Ministry of Healthcare of Ukraine

Poltava State Medical University

Approved
at the meeting of Internal Medicine №1 Department "____"_____
Protocol № ____ from _____
The Head of the Department
Associate Professor Maslova H.S.

Methodical guidelines

for students' self-studying to prepare

for practical (seminar) classes and on the lessons

Academic discipline	Internal medicine
Module №	1
Topic of the lesson	Chronic obstructive pulmonary disease (COPD)
Course	IV
Faculty	of foreign students training

1. Relevance of the topic Chronic obstructive pulmonary disease (COPD) is the leading cause of chronic morbidity and mortality worldwide; many people have been ill for years and die prematurely due to COPD or its complications. Worldwide, COPD-induced burden is projected to increase over the coming decades due to the continued impact of COPD risk factors and population aging.

COPD is a major health problem, but it is treatable and preventable.

2. Specific aims:

- To determine the etiological and pathogenetic factors of COPD.
- Classify COPD and analyze a typical clinical picture.
- Develop a personalized diagnostic search scheme, identify and propose the required volume and sequence of patient examination methods for suspected COPD.
- To be able to carry out examination of the patient (survey, examination, palpation, percussion, auscultation) and to justify the preliminary diagnosis.
- Compose a plan for additional examination of the patient with suspected COPD.
- To substantiate the main diagnostic methods used in the examination of patients with COPD, indications and contraindications for their conduct and possible complications.
- To interpret the results of additional research methods - general clinical analysis, biochemical blood analysis, general sputum analysis, chest organs radiographic examination, spirography, bronchoscopic and bronchographic examinations, etc.
- Perform differential diagnosis and substantiate clinical diagnosis.
- Know the principles of treatment, rehabilitation and prevention of COPD.

3. Basic knowledge, abilities, skills required to study the topic (interdisciplinary integration).

Names of previous disciplines	Obtained skills
1. Anatomy 2. Histology 3. Anatomy 4. Physiology 5. Pathology 6. Radiology 7. Propaedeutic internal medicine 8. Pharmacology	Describe the anatomical features of the structure of the respiratory system Demonstrate knowledge of normal physiology of respiratory function. Know the indicators of the function of external respiration, their value Have an understanding of the chemical reactions and processes that occur in cells and tissues in COPD Describe the basics of pathological processes

	and morphological aspects of COPD pathogenesis To determine regularities of occurrence of development and result of pathological processes; features and character of dynamic changes of physiological functions in COPD laboratory results. Demonstrate the ability to conduct surveys (complaint collection, medical history and life). Have a method of physical examination of patients with COPD Apply knowledge of the classification, pharmacokinetics, pharmacodynamics of drugs prescribed for COPD treatment.

4. Tasks for self-studying to prepare for the lesson and on the lesson.

4.1. List of main terms, parameters, characteristics that should be learnt by student during preparation for the classes:

Term	Definition
COPD	is a common disease that can be prevented and treated, characterized by persistent respiratory symptoms and restriction of the resulting air flow- It is caused by respiratory abnormalities and / or alveoli, usually caused by significant exposure to harmful particles and gases.
Reverse bronchial obstruction test	For the diagnosis of COPD and severity, the values of FEV1 and FVC after taking bronchodilator (at 10–15 minutes after taking of 400 μg salbutamol or another β2-agonist at an adequate dose, at 30–45 minutes - after taking 160 μg of cholinolytic or

	its combinations).
Antacids	group of drugs that reduce stomach acidity and capable to neutralise the effects of stomach acid (PPIs and H2-blockers).
Alginates	group of drugs capable to neutralise the effects of stomach acid by coating formation on the surface of stomach.

Theoretical questions to the class:

- Definition of COPD.
- Current views on the etiology and pathogenesis of COPD.
- COPD classification.
- Clinical manifestations of COPD.
- Laboratory and instrumental examination methods for COPD.
- Differential diagnosis of COPD.
- Complications of COPD.
- Standards of treatment, rehabilitation of COPD.
- The prognosis and capacity of patients with COPD.

4.3. Practical work (tasks), performed on the lesson:

- to collect a medical history in detail;
- to conduct a physical examination of the patient, to identify and evaluate changes in his condition;
- make a plan for additional examination, evaluate its results;
- to justify and formulate a preliminary and clinical diagnosis of COPD taking into account the severity of respiratory tract disorders according to classification, comprehensive assessment of COPD and the distribution of patients into groups;
- basic principles of stable COPD;
- assessment of COPD exacerbations and treatment tactics;
- evaluate the results of general clinical examination, biochemical blood test, general and microbiological analysis of sputum, spirography, radiographic examination and others.

