GUIDELINES
FOR the STUDENTS
INDEPENDENT WORK
FOR THE PRACTICAL CLASSES PREPARING

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

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.
   5. Diagnostic criteria. Diagnostic Tests

   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)

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

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic obstructive pulmonary disease (COPD)</td>
<td>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.</td>
</tr>
<tr>
<td>The test for the airflow obstruction reversibility</td>
<td>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 β2-agonist in an adequate dose; at 30-45 minutes after receiving 160 mg of short-acting anticholinergic or there combination).</td>
</tr>
</tbody>
</table>

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;

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 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 α1-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

<table>
<thead>
<tr>
<th>Wheezing (a cardinal COPD symptom), which:</th>
<th>Progressing (eventually reinforced)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Usually it increases with physical exertion</td>
</tr>
<tr>
<td></td>
<td>Persistent (lasting for a day)</td>
</tr>
<tr>
<td></td>
<td>The patient describes it as &quot;respiration requires increasing effort,&quot; &quot;heaviness,&quot; &quot;lack of air&quot; or &quot;shortness of breath&quot;.</td>
</tr>
<tr>
<td>Chronic cough (often the first symptom of COPD)</td>
<td>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.</td>
</tr>
<tr>
<td>Chronic sputum</td>
<td>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.</td>
</tr>
</tbody>
</table>
| 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.

<table>
<thead>
<tr>
<th>History of risk factors influence</th>
<th>Tobacco smoke</th>
<th>Industrial dust and chemicals</th>
<th>Cooking fumes and smoke from the burning of fuel</th>
</tr>
</thead>
</table>

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 β2-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 -> 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).

<table>
<thead>
<tr>
<th>Category</th>
<th>Characteristic</th>
<th>FEV1</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD 1</td>
<td>mild obstruction</td>
<td>≥80%</td>
</tr>
<tr>
<td>GOLD 2</td>
<td>moderate obstruction</td>
<td>≥50% i &lt;80%</td>
</tr>
<tr>
<td>GOLD 3</td>
<td>severe obstruction</td>
<td>≥30% i &lt;50%</td>
</tr>
<tr>
<td>GOLD 4</td>
<td>very severe obstruction</td>
<td>&lt;30%</td>
</tr>
</tbody>
</table>

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 ≥ 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 ≤ 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 ≤ 50% (GOLD 3 or GOLD 4) and/or ≥ 2 exacerbations per year and mMDR ≥ 2 or CAT≥10.

<table>
<thead>
<tr>
<th>risk</th>
<th>GOLD classification airway restrictions</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>≥ 2</th>
<th>Risk History of exacerbations in the previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
<td>symptoms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mMDR &lt; 2</td>
<td>mMDR ≥ 2</td>
<td>CAT &lt; 10</td>
<td>CAT ≥ 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 ≥ 2 or CAT≥ 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 ≥ 2 or CAT≥ 10.

**COPD Differential Diagnosis**

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

<table>
<thead>
<tr>
<th>Criterion</th>
<th>COPD</th>
<th>Bronchial asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker or former smoker</td>
<td>Almost always</td>
<td>Possible</td>
</tr>
<tr>
<td>Symptoms after age of 35 years</td>
<td>Usually</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Chronic cough</td>
<td>Usually</td>
<td>Unknown</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>Sustainable and progresses</td>
<td>Sustainable and</td>
</tr>
<tr>
<td></td>
<td>Variable</td>
<td>progresses</td>
</tr>
<tr>
<td>Night waking up with breathing disorders and / or breathlessness</td>
<td>Rarely</td>
<td>Usually</td>
</tr>
<tr>
<td>Значительная дневная или день ото дня изменение симптомов.</td>
<td>Rarely</td>
<td>Usually</td>
</tr>
</tbody>
</table>

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 pickflowmetry 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 programs.

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**

<table>
<thead>
<tr>
<th>Characteristics of patients (group)</th>
<th>First choice</th>
<th>Second choice</th>
<th>An alternative choice *</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Bronchodilators short-acting according to needs: or [2-agonist short-acting or short-acting anticholinergic</td>
<td>Long-acting bronchodilators [2-agonists or The long-acting anticholinergic or [2-agonist short-acting</td>
<td>Theophylline Doxofylline Fenspiride</td>
</tr>
</tbody>
</table>

Low risk, symptoms are less pronounced (mMKD <2 CAT<10), the degree of bronchial obstruction according to GOLD 1-2
<table>
<thead>
<tr>
<th>Characteristics of patients (group)</th>
<th>First choice</th>
<th>Second choice</th>
<th>An alternative choice *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B</strong></td>
<td>Long-acting bronchodilators</td>
<td>β 2-agonists or The long-acting anticholinergics</td>
<td>β 2-agonist short-acting and / or short-acting anticholinergic</td>
</tr>
<tr>
<td>Low risk, the symptoms are more pronounced (mMKD ≥2, CAT ≥10), the degree of bronchial obstruction according to GOLD 1-2</td>
<td>ICS + β 2-agonists or The long-acting anticholinergic</td>
<td>β 2-agonists and The long-acting anticholinergics</td>
<td>Doxofylline Theophylline Fenspiride</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>ICS + β 2-agonists or The long-acting anticholinergic</td>
<td>β 2-agonists and The long-acting anticholinergics</td>
<td>β 2-agonist short-acting and / or short-acting anticholinergic Euphylline Doxofylline Phosphodiesterase inhibitor -4</td>
</tr>
<tr>
<td>High risk, symptoms are less pronounced (mMKD &lt;2, CAT &lt;10), the degree of bronchial obstruction according to GOLD 3-4</td>
<td>ICS + β 2-agonists or The long-acting anticholinergic</td>
<td>β 2-agonists and The long-acting anticholinergics</td>
<td>β 2-agonist short-acting and / or short-acting anticholinergic Euphylline Doxofylline Phosphodiesterase inhibitor -4</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>ICS + β 2-agonists or The long-acting anticholinergic</td>
<td>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</td>
<td>B2-agonist short-acting and / or short-acting anticholinergic Euphylline Carbocysteine</td>
</tr>
<tr>
<td>High risk, the symptoms are more pronounced (mMKD ≥2, CAT ≥10), the degree of bronchial obstruction according to GOLD 3-4</td>
<td>ICS + β 2-agonists or The long-acting anticholinergic</td>
<td>β 2-agonists and / or short-acting anticholinergic Euphylline Doxofylline Phosphodiesterase inhibitor -4</td>
<td></td>
</tr>
</tbody>
</table>

The patient with COPD is needed 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.
   C. 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).
   C. 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 β2-agonists include all of the above, except:
A. Salbutamol.
B. Terbutaline.
B. Fenoterol.
G. Salmeterol.

5. Do not include to inhalated corticosteroids:
A. Beclomethasone.
B. Budesonide.
B. Prednisolone.
G. Fluticasone.

6. Do not relate to bronchodilators:
A. β2-agonists.
B. β2-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 – 10x10⁹ /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**