

**MINISTRY OF HEALTH CARE OF UKRAINE
HSEEU "Ukrainian Medical Stomatological Academy"**

"Approved"

at the meeting of the internal
medicine №1 department
The Head of the Department
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Protocol № 2 of 15.09.2016

**GUIDELINES
FOR the STUDENTS
INDEPENDENT WORK
FOR THE PRACTICAL CLASSES PREPARING**

<i>Academic discipline</i>	Internal medicine
<i>Module</i>	Basics of Internal Medicine
<i>Content module</i>	Fundamentals of diagnostics, treatment and prevention of respiratory diseases
<i>Study subject</i>	Chronic obstructive pulmonary disease: chronic bronchitis and emphysema
<i>Course</i>	IV
<i>Faculty</i>	of foreign students training

Poltava 2016.

1. The topic relevance: *Chronic obstructive pulmonary disease (COPD)* - a disease that can be prevented and treated, characterized by persistent restriction of the airways which usually progressive and associated with an increased response to chronic inflammatory airways and lungs to noxious particles and gases.

Exacerbations and comorbidities further reinforce the overall severity in some patients. COPD develops in people of middle age, with a significant smoking history, the patients had already have other diseases for which smoking and age were also risk factors for their development.

2. The student should know:

1. COPD definition.
2. Etiological factors, pathogenesis.
3. Classification.
4. Clinical features.
5. Diagnostic criteria. Diagnostic Tests
6. Differential diagnostic distinction.
7. Treatment. Prognosis. Prophylaxis.

The student should be able to:

1. Choose from complaints and medical history information reflecting the possibility of COPD development.
2. Identify the COPD signs at objective examination of the patient.
3. Create a plan of laboratory and instrumental tests and interpret their results.
4. According to the biochemical and cytological examination of the pleural cavity content to distinguish exudate from transudate.
5. Determine the principles of treatment of patients with different COPD forms, prescribe treatment.

3. Basic knowledge, abilities, skills (interdisciplinary integration)

Discipline	Know	be able to
Anatomy	The structure of the bronchial-pulmonary system, blood supply, innervation	
Histology	The structure of the wall of the trachea, bronchi, alveoli in health and disease	
Topographical anatomy	Interposition of the chest organs	
Normal physiology	Indicators of respiratory function, their value	To determine the function of external respiration
Pathological anatomy	Changes in the structure of the wall of bronchopulmonary tissue in COPD	
Pathological physiology	Spirography indicators depending to the degree of respiratory function impairment	Analyze the performance of external respiration
Propaedeutic therapy	COPD symptomatology and complications (multiple organ lesions syndrome, respiratory distress syndrome and pulmonary insufficiency)	Perform a physical examination of the patient, analyze the clinical and laboratory data of the patient
Pharmacology	The mechanism of action, indications and contraindications for the corticosteroids, bronchodilators,	Prescribe these drugs

	expectorants.	
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4. Tasks for independent work during preparation for classes.

4.1. The list of key terms, parameters, characteristics which the student needs to study during preparing for the classes:

Term	Definition
Chronic obstructive pulmonary disease (COPD)	COPD –is a disease that can be prevented and treated, characterized by persistent restriction of the airways which usually progressive and associated with an increased response to chronic inflammatory airways and lungs to noxious particles and gases. Exacerbations and comorbidities further reinforce the overall severity in some patients.
The test for the airflow obstruction reversibility	For the diagnosis of COPD and to determine the severity it is necessary to know the value of FEV1 and FVC after receiving bronchodilators (at 10-15 minutes after administration of 400 micrograms of salbutamol or of another a β 2-agonist in an adequate dose; at 30-45 minutes after receiving 160 mg of short-acting anticholinergic or there combination).

4.2. Theoretical questions to the lesson:

1. Definition of COPD;
2. Modern views on the etiology and pathogenesis of COPD;
3. Classification of COPD;
4. The main clinical and laboratory syndromes in COPD;
5. COPD diagnostic criteria;
6. Differential diagnosis;
7. Complications of COPD;
8. Standards therapy, rehabilitation of patients with COPD;
9. Forecast and work capacity.