Topic content:

COPD is a common pathology that is treatable and preventable and is characterized by persistent respiratory symptoms, as well as airflow restriction caused by pathological changes in the respiratory tract and / or alveoli, which are usually caused by significant exposure to harmful

particles or gases. The chronic airflow limitation inherent in COPD is the result of a combination of small respiratory tract diseases (eg, obstructive bronchiolitis) and destruction of the parenchyma (emphysema), the relative contribution of which varies from person to person.

The risk of COPD developing is related to the following factors:

• Smoking tobacco.

• Indoor air pollution: Combustion of biofuels used for cooking and heating in poorly ventilated rooms is a risk factor that particularly affects women in developing countries.

• Occupational exposure: organic and inorganic dust, chemicals and vapors are undervalued risk factors for COPD.

• Air pollution: contributes to the total inhalation load on the lungs, although it appears to have a relatively small effect on the development of COPD.

• Genetic factors, including severe hereditary deficiency of α1-antitrypsin; a gene encoding matrix metalloproteinase-12 (MMP-12) and glutathione-S-transferase is also associated with a decrease in lung function or the risk of COPD.

• Age and Gender: Older age and female gender increase the risk of COPD.

• Lung growth and development: Any factor that affects the formation of lungs during pregnancy and infancy (low birth weight, respiratory infections, etc.) is capable of increasing the individual risk of developing COPD.

• Bronchial asthma (AD) and airway hyperreactivity: AD may be a risk factor for airflow restriction and COPD.

• Chronic bronchitis: may increase the incidence of exacerbations, including severe ones.

• Infections: A history of severe childhood respiratory tract infections is associated with decreased lung function and increased respiratory symptoms in adult.

COPD diagnosis and evaluation

The diagnosis of COPD should be considered in any patient with shortness of breath, chronic cough or sputum production and / or history of the risk of developing the disease (Table 1).

Table 1. Main criteria for assuming COPD diagnosis

Shortness of breath	Progresses for a long time. Exacerbates during exercise. Permanent
Chronic cough	May be intermittent or unproductive. Recurrent bronchial obstruction
Chronic sputum production	Any sign of chronic sputum formation

Risk factors in the anamnesis	Individual factors (genetic, congenital anomalies and developmental disorders). Tobacco smoking (including popular local forms of consumption). Smoke generated during cooking and space heating. Industrial dust, fumes, fumes, gases and other chemicals
Family history of COPD and / or the presence of risk factors in childhood	Low birth weight, respiratory infections in childhood, etc.

The clinical diagnosis must be confirmed by the results of spirometry. For the diagnosis of COPD and severity, the values of FEV1 and FVC after taking bronchodilator (after 10–15 minutes after taking 400 μg of salbutamol or another β2-agonist at an adequate dose, after 30–45 minutes - after taking 160 μg of cholinolytic or cholinolytic, are taken into account. combinations). The main functional characteristic of COPD is the FEV1 / FEV value after bronchodilator administration less than 0.7. FEV1 can be reduced (may also be within the normal range -> 80% of the appropriate), the degree of its decrease reflects the severity of spirometric disorders in a patient with COPD.

To assess the severity and the damaging effect of COPD on an individual patient who is at risk of adverse events in the course of the disease (the development of exacerbations in the future, hospitalizations, death due to COPD) and to determine further treatment tactics, a comprehensive assessment is carried out with:

• the current level of symptoms

• the severity of spirometric disorders

• the risk of exacerbations

• presence of concomitant pathology.

The Modified Medical Research Council (MMRC) Dyspnea Scale and COPD Assessment Test (CAT) are available for symptom evaluation. The mDDR scale reflects one symptom - shortness of breath, and the COPD assessment test more fully reflects the impact of the disease on the patient's daily activity and well-being. The mDDR scale correlates well with other instruments for measuring health status and predicts the risk of future mortality.

The CAT contains 8 items that measure the deterioration of COPD health status. The total score ranges from 0 to 40; correlates closely with health status as measured by the St. John's Hospital Questionnaire. George, reliable and sensitive.

The CAT total score is defined as the sum of the points for each of the eight questions. Comprehensive assessment of COPD patients as an integral component includes spirometric evaluation. In addition, the severity of COPD clinical symptoms, disability limitations, and the incidence of exacerbations for the patient's clinical perspective mean much more than the degree of deterioration of FDF indices, and therefore more attention should be paid to multivariate COPD exacerbation than severity categorization.

This extends the definition of respiratory dysfunction to include a group of people with FEV1> 80% of proper (with FEV1 / FVC <0.7), and thus extends the clinical diagnosis of COPD, including patients with mild respiratory distress accompanied by respiratory distress symptoms. The present classification of the severity of disorders of the bronchial patency involves determining the severity.

