атипичных_пневмоний_детей_пост_МЗ_29.04.2023_65.pdf (дата обращения: 01.01.2026).

5. *Диагностика* и лечение внебольничной пневмонии (детское население) : клинический протокол : постановление М-ва здравоохранения Респ. Беларусь от 18 дек. 2023 г. № 204 // Министерство здравоохранения Республики Беларусь. – URL: https://minzdrav.gov.by/upload/dadvfiles/CProtokol/КП_Диагностика_лечение_внебольничной_пневмонии_дет_взр_население_пост_МЗ_18.12.2023_204.pdf (дата обращения: 01.01.2026).

6. *Внебольничная* пневмония у взрослых : клинические рекомендации // Министерство здравоохранения Российской Федерации. – URL: https://spulmo.ru/upload/kr/Pneumonia_2021.pdf (дата обращения: 01.01.2026).

7. *Острый* бронхит у взрослых : клинические рекомендации // Министерство здравоохранения Российской Федерации. – URL: https://spulmo.ru/upload/kr/OB_2022.pdf (дата обращения: 01.01.2026).

8. *Поликлиническая* терапия : учеб. / М. В. Зюзенков [и др.]. – 3-е изд., испр. – Минск : Выш. шк., 2022. – 623 с.

9. *Kramer-Feldman, J.* First Aid Clinical Algorithms for the USMLE Step 2 CK / J. Kramer- Feldman, L. Jiang. New York : McGraw Hill LLC, 2024. – 872 p.

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