4.3. Practical tasks that are performed in class:

- Detailed collect anamnesis of disease;
- Conduct a physical examination of the patient to identify and assess changes in his state;
- Create additional inspection plan, to evaluate its results;
- Substantiation and formulation of a preliminary and clinical diagnosis based at the severity of airway obstruction according to the modern COPD classification;
- Basic principles of stable COPD; assessment of COPD exacerbations and treatment strategy;
- Master the skills of health care in pulmonary hemorrhage, acute respiratory failure
- Evaluate the results of physical examination, biochemical blood analysis,
- General and microbiological sputum analysis, spirogram, chest X-ray examination and others.

Topic's Content

Chronic obstructive pulmonary disease (COPD) - a disease that can be prevented and treated, characterized by persistent passability restriction of the airways which usually progressive and associated with an increased airways and lungs chronic inflammatory response to noxious particles and gases.

Exacerbations and comorbidities further worsen the overall severity course in some patients. COPD chronic airway restriction connected with a combination of small airway

disorder (obstructive bronchiolitis) and parenchymal destruction (emphysema), the relative contribution of each component is different in different patients. Chronic inflammation leads to structural changes and narrowing of the small airways.

Destruction of the lung parenchyma due to inflammation leads to loss of alveolar attachments to the small airways and decreases lung elasticity; in turn, these changes diminish the ability of the airways to remain open it during exhalation. Airway limitation measured by spirometry, which is the most widespread, affordable and reproducible method of pulmonary function tests.

Along with the lungs damage COPD causes the significant extrapulmonary (systemic) effects of concomitant diseases that burden for COPD in some patients. COPD develops in people of middle age, with a significant smoking history, the patients had already have other diseases for which smoking and age were also the risk factors for their development. But COPD in itself, also leads to significant extrapulmonary effects that lead to the development of comorbidity. The recognized extrapulmonary effects of COPD is weight loss, eating disorders, skeletal muscle dysfunction. COPD patients an increased risk of myocardial infarction, angina pectoris, osteoporosis, respiratory infections, bone fractures, depression, diabetes, sleep disorders, anemia, glaucoma, there is evidence that lung cancers also.

COPD has a progressive nature generally, especially when there is exposure to irritants. Termination of this influence, even with a significant restriction of the airway, may improve some extent the pulmonary function and slow progression of the disease. Treatment of patients with COPD may reduce the severity of symptoms, improve quality of life, reduce the frequency of exacerbations and reduce mortality.

COPD - polygenic disease and a classic sample of gene and environment interaction. The hereditary deficiency of α 1-antitrypsin is the most studied genetically caused COPD risk factor. The greatest risk factor for the development and progression of COPD is smoking. In addition, any factor that violates the lung development during gestation and childhood (reduced birth weight, respiratory infections, etc.) has a potential impact increasing the risk of COPD developing. COPD is characterized by lesions in the central (proximal) and peripheral parts of the respiratory system, the lung parenchyma and blood vessels.

Airway Inflammation in COPD is an increased inflammatory response effects by chronic respiratory tract irritants (e.g., tobacco smoke) with inflammatory cells and inflammatory mediators participation.

Inflammation of the airway is further deepened by oxidative stress and excess proteinases in the lung. Both of these mechanisms lead to the characteristic pathological changes in COPD. The diagnosis of COPD should be considered in anyone who has a complaint of breathlessness, chronic cough or sputum production, and/or a history of the risk factors, smoking especially, influence.

Key features of COPD diagnosis

Wheezing (a cardinal COPD symptom), which:	Progressing (eventually reinforced)
	Usually it increases with physical exertion
	Persistent (lasting for a day)
	The patient describes it as "respiration requires increasing effort," "heaviness," "lack of air" or "shortness of breath".
Chronic cough (often the first symptom of COPD)	At first it may be occasionally, and later – every day, often all over the day. It may be nonproductive cough. Sometimes significant bronchial obstruction may develop without the presence of a cough.
Chronic sputum	Chronic sputum production may indicate COPD. Very often a small amount of sticky, hard expectorated sputum coughs. Amount of sputum is sometimes difficult to establish (patients swallow it). If the sputum in large amount - this may be due to the presence of bronchiectasis. Purulent sputum indicates infectious exacerbation.
Wheezing and the	Non-specific symptoms can change from day to day, throughout the

constraint feeling at the chest	day. Their presence or absence does not confirm any diagnosis of COPD nor denies it.
History of risk factors influence	tobacco smoke
	Industrial dust and chemicals
	Cooking fumes and smoke from the burning of fuel

To suspect COPD and conduct spirometry study in the presence of these symptoms in a patient over the age of 40 years is necessary. These characteristics are not diagnostic by themselves, but their combination increases the probability of COPD diagnosis.