Table 2. Classification of severity of air flow limitation in COPD (based on FEV1 after bronchodilator; FEV1 / FVC <0.7)

GOLD 1	Light	FEV1 ≥ 80% of the predicted value
GOLD 2	Moderate	50% ≥ FEV1 <80% of predicted value
GOLD 3	Severe	30% ≥ FEV1 <50% of the predicted value
GOLD 4	Very severe	FEV1 <30% of predicted value

COPD exacerbation is defined as an acute event characterized by a worsening of the patient's respiratory symptoms that goes beyond daily variability and requires changes in treatment. The best predictor of frequent exacerbations (≥ 2 per year) is a history of previous exacerbations requiring treatment. Increased bronchial obstruction also indicates an increased risk of exacerbation and risk of death. There are two ways to evaluate the risk of adverse events in the future.

One considers the criteria for the classification of the degree of bronchial patency (FEV1): Grades 3 and 4 (severe and very severe degree of bronchial obstruction, FEV1 <50% of appropriate) indicate a high risk.

Another approach is based on a history of exacerbations in the last year: 2 or more exacerbations, or one exacerbation during the year that required hospitalization, is high risk. In the case of a discrepancy between the risk category according to the classification of the degree of bronchial patency (FEV1) and a history of exacerbations, the highest risk is taken into account.

Complex evaluation algorithm: first, the symptom score is evaluated on the mDDR or CAT scale, and it is determined whether the patient refers to fewer symptoms (left score of 0–1 or total CAT score <10), or right to more symptoms (score MMDR ≥ 2, or total CAT test score ≥

10). The risk of exacerbation is then evaluated to determine which range of lower (low risk) or upper (high risk) to be assigned to the patient. This can be done in two ways: 1) using low-risk spirometry to determine the rate of airway obstruction according to the spirometric classification GOLD: GOLD 1 and GOLD 2 (FEV1 ≥ 50% of proper) indicate low risk, GOLD 3 and GOLD 4 (FEV1 <50 % of due) indicate high risk; or 2) estimate the number of exacerbations in the patient during the previous 12 months (0 or 1 exacerbation indicates low risk; 2 or more, or one requiring hospitalization - at high risk).

<table>
<tr><td></td><td colspan="4">When assessing risk, the highest risk of adverse events should be selected based on spirometric classification or anamnesis of exacerbations.</td><td></td></tr>
<tr><td rowspan="4">Risk
GOLD classification of airway obstruction</td><td>4</td><td rowspan="2">C</td><td rowspan="2">D</td><td>≥ 2</td><td rowspan="4">Risk The history of exacerbations in the previous year</td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>2</td><td rowspan="2">A</td><td rowspan="2">B</td><td>1</td></tr>
<tr><td>1</td><td>0</td></tr>
<tr><td></td><td></td><td>mMDR <2</td><td>mMDR ≥ 2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>CAT< 10</td><td>CAT ≥ 10</td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="2">Symptoms</td><td></td><td></td></tr>
</table>

Thus, groups of patients can be characterized as:

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

Generally, **FEV1> 50% (GOLD 1 or GOLD 2) and / or ≤ 1 exacerbations per year and mDDR <2 or CAT<10.**

Group B patients have a low risk of adverse events, many symptoms.

Generally, **FEV1> 50% (GOLD 1 or GOLD 2) and / or ≤ 1 exacerbations per year and mDDR ≥ 2 or CAT ≥ 10.**

Group C patients are at high risk for adverse events, few symptoms.

Typically, **FEV1 ≤ 50% (GOLD 3 or GOLD 4) and / or ≥ 2 exacerbations per year and mDDR <2 or CAT <10.**

Group D patients are at high risk for adverse events, many symptoms.

Typically, **FEV1 ≤ 50% (GOLD 3 or GOLD 4) and / or ≥ 2 exacerbations per year and mDDR ≥ 2 or CAT ≥ 10.**

COPD differential diagnosis

Diagnosis	signs
COPD	Beginning in middle age Symptoms progress slowly History of smoking
Asthma	Beginning at an early age, often in childhood Symptoms vary from day to day The symptoms worsen at night / early in the morning Frequent allergies, rhinitis, and / or eczema Family history of asthma
Heart failure	X-ray - enlarged heart, pulmonary edema External Respiratory Function - Restriction, No Airway Limitation
Bronchiectasis	Purulent sputum in large quantities Often associated with bacterial infection At X-ray examination / CT - enlargement of the bronchi, thinning walls of the bronchi
Tuberculosis	Starts at any age The presence of infiltrative changes in the X-ray study Microbiological confirmation High local prevalence of tuberculosis in radiological examination
Obliterative bronchiolitis	Beginning at a young age. Don't smoke They may have a history of rheumatoid arthritis or acute smoke inhalation It often occurs after a lung or bone marrow transplant On CT inhalation - areas with low density
Diffuse panbronchiolitis	Preferably in Asian patients Most patients are men and non-smokers Almost everyone has chronic sinusitis X-ray and high resolution CT scan - small diffuse nodular opacities and pulmonary hyperinflation
These symptoms are usually characteristic of the above mentioned diseases but are not required. For example, COPD may develop in a patient who has never smoked (especially in developing countries where other risk factors are more important than smoking); bronchial asthma can develop in adulthood or even older	

Differential diagnosis of COPD and bronchial asthma.

criterion	COPD	Bronchial asthma
Smoker or former smoker	Almost always	Possible
Symptoms after the age of 35	Usually	Sometimes
Chronic cough	Usually	Unknown
Respiratory Impairment	Stable and progressive	Variable
Night awakenings with respiratory distress and / or shortness of breath	Rarely	Usually
Significant day or day changes in symptoms.	Rarely	Usually

In the case of diagnostic doubt, the following criteria should be used to identify asthma:

• an increase in FEV1 (> 400 ml) in response to bronchodilator intake;

• an increase in FEV1 (> 400 ml) in response to prednisolone 30 mg oral administration daily for 2 weeks;

• sequential peak fluctuations show fluctuations of 20% or more during the day or day after day.

Clinically expressed COPD is not confirmed provided that the FEV1 and FEV1 / FVC values return to the estimated values when using medication.

Treatment

Pharmacological treatment is aimed at reducing the symptoms, frequency and severity of exacerbations, improving health status and exercise tolerance. The choice of drug within each class depends on its availability and response to the patient. The approach to prescribing pharmacological treatment should be specific to each patient and should be based on the severity of the symptoms, the risk of exacerbations, the availability of the drugs, and the patient's response to treatment. When prescribing drugs in inhalers, the patient should be trained in the proper technique of using them to deliver an effective dose. The choice of inhaler depends on the availability, cost, doctor's appointment, skills and capabilities of the patient. COPD patients may have difficulty coordinating and may find it difficult to use a metered-dose aerosol inhaler (MDAI). It is important to make sure that the inhalation technique is correct and to check it at each visit.

In addition to metered-dose aerosol inhalers, there are others - breath-activated inhalers, dry powder inhalers (DPIs), spacers. In general, COPD patients are more often located in the central bronchial tubes (due to fixed bronchial obstruction and reduced inspiratory force). The use of large or small volume MDAIs can overcome coordination problems, improve drug delivery to the distal airways, and improve treatment efficiency. Many drugs exist in the form of nebulizer

solutions, and it can be assumed that in patients with severe hyperinflation and low inspiratory force, nebulizer administration may have advantages over other delivery devices.

Drugs for the COPD treatment

Drug	Inhaler (mcg))	Nebulizer solution (mg / ml)	For oral administration	Dosage
		Short-acting B-agonists		
Salbutamol	100 (MDAI, DPI) 2.0 / 2.0 2.5 / 2.5	**2,0/2,0 2,5/2,5** nebula	5 mg (table), 0.024% (syrup)	Inhaler: 1-2 inhalations once, , 2 inhalations 4 times a day (maximum 8 inhalations per day). Nebula: 2.5-5 mg to 4 times a day
Fenoterol	100-200 (MDAI)	1	2 mg, 4 mg (tab.) 0,05% (syrup) 0,005 (tabл.)	1-2 inhalations 3-4 times a day (maximum 8 inhalations per day)
		Long-acting B-agonists		
Formoterol	4,5-12 (MDAI)			1 inhalation 2 times a day
Salmeterol	25 (MDAI); 50 (MDAI) 2			2 inhalations (2x25 mg) 2 times a day
Indacaterol	75-300 (DAI) 150, 300			Inhalation of 1 capsule once a day. The maximum dose is 300 mcg once a day
Olodaterol 5	5 (IMT)		1 inhalation once daily	1 inhalation once daily
		Short-acting cholinolytics		
Ipratropium bromide	20, 40 (DAI)	0,25, 0,5		1-2 inhalations 3-4 times a day (maximum 8 inhalations per day)
		Long-acting cholinolytics		
Tiotropium bromide				1 inhalation once daily
Glycopyrone bromide	18 (DPI), 5 2,5 (SSI)			1 inhalation once daily
Umeclidinium	44 (DPI) 50 (DpI) 62,5 (DPI)			1 inhalation once daily
		Short-acting in one inhaler		
Fenoterol / ipratropium bromide	50/20 (MDAI)	1.25 / 0.5 0.5 / 0.25 in 1 ml, fl. 20, 40 ml		1-2 inhalations 3-4 times a day Solution for inhalation for bronchospasm attacks - 1-2,5 ml (up to 4 ml) with saline solution
Salbutamol / ipropropium bromide	100/20 (SSI)			1-2 inhalations 3-4 times a day (maximum 8 inhalations per day)
		Long-acting in one inhaler		
Indacaterol / glycopyrnium	80/43 (MDAI) 50/110 (DPI)			1 inhalation once daily
Olodaterol / Tiotropium	5/5 (SSI)			1 inhalation once daily
Vilanterol / umeclidinum	22/55 (DAI)			1 inhalation once daily
		Methylxanthines		
Theophylline			100 mg 200 mg (caps.) 300 mg	200-300 mg 3 times a day
		Inhaled glucocorticosteroids (ICS)		
Beclomometasone	50-400 (MDAI) 250 mcg_(DPI)			250-500 mkg 2-4 times a day
Budesonide	100, 200, 400 mcg (MDAI)	0,20, 0,25/1; 0,5/1, nebula 2 ml		400 µg 2 times a day
Fluticasone	250 (DAI, DPI), 125 (MDAI)	0,5/2; 2/2 nebula 2 ml		250 µg 2 times a day
		LABA+ ICS in one inhaler		
Formoterol / beclomethasone	6/100 (MDAI)			1-2 inhales 2 times a day
Formoterol / budesonide	4,5/160, 9/320 (DPI)			2 inhales 2 times a day
Salmeterol / fluticasone	50/100,250, 500(MDAI)			1 inhale 2 times a day
Vilanterol / fluticasone furoate	25/100/200 (DPI)			1 inhale 2 times a day
		Triple combination in one inhaler		
Fluticasone / Umeclidinium / Vilanterol	DPI			
Beclamethasone / Fluticasone / Glycopyronium	MDAI			