Clinical diagnosis should be confirmed by spirometry results.

For the diagnosis of COPD and to determine the severity it is necessary to know the value of FEV1 and FVC after receiving bronchodilators (10-15 minutes after administration of 400 mcg salbutamol and other β_2 -agonists in adequate doses, 30-45 minutes - after taking 160 mg of short-acting anticholinergic or combination). The main functional characteristics of COPD - the value of FEV1 / FVC decreased after bronchodilators administration 0.70. FEV1 may be reduced (can also be in the normal range \rightarrow 80% of predicted), the degree of reduction reflects the severity of spirometric abnormalities in COPD patients. The magnitude of increase in FEV1 after administration of bronchodilators is not a diagnostic and/or prognostic significance in patients with COPD. Fatigue, weight loss, anorexia - often found in patients with severe and very severe COPD. They are prognostically significant because may be (eg, tuberculosis, lung cancer), they always need to explore. It can happen when you cough syncope (due to the rapid increase in the internal thoracic pressure during long bouts of coughing). Swelling of the ankles may be the only symptom of pulmonary heart. Symptoms of depression and/or anxiety are frequent in COPD, deserves particular study, are associated with increased risk of relapse and poor quality of life.

To assess the severity and the damaging effects of COPD on an individual patient, manifested in the risk of adverse events in the course of the disease (the development of exacerbations in the future, hospitalization, death due to COPD) and to determine further treatment strategy comprehensive assessment, taking into account:

- the current level of symptoms,
- severity of the spirometric disorders,
- the risk of exacerbations,
- presence of comorbidity.

The **modified scale Medical Dyspnea Research council (mMDR)**, **Modified Medical Research Council (MMRC)** and **COPD Assessment Test (CAT)** to assess the symptoms are offered. Scale mMDR displays one symptom - dyspnea, **CAT** test reflects more fully the influence of the disease at the daily activity of the patient and his health.

Scale mMDR correlates well with other methods of the health status determination and assumes the risk of future mortality.

CAT accommodates 8 items that determine the deterioration in health status in COPD. Total score ranges from 0 to 40; closely correlated with health status, is determined according to the St. George hospital questionnaire, reliable and sensitive.

Total CAT score is defined as the sum of scores of answers to each of the eight questions.

The assessment of dyspnea mMDR ≥ 2 and the total CAT score ≥ 10 indicate the severity of COPD symptoms. It is possible to use one of the tests.

Spirometry is included as an integral component of the evaluation in a comprehensive assessment of the patient with COPD.

In addition, the severity of clinical symptoms of COPD, a disability, relapse rate for patients clinical perspectives means much more than the degree of deterioration of respiratory function parameters, and therefore more attention should be given to the multidimensional assessment of COPD worsening than just categorization on the severity of the respiratory function deterioration.

It expands the definition of respiratory function violations, including a group of people with FEV1 > 80% predicted (with a ratio of FEV1/FVC < 0.70), and thus expands the clinical diagnosis of COPD, including those with mild impairment of respiratory function, which are accompanied by respiratory symptoms. The current classification of the bronchial obstruction disorders severity involves determining the degree of severity.

Classification of the airway obstruction severity in patients with COPD (after receiving bronchodilators).

Category	Characteristic	FEV1
GOLD 1	mild obstruction	$\geq 80\%$
GOLD 2	moderate obstruction	$\geq 50\% \text{ i } < 80\%$
GOLD 3	severe obstruction	$\geq 30\% \text{ i } < 50\%$
GOLD 4	very severe obstruction	$< 30\%$

Exacerbation of COPD is defined as an acute event, characterized by a deterioration of the patient's respiratory symptoms, which goes beyond the daily variability and requires a change in treatment. The best predictor of frequent exacerbations (≥ 2 years) - a history of previous exacerbations requiring treatment. Increased bronchial obstruction is also indicates an increase in the risk of exacerbations and the risk of death. To assess the risk of adverse events in the future are offered two ways. One takes into account the criteria for the classification of the degree of bronchial obstruction (FEV1): grade 3 and grade 4 (severe and very severe degree of airflow obstruction, FEV1 < 50% of due value) indicate a high risk. Another approach is based on a history of exacerbations registered over the last year: 2 or more relapses or one exacerbation during the year, which required hospitalization, indicate a high risk.