Phosphodiesterase-4 inhibitors

Roflumilast	500mcg (tab)

The purpose of treatment of a patient with a COPD stable course is to reduce symptoms and future risks:

Reduction of symptoms:

• Reduce symptoms

• Improve exercise tolerance

• Improving health status

Risk Reduction:

• Prevention of disease progression

• Prevention and treatment of exacerbations

• Reduce mortality

These goals should be achieved with minimal side effects of therapy, with concomitant pathology that needs to be identified and treated. It is important for the patient to understand the nature of the disease, the risk factors for its progression, importance of the treatment. The patient should be constantly monitored, identified risk factors and monitored disease progression, effectiveness of therapy and possible side effects, exacerbation, comorbidity. Identifying and reducing the impact of risk factors is very important in the treatment and prevention of COPD. All smokers should be encouraged to quit smoking. Wherever possible, the effects of industrial hazards, smoke, gases, polluted environments should be avoided.

Initial therapy depending on the group of patients

> 2 or> 1 exacerbations with hospitalization	**Group C** **LACL**	**Group C LACL** or **LACL +LABA* або** **ICS + LABA **** *****If symptoms are pronounced (CAT> 20) ** Blood eosinophil level> 300
0 or 1 without hospitalization	**Group A** Short or long acting bronchodilator	**Group B** Long-acting bronchodilators **(LABA or LACL**
	mMRC 0-1; CAT < 10	mMRC > 2; CAT > 10

Short-acting bronchodilators should be given to all patients to relieve acute symptoms.

Group A

• All patients in group A should be offered bronchodilator therapy, with both short- and long-term medications.

• If a positive effect is noted, treatment should be continued.

Group B

• Initial therapy should be performed using long-acting bronchodilators; short-acting bronchodilators are prescribed as needed.

• There is no evidence of superiority of one class of long-acting bronchodilators over another in this group of patients. The choice of the drug should be made according to the individual feeling of relief of symptoms in each patient.

• Patients with severe shortness of breath should be prescribed treatment with two bronchodilators.

• Co-morbidities that may give additional symptoms and worsen the prognosis should be considered.

Group C

Initial therapy should be performed using one long-acting bronchodilator. LACLs have advantages over LABA in preventing exacerbations, which is why starting therapy is recommended with LACL.

Group D

• Starting therapy should be performed using LACL, given their positive effects on shortness of breath and prevention of exacerbations.

• Patients with more severe symptoms (CAT> 20), especially with severe shortness of breath and / or impaired physical activity, should be treated for LACL / LABA.

• For some patients, the first choice may be LABA / ICS therapy; this treatment is likely to prevent exacerbation in patients with eosinophils > 300 / µl; LABA / ICS may also be the first choice in patients with a history of asthma.

• ICS can cause side effects, such as pneumonia, and can therefore only be assigned with a benefit-risk balance.

Further management of the patient requires a new assessment of his condition to achieve the goals of treatment and to identify possible obstacles to successful therapy. Primary response therapy should be analyzed and corrected if necessary.

Unlike initial therapy, further COPD therapy is based on the symptoms and exacerbations and does not depend on the distribution of patients into groups A, B, C, D at diagnosis.

If the response to the initial therapy is satisfactory, the treatment should continue unchanged, if not:

• The treatment algorithm should be considered depending on the dominant characteristic (shortness of breath or exacerbation): use the algorithm of managing patients with exacerbations when both shortness of breath and exacerbation are expressed.

• Position the patient in the cell according to the composition of the therapy the patient receives and move according to the algorithm.

• Evaluate response to therapy, inhalation techniques and adjust treatment as needed.

The strategy of escalation and de-escalation of therapy is based on the results of evaluation of effectiveness and safety. Enhancement or extension of therapy (escalation) is performed with insufficient effect of the previous treatment, and it is always necessary to evaluate the response to escalation. De-escalation is indicated in the absence of effect or side effects, and may also be considered in cases of reduction of some of the symptoms.

For patients with constant shortness of breath or physical activity limitation with LABA monotherapy, it is recommended to use two bronchodilators. If the addition of another long-acting bronchodilator does not improve the symptoms, you can return to monotherapy again and consider changing the delivery device or molecule. Patients with persistent shortness of breath or limiting physical activity on LABA / ICS should be added to LACLand escalation.

The transition from LABA / ICS to LABA / LACL should be considered in the absence of indications for ICS (eg when ICS is used in the absence of a history of exacerbations), if no response to ICS therapy or treatment is accompanied by the side effects of ICS.

Exacerbation

The aggravationof COPD is an acute exacerbation of respiratory symptoms that requires additional therapy. They are important episodes of COPD, as they negatively affect health, increase hospitalizations, lead to disease progression, impair patients' quality of life and increase mortality. COPD exacerbation is a complex of events that is usually associated with increased respiratory tract inflammation, increased mucus production, and marked hyperinflation of the lungs. These changes exacerbate shortness of breath, which is a key sign of exacerbation. Other respiratory symptoms include increased pyrulence and sputum, as well as increased coughing and wheezing. Because COPD patients have frequent comorbidities, it is necessary to clinically separate the underlying pathology from other events: acute coronary syndrome, worsening heart failure, pulmonary embolism, and pneumonia.

Classification of exacerbations

• **Mild** (treated with short-acting bronchodilators (SABA) only).

• **Moderate** severity (treated with SABA + antibiotics and / or oral corticosteroids).

• **Severe** (patients need hospitalization). They are often associated with acute respiratory failure.

Exacerbations are mainly caused by respiratory viral infections, although bacterial infections and environmental factors can also initiate and / or exacerbate these events.

For patients with persistent exacerbations of long-acting bronchodilators, escalation is recommended: LABA / LACL or LABA / ICS. LABA / ICS has advantages in prescribing to

patients with a history of asthma or with asthma signs. The amount of eosinophils in the blood may be a factor in predicting the degree of likelihood of a positive response to ICS. For patients with one exacerbation per year and a blood eosinophil level> 300 µL, a more positive response to LABA / ICS is likely. Patients with two moderate exacerbations per year or at least one severe exacerbation with hospitalization should consider LABA / ICS at eosinophil levels> 100 µl. The effects of ICS are more pronounced in patients with frequent exacerbations and / or severe exacerbations.

If exacerbations develop in patients with TBA / TDLC, two follow-up options are recommended, taking into account that blood eosinophils <100 µl are a factor predicting low efficacy of ICS. Escalation of treatment to TDBA / TDLC / ICS. Response to ICS therapy may be observed at eosinophil levels> 100 µl. Prescribe roflumilast or azithromycin if blood eosinophils <100 µl.

If exacerbation of patients with LABA / ICS continues to develop, it is recommended to increase the therapy to triple by adding LACL. Alternatively, you can switch to LABA / LACL if the adverse effects of ICS therapy or cancellation of ICS require their side effects.

If exacerbations are observed in patients with triple therapy (LABA / LACL / ICS), the following options are recommended:

• Add roflumilast. This may be considered in patients with FEV1> 50% and chronic bronchitis, especially if they have been hospitalized at least once for exacerbation during the previous year.

• Add macrolide. Better evidence for the use of azithromycin has been obtained in patients who are currently non-smokers.

Discontinuation of ICS - in the event of side effects (such as pneumonia) or no effect of therapy. However, patients with blood eosinophil levels> 300 µl are likely to develop new exacerbations after withdrawal of ICS, which should be carefully considered in the follow-up of the patient.

Non-pharmacological therapy.

Education, self-control and pulmonary rehabilitation

• Education is needed to increase patient knowledge, but there is no evidence that this alone will change patient behavior.

• Training self-control with the support of a curator, with or without the use of a written action plan, is recommended to prevent complications such as hospitalization.

• Rehabilitation is indicated for all patients with relevant symptoms and / or high risk of exacerbation.

• Physical activity is a strong predictor of mortality. Patients should be encouraged to increase physical activity.