If a discrepancy between the risk categories according to the classification in the degree of bronchial obstruction disorders (FEV1) and a history of exacerbations, considered the greatest risk.

Algorithm for a comprehensive assessment: first, an assessment of symptoms on a scale mMDR or CAT is determined, the patient refers to the left-hand column, or at least symptoms (score 0-1 mMDR or general CAT test score less than 10), then to the right - more symptoms (score mMDR ≥ 2 , or common CAT test score ≥ 10). Then the estimated risk of relapse to determine which number - the lower (lowest risk) or high (high risk) to carry the patient. This can be done in two ways: 1) by spirometry to determine airway limit degree according to GOLD spirometric classification: GOLD 1 and GOLD 2 (FEV1 $\geq 50\%$ of due value) indicate low risk, GOLD 3 and GOLD 4 (FEV1 < 50 % of due value) indicate a high risk; or 2) to estimate the number of exacerbations in a patient over the previous 12 months (0 or 1 exacerbation indicates a low risk, two or more, or one that required hospitalization, - high risk).

Thus, the group of patients can be characterized as:

The patients of **A group** - low risk of adverse events, few symptoms.

Typically, FEV1 > 50% (GOLD 1 or GOLD 2) and/or ≤ 1 year relapse mMDR < 2 or CAT < 10.

The patients of **B group** - a low risk of adverse events, many of the symptoms.

Typically, FEV1 > 50% (GOLD 1 or GOLD 2) and / or ≤ 1 year relapse mMDR ≥ 2 or CAT ≥ 10 .

The patients of **C group** - high risk of adverse events, few symptoms.

Typically, the FEV1 $\leq 50\%$ (GOLD 3 or GOLD 4) and / or ≥ 2 exacerbations per year and mMDR < 2 or CAT < 10.

The patients of **D group** - a high risk of adverse events, many of the symptoms.
Typically, the $FEV1 \leq 50\%$ (GOLD 3 or GOLD 4) and/or ≥ 2 exacerbations per year and $mMDR \geq 2$ or $CAT \geq 10$.

	The risk assessment is necessary to choose the highest risk of adverse events based on the spirometric classification or history of exacerbations				
risk GOLD classification airway restrictions	4	C	D	≥ 2	Risk History of exacerbations in the previous year
	3				
	2	A	B	1	
	1			0	
		$mMDR < 2$	$mMDR \geq 2$		
		$CAT < 10$	$CAT \geq 10$		
		symptoms			

Thus, the group of patients can be characterized as:

1. The patients of **group A** - low risk of adverse events, few symptoms.
Typically, GOLD 1 or GOLD 2 and / or ≤ 1 year relapse $mMKD < 2$ or $CAT < 10$
2. The patients of **group B** - a low risk of adverse events, many of the symptoms.
Typically, GOLD 1 or GOLD 2 and / or ≤ 1 year relapse $mMKD \geq 2$ or $CAT \geq 10$
3. The patients of **group C** - high risk of adverse events, few symptoms.
Typically, GOLD 3 or GOLD 4 and / or ≥ 2 exacerbations per year and $mMKD < 2$ or $CAT < 10$
4. The patients of **group D** - a high risk of adverse events, many of the symptoms.
Typically, GOLD 3 or GOLD 4 and / or ≥ 2 exacerbations per year and $mMKD \geq 2$ or $CAT \geq 10$.

COPD Differential Diagnosis

Diagnosis	The signs
COPD	Beginning in middle age Symptoms progresses slowly Smoking history
Bronchial asthma	Beginning at an early age, often in childhood Symptoms vary from day to day The symptoms are worse at night / early in the morning Common allergies, rhinitis and / or eczema Family history of asthma
Heart failure	On radiographs - enlarged heart, pulmonary edema ERF (lung function) - restriction of volumes, there is no restriction of the ai
Bronchiectasis	Purulent sputum in large quantities Often associated with bacterial infection X-ray / CT - bronchiectasis, thinning bronchial wall
Tuberculosis	Start at any age The presence of infiltrative changes in x-ray study microbiological confirmation High local prevalence of tuberculosis X-ray examination
Obliterating bronchiolitis	Starting at the young age. Non-smoking May have a history of rheumatoid arthritis or acute smoke inhalation Often it occurs after lung or bone marrow transplantation At X-ray/CT- areas with low density
Diffuse panbronchiolitis	Mostly from Asian race patients The majority of patients - men and those who do not smoke

	Almost all chronic sinusitis At X-ray study, and high-resolution CT - diffuse small nodular opacity and pulmonary hyperinflation
These symptoms are generally characteristic of the above mentioned diseases, but not required. For example, COPD can develop in a patient who had never smoked (especially in developing countries, where other risk factors are more important than smoking); asthma may develop in adulthood, or even older	

COPD and Asthma differential diagnosis.