Vaccination

Flu vaccination is recommended for all COPD patients. Pneumococcal vaccination is recommended for all patients 65 years of age and older, as well as patients with significant comorbidities, including chronic heart or lung disease.

Food

• Nutritional support should be considered in depleted COPD patients.

Treatment of hypoxemia

• Patients with severe hypoxemia at rest show long-term oxygen therapy

• In patients with stable COPD and moderate desaturation at rest or under load, long-term oxygen therapy should not be routinely prescribed, and the need for its administration should be considered in the light of individual factors.

Treatment of hypercapnia

• In patients with severe chronic hypercapnia and a history of hospitalization for acute respiratory failure, consideration should be given to prescribing assisted long-term non-invasive pulmonary ventilation.

Interventional bronchoscopy and surgical treatment

• Surgical reduction of the volume of the lungs with maxillary emphysema, interventional bronchoscopic reduction in some patients with advanced emphysema, surgical bulektomy in cases of extremely severe COPD - lung transplantation may be considered in some patients.

6. Materials for self-control.

Test tasks:

1. Most important component of the COPD pathophysiology is:

A. Mucus hypersecretion and dysfunction of the ciliated epithelium.

B. Restriction of air flow in the bronchi and excessive pulmonary edema.

C. Disruption of gas exchange.

D. Pulmonary hypertension.

E. Pulmonary heart

2. In the study of the external breathing function the most important in COPD are:

A. Volume of forced expiration in the first second (FEV1).

B. Forced Vital Lung Capacity (FVC).

B. The ratio of FEV1 / FVC

D. All of the above.

E. The most important indicator is not named

3. The COPD diagnostic criterion is a decrease in indicators, starting with:

A. FEV1 <90% of the appropriate in combination with FEV1 / FVC < 80%.

B. FEV1 < 80% of the corresponding in combination with FEV1 / FVC < 70%.

C. FEV1 < 70% of the proper in combination with FEV1 / FVC< 60%.

D. FEV1 < 60% of the due in combination with FEV1 / FVC < 50%.

E. FEV1 < 50% of the due in combination with FEV1 / FVC < 40%.

4. Short-acting bronchodilators, inhaled β_2-agonists include, except:

A. Salbutamol.

B. Terbutalin.

B. Fenoterol.

G. Salmeterol.

5. Inhalation corticosteroids do not include:

A. Beclamethasone.

B. Budesonide.

C. Prednisone.

D. Fluticasone.

6. Bronchodilators do not include:

A. β_2-agonist.

B. β_2- blockers

C. Cholinolytics

D. Theophylline.

E. Euphylline.

7. Patient 55 years, after appendectomy for 2 days complains of progressive shortness of breath and cough with purulent sputum. Such symptoms are noted in the autumn and spring. Smokes for 25 years. Temperature - 37.1 ° C. In the lungs - breathing is weakened with single dry wheezing. In the blood: L - $10x10^9$ / l.

X-ray: increased lung airiness, increased pulmonary pattern. Bronchoscopy: hyperemia of the mucous membrane with the presence of purulent-mucous character secretions. What is the previous diagnosis?

A. Bronchial asthma

B. Chronic bronchitis

C. Bronchoectatic disease

D. Pulmonary artery branches embolism

E. Pneumonia

8. A 39-year-old truck driver complains of shortness of breath, a cough with a small amount of mucous sputum, mostly in the morning. Has been suffering from COPD for a long time, sinusitis. Smokes, consumes alcohol occasionally. Objectively: temperature - 36.5 ° C, BH - 24 / min, pulse - 90 / min, blood pressure - 120/80 mm Hg. Art. At auscultation breathing is hard, a moderate amount of dry wheezing. FEV1 - 68% of due value. What preventive measures are appropriate in the first place?

A. Rational employment

B. Refusing to drink alcohol

C. Remediation of chronic infection foci

D. Smoking cessation

E. Moving to another climate zone

9. A 60-year-old man complains of shortness of breath, exacerbated by exertion, cough with a small amount of mucous-purulent sputum mostly in the morning. COPD in anamnesis. Objectively: temperature - 36.0 ° C, RR - 22 / min, HR - 84 / min, BP - 110/70 mm Hg. Art. Skin is moist, diffuse cyanosis. At auscultation, the breath is stiff, scattered wheezing. FEV - 62% of due value; pharmacological test with salbutamol - increase of 5%. What is the most likely mechanism of bronchial obstruction development in the patient?

A. Hypercrynia

B. Inflammatory edema

C. Bronchospasm

D. Diffuse-sclerotic changes

E. Mucostasis

10. A 60-year-old man complains of shortness of breath, which is exacerbated by exercise. Smokers for about 30 years. Objectively: temperature - 36.5 ° C, RR - 22 / min, HR - 88 / min, BP - 130/85 mm Hg; barrel chest, band box sound over the entire surface of the pulmonary fields, weakened vesicular breathing. Which anamnesis disease most likely led to pathological changes?