Criterion	COPD	Bronchial asthma
Smoker or former smoker	Almost always	Possible
Symptoms after age of 35 years	Usually	Sometimes
Chronic cough	Usually	Unknown
Respiratory failure	Sustainable and progresses Variable	Sustainable and progresses Variable
Night waking up with breathing disorders and / or breathlessness	Rarely	Usually
Значительная дневная или ночная переменчивость симптомов.	Rarely	Usually

The following criteria should be used to identify asthma in diagnostic doubts:

- increasing in FEV1 (> 400 mL) in response to receiving bronchodilators;
- increasing in FEV1 (> 400 mL) in response to receiving prednisolone oral 30 mg daily for 2 weeks
- Consistent implementation of peakflowmetry shows the fluctuations of 20% or more during the day or from day to day.

Clinically significant COPD is not confirmed, provided that the performance of FEV1 and FEV1 / VC back to the calculated using medication.

Treatment

The goals of treatment in patients with COPD are: a reduction of symptoms, prevention of disease progression, improving exercise tolerance, improving health status, prevention and treatment of exacerbations, prevention and treatment of complications, reduction of mortality, prevent or minimize the side effects of treatment. Stopping smoking should be included as an objective in all patient management programme.

Pharmacological treatment of COPD is aimed at reducing symptoms, the frequency and severity of exacerbations, improve health status and exercise tolerance. There is no reliable data about the existing medications for COPD treatment capable of modifying the long-term decline in lung function

The initial pharmacological treatment of COPD

Characteristics of patients (group)	First choice	Second choice	An alternative choice *
A <i>Low risk, symptoms are less pronounced (mMKD <2 CAT<10), the degree of bronchial obstruction according to GOLD 1-2</i>	Bronchodilators short-acting according to needs: or β 2-agonist short-acting or short-acting anticholinergic	Long-acting bronchodilators β 2-agonists or The long-acting anticholinergic or β 2-agonist short-	Theophylline Doxofylline Fenspiride

Characteristics of patients (group)	First choice	Second choice	An alternative choice *
		acting + short-acting anticholinergics	
B <i>Low risk, the symptoms are more pronounced (mMKD ≥ 2, CAT ≥ 10), the degree of bronchial obstruction according to GOLD 1-2</i>	Long-acting bronchodilators β 2-agonists or The long-acting anticholinergics	β 2-agonists and The long-acting anticholinergics	β 2-agonist short-acting and / or short-acting anticholinergic Doxofylline Theophylline Fenspiride
C <i>High risk, symptoms are less pronounced (mMKD < 2, CAT < 10), the degree of bronchial obstruction according to GOLD 3-4</i>	ICS + β 2-agonists or The long-acting anticholinergic	β 2-agonists and The long-acting anticholinergics	β 2-agonist short-acting and / or short-acting anticholinergic Euphylline Doxofylline Phosphodiesterase inhibitor -4
D <i>High risk, the symptoms are more pronounced (mMKD ≥ 2, CAT ≥ 10), the degree of bronchial obstruction according to GOLD 3-4</i>	ICS + β 2-agonists or The long-acting anticholinergic	ICS+ β 2-agonists or combination of β 2-agonists + X + long-acting anticholinergic or combination β 2-agonists + X + a phosphodiesterase-4 inhibitor or β 2-agonists long-acting anticholinergic + or The long-acting anticholinergic + phosphodiesterase-4 inhibitor	β 2-agonist short-acting and / or short-acting anticholinergic Euphylline Carbocysteine

The patient with COPD is need in constant observation: ERF measuring (it gets worse over the time in spite of the best treatment), to assess the symptoms dynamics, to change the therapy promptly, to identify in time any potential complications.

Spirometry is recommended at least 1 time per year (to identify patients who have respiratory function deteriorates faster); every 2-3 months it is necessary to evaluate CAT indicates (assessment of symptoms over the time is more informative than a one-time assessment). On each visit to interview about the changes (since the last visit) symptoms (cough, sputum, fatigue, limitation of daily activities, sleep disturbances), inhalers use.

It is very important to motivate the patient's stop smoking. Evaluate the effectiveness of the prescribed therapy, the patient's adherence to therapy, his skills in the art of inhalers use, side effects of therapy; aggravation, the possible reasons which led to the aggravation; evaluate comorbidities, its treatment.

COPD exacerbation.

A common cause of exacerbation are an infection of the tracheobronchial tree and air pollution, but in 1/3 of the cases the cause of severe exacerbations can not be identified. At present, the diagnosis of exacerbation is based only at clinical manifestations. Assessment of the COPD exacerbations severity is based on the medical history of the patient's condition before the exacerbation, existing comorbidities, symptoms, physical examination, performance measurement of arterial blood gases and other laboratory tests.

The main goal of treatment is to minimize the damaging effects of the current exacerbation and prevent the development of subsequent exacerbations. The patients can be treated as an outpatient and inpatient depending on the severity of exacerbation.

More than 80% of patients with COPD exacerbation can be treated on an outpatient basis (using bronchodilators, corticosteroids, antibiotics).

Corticosteroids. The use of systemic corticosteroids in exacerbations of COPD decreased the terms of recovery, improves lung function (FEV1) and arterial hypoxemia; reduces the risk of early recurrence of exacerbations, treatment failure, and length of hospital stay. Recommended prednisone use - 30-40 mg daily for 10-14 days. The advantage is the use of prednisolone per os. The budesonide (or fluticasone) using by nebulization may be an alternative to oral corticosteroids in the treatment of COPD exacerbations.

Antibiotics. Antibiotics for exacerbations of COPD is indicated in the presence of bacterial infection clinical signs, such as sputum purulence increasing. Antibiotics indicated in patients with acute exacerbation of COPD in the presence of 3 cardinal symptoms: increased dyspnea, increased sputum volume and sputum purulence; may be 2 cardinal symptoms, if one of them - increased sputum purulence or in mechanical ventilation need (invasive or noninvasive). Recommended the antibiotic therapy duration - 5-10 days. For the initial empirical treatment aminopenicillin, including protected, macrolides (azithromycin or clarithromycin), fluoroquinolones or 2nd generation cephalosporins should be applied. During the empirical antibiotic treatment, the physician should take into account the possible list of the most common pathogens, the number of previous exacerbations (per year), antibiotics prior use, respiratory function indices, comorbidities. The choice of antibiotic is based on the local pattern of antibiotic resistance. The way of administration (oral or parenteral) depends on the patient's ability to swallow and pharmacokinetics of the antibiotic, although preference is given to oral forms. In clinical success indicate in a dyspnea decrease and sputum purulence.

Self-control materials:

Tests:

1. The most important component of the pathophysiology of COPD is:
 - A. Hypersecretion of mucus and mucociliary dysfunction.
 - B. Restriction of air flow in the bronchi and excessive lung distension.
 - B. Gases exchange violation.
 - D. Pulmonary hypertension.
 - D. Pulmonary heart disease (Cor Pulmonale).

2. In the study of external respiration function (ERF) in COPD the most important are:
 - A. Forced expiratory volume in one second (FEV1).
 - B. Forced vital capacity (FVC).
 - B. The ratio of FEV1 / FVC.
 - D. All of the above.
 - D. The most important factor is not named

3. The diagnostic criterion for COPD is the reduction of indicators, starting with:

- A. $OFV1 < 90\%$ of due value in combination with $FEV1 / FVC < 80\%$.
- B. $OFV1 < 80\%$ of due value in combination with $FEV1 / FVC < 70\%$.
- B. $OFV1 < 70\%$ of due value in combination with $FEV1 / FVC < 60\%$.
- G. $OFV1 < 60\%$ of due value in combination with $FEV1 / FVC < 50\%$.
- D. $OFV1 < 50\%$ of due value in combination with $FEV1 / FVC < 40\%$.

4. Bronchodilators, inhaled short-acting β_2 -agonists include all of the above, except:

- A. Salbutamol.
- B. Terbutaline.
- B. Fenoterol.
- G. Salmeterol.

5. Do not include to inhaled corticosteroids:

- A. Beclomethasone.
- B. Budesonide.
- B. Prednisolone.
- G. Fluticasone.