A. COPD

B. Bronchiectatic disease

C. Pulmonary tuberculosis

D. Pneumonia

E. Tumor of the bronchus

Test Answers: 1-B, 2-D, 3-B, 4-D, 5- B, 6-B, 7-B, 8-D, 9-D, 10-A.

Recommended literature. Main:

I. Main:

1. Internal Medicine: in 2 books. Book 1. Diseases of the Cardiovascular and Respiratory Systems: textbook / N.M. Seredyuk, I.P. Vakaliuk, R.I. Yatsyshyn et al. Київ, Медицина., 2019. - 664 + 48 кольор. вкл.).
2. Internal medicine: Part 1 (cardiology, rheumatology, haematology): textbook for English-speaking students of higher medical schools / edited by Professor M.A. Stanislavchuk and Professor V.A. Serkova. - Vinnytsia: Nova Knyha, 2019. - 392 p.
3. Медицина за Девідсоном: принципи і практика / Навчальний посібник: пер. 23-го англ. вид.: у3 т. Т.3 С. Ралстона, Я. Пенмана, М. Стрекена, Р. Гобсона; К.: ВСВ «Медицина», 2021. – 642 с.
4. 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)/
5. Побічнадіяліків – SideEffectsofMedications: навчальнийпосібнику 2 т. / зазаг.ред. В.М. Бобирьова, М.М. Потяженка. – Вінниця:
6. Cardiovascular diseases. Classification, standards of diagnosis and treatment / Edited by Academician Kovalenko V.M., Prof. Lutaia M.I., Prof. Sirenko Yu.M., Prof. Sychova O.S. – Kyiv. – 2020.
7. Perederii V.H., Tkach S.M. Principles of internal medicine. – Vol.2 / Textbook for students of higher educational institutions. – Vinnytsia: Nova knyha. – 2018.
8. Internal diseases. The textbook based on the principles of evidentiary medicine, 2018.

II. Additional literature:

1. Recommendations of the Association of Cardiologists of Ukraine for the diagnosis and treatment of chronic heart failure / Voronkov L.H. –

moderator, working group of the Ukrainian Association of Heart Failure Specialists. – 2017.
2. Respiratory diseases / Ghanei M. - In Tech, 2012. - 242 p.
3. Clinical respiratory medicine / Spiro S., Silvestri G., Agusti A. - Saunders, 2012. - 1000 p.
4. Principles and practice of interventional pulmonology / Ernst A., Herth F. - Springer, 2012. - 757 p.
5. Clinical respiratory medicine / Spiro S., Silvestri G., Agusti A. - Saunders, 2012. - 1000 p.
6. Petrov Y. The chief symptoms and syndromes in patients with cardiovascular pathology : The practical handbook fur medical students / Ye. Petrov, Yu. Goldenberg, N. Chekalina; UMSA. - Poltava : TexcepBic, 2010. - 143 .
7. Gastroenterology and Hepatology Board Review: Pearls of Wisdom, Third Edition (Pearls of Wisdom Medicine) by John K. DiBaise (May 11, 2012)
8. Clinical Pulmonology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Oct 30, 2011) - Kindle eBook
9. Clinical Nephrology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Sep 19, 2011) - Kindle eBook
10. Clinical Nephrology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Sep 19, 2011) - Kindle eBook
11. Hematology: Clinical Principles and Applications, 4e by Bernadette F. Rodak MS MLS (Feb 18, 2017)
12. Rheumatology, 2-Volume Set: EXPERT CONSULT - ENHANCED ONLINE FEATURES AND PRINT, 5e by Marc C. Hochberg MD MPH, Alan J. Silman MD, Josef S. Smolen MD and Michael E. Weinblatt MD (Oct 19, 2019)
13. Endocrine Pathology: Differential Diagnosis and Molecular Advances by Ricardo V. Lloyd (Nov 5, 2018)
14. Clinical Endocrinology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Sep 19, 2017) - Kindle eBook

15. Williams Textbook of Endocrinology: Expert Consult-Online and Print, 12e by Shlomo Melmed, Kenneth S. Polonsky MD, P. Reed MD Larsen and Henry M. Kronenberg MD (May 27, 2016)
16. Electrocardiography, 3e with Student CD (Booth, Electrocardiography for Health Care Personnel) by Kathryn A. Booth (Jan 27, 2017)
17. Echocardiography Review Guide: Companion to the Textbook of Clinical Echocardiography: Expert Consult: Online and Print, 2e (Expert Consult Title: Online + Print) by Catherine M. Otto (Mar 7, 2017).