6. Do not relate to bronchodilators:

- A. β_2 -agonists.
- B. β_2 -blockers.
- B. Anticholinergics.
- G. Theophylline.
- D. Euphilline.

The answers to the tests: 1-D, 2-D, 3-D, 4-D, 5-B, 6-B.

Situational tasks:

1. The patient of 55 years at 2 days after appendectomy complains of progressive dyspnea and cough with purulent sputum. Such symptoms are observed in autumn and spring. Smokes during 25 years. The body temperature - 37.1°C , in the lungs - weakened breathing, single dry wheezing. In the blood: $WBC = 10 \times 10^9 / \text{L}$. X-ray: increased lungs airiness, amplified pulmonary pattern. Bronchoscopy: mucosal hyperemia with the presence of mucopurulent character secretions. What is the diagnosis?

- A. Asthma
- B. Chronic bronchitis**
- S. Bronchiectasis
- D. Pulmonary artery branches thromboembolism
- E. Pneumonia

2. A man 39 years old, truck drivers, complaining of shortness of breath on exertion, cough with a small amount of mucous expectoration mainly in the morning. For a long time ill COPD, sinusitis. Smoking, alcohol uses occasionally. Objectively: temperature - 36.5°C , RR - 24/min, Ps - 90/min, BP - 120/80 mm Hg. At auscultation: harsh breathing, a moderate amount of dry wheezing. $FEV1$ - 68% of due value. What is the preventive action should be at first place to prevent the disease?

- A. Sustainable employment
- B. Failure to alcohol
- C. Remediation of chronic infection foci
- D. Quitting smoking**
- E. Resettlement to another climate zone

3. A man of 60 years old, complains of dyspnea with labored breath, aggravated by exertion, coughing up a small amount of muco-purulent sputum mainly in the morning. COPD diagnosed. Objectively: body temperature - 36.0 ° C, RR - 22 / min, Ps - 84 / min, BP - 110/70 mm Hg. The skin is moist, diffuse cyanosis. At auscultation: harsh breathing, diffuse wheezing. The FEV1- 62% of due value; pharmacological test with salbutamol – increase in 5%. What is the bronchial obstruction development mechanism is more likely in the patient?

- A. Hypercrinia
- B. The inflammatory edema
- C. Bronchospasm
- D. Diffuse sclerotic changes**
- E. Mucostasis

4. A man of 60 years complains of shortness of breath, which increases during exercise. Smokes for about 30 years. Objectively: temperature - 36.5 ° C, BH - 22 / min, Ps - 88 / min, BP - 130/85 mm Hg. The chest is barrel-shaped, lung sounds with boxed shade over the entire surface of the lung fields, weakened vesicular breathing. What disease history is likely to lead to pathological changes?

- A. COPD**
- B. Bronchiectasis
- C. Pulmonary tuberculosis
- D. Pneumonia
- E. The tumor of the bronchus

5. A man of 60 years old complains of dyspnea with labored breath, dry cough. 30 years has COPD history. The aggravation 3 weeks ago, often uses berotec. Smoke 1.5 packets of cigarettes a day. Last month treated for coronary heart disease, takes fenigidin, nitroglycerin, propranolol. Objectively: t -36,4 ° C, RR - 28 / min. HR - 98 / min, BP -120/80 mmHg. In the lungs vesicular breathing, wheezing, dry scattered during exhalation mostly. Heart sounds are muffled, the rhythm is regular. What is the most likely the patient's condition aggravation cause?

- A. Fenigidin prescription
- C. Tobacco smoking
- C. Anaprilin admission
- D. Berotec abuse
- E. COPD exacerbation**

Recommended literature

1. Harrison's Principles of Internal Medicine / D.Kasper, A.Fauci, S.Hauser, D. Longo.-19 ed. –N.Y.: McGraw-Hill Professional, 2015. - Vol. 1, Vol.2.-3000 p.
2. CURRENT Medical Diagnosis and Treatment 2012, Fifty-First Edition (LANGE CURRENT Series) by Stephen McPhee, Maxine Papadakis and Michael W. Rabow (Paperback – Sep 12, 2011), McGraw-Hill Prof Med/Tech, 1867 p.
3. Clinical Pulmonology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Oct 30, 2011) - Kindle eBook
4. GOLD. Global Strategy for the Diagnosis, Management and Prevention of Chronic Obstructive Pulmonary Disease. Update 2016. – 84 p.