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	Asthma
Course	IV
Faculty	of foreign students training

1. Relevance of the topic: According to statistics, 300 million people worldwide suffer from bronchial asthma (BA). It is a global health problem because it affects all ages, its incidence is rising in many developing countries, and the cost of AB treatment is increasing.

2. Certain aims:

- To determine the etiological and pathogenetic factors of BA

.

- Classify asthma 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 asthma.
- To be able to carry out examination of the patient (survey, examination, palpation, percussion, auscultation) and to justify the preliminary diagnosis.
- Make a plan for additional examination of the patient with suspected asthma.
- To substantiate the use of the main diagnostic methods used in the examination of patients with asthma, indications and contraindications for their conduct and possible complications.
- To interpret the results of additional research methods - general clinical examination, biochemical blood analysis, general sputum analysis, radiographic examination of OGK, spirography, picfluorometry, etc.
- Carry out differential diagnosis and substantiate the clinical diagnosis of asthma.
- Know the principles of treatment, rehabilitation and prevention of asthma.
- Provide medical assistance for exacerbated bronchial asthma.

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

Names of previous disciplines	Obtained skills
1. Anatomy 2. Histology	To describe the structure of the respiratory system
3. Anatomy 4. Physiology	Demonstrate the knowledge of respiratory function physiology.

5. Pathology 6. Radiology 7. Propaedeutic internal medicine 8. Pharmacology	Know the indicators of the external breathing function, their value Have an understanding of the chemical reactions and processes that occur in cells and tissues in BA Describe the basics of pathological processes and morphological aspects of BA pathogenesis To determine regularities of occurrence of development and result of pathological processes; features and nature of dynamic changes in physiological functions in BA Demonstrate the ability to conduct surveys (complaint collection, medical history and life). To demonstrate the practical skills in physical examination of the patients with asthma Apply knowledge of the classification, pharmacokinetics, pharmacodynamics of drugs prescribed for BA treatment and control.

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

Bronchial asthma	Inflammatory airway disease, in which cells and inflammatory mediators are involved. Chronic inflammation is combined with bronchial hyperreactivity, which is manifested by recurrent symptoms of wheezing, shortness of breath, chest tightness, cough, especially at night and early in the morning.
The daily variability of the Peak Expiratory Flow Rate (PEFR)	The PEFR is the amount of air a person can quickly force out of their lungs in one breath. Determination of PEFR during the week (morning and evening) and calculating the difference between the maximum and minimum values: K = (max PEF- min PEF) / max PEF × 100%
Allergen-specific immunotherapy	Treatment of causative allergens that are introduced into the patient's body in increasing doses to reduce sensitivity to etiologically significant allergens at their natural exposure.

4.2. Theoretical questions for the lessons:

- Determination of bronchial asthma.
- Specify risk factors for the development of asthma.
- Pathophysiological mechanisms of development of bronchial asthma.
- Diagnostic criteria for BA.
- What is the auscultation pattern characteristic of asthma attacks?
- Modern classification of asthma.

- Specify the principles and features of pharmacotherapy of BA in accordance with the order of the Ministry of Health of Ukraine.
- What is BA control?

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;
- justify and formulate a preliminary and clinical diagnosis of asthma according to the classification;
- basic principles of managing patients with asthma;
- assessment of exacerbations of asthma and treatment tactics;
- evaluate the results of general clinical examination, biochemical blood test, general and microbiological analysis of sputum, spirography, radiographic examination of the chest organs and others.

Topic content:

Bronchial asthma is a chronic inflammatory disease of the respiratory tract that is caused by a large number of cells and inflammatory mediators. Chronic inflammation is combined with bronchial hyperreactivity, which is manifested by recurrent symptoms of wheezing, shortness of breath, chest stiffness, cough, especially at night and early in the morning. These episodes are usually associated with widespread but variable bronchial obstruction, which is either spontaneous or under the influence of therapy.

The main cellular elements of inflammation are eosinophils, hairy cells, T-lymphocytes, macrophages. Bronchial obstructive syndrome in bronchial asthma is caused by spasm of bronchial smooth muscle, mucosal edema, and discrina. Hyperreactivity, both specific and nonspecific, is the main universal pathophysiological feature of AD that underlies airway instability.

BA is a chronic inflammatory process that needs to be treated on a basic basis, not just symptomatically with the help of bronchodilators.

Bronchial asthma is classified by severity on the basis of a bronchial obstruction clinical and functional features complex. The doctor evaluates the frequency, severity and duration of expiratory breathlessness, the patient's condition between attacks, the severity, variability and return of functional disorders of the bronchial patency, the response to treatment. Functional evaluation to determine the severity of the disease is carried out in the absence of episodes of expiratory dyspnea. According to this classification, the patient's condition is determined by the severity of bronchial asthma. Yes, there is an **intermittent** (episodic) course; **persistent** (continuous) course: ***mild, moderate and severe***.

Intermittent bronchial asthma

Clinical symptoms before treatment

• Short-term symptoms (episodes of coughing, wheezing, shortness of breath) at least once a week for at least 3 months.

• Short-term exacerbations.

• Nocturnal asthma symptoms occur no more than 2 times a month

• Normal external lung function between exacerbations

• FEV1 or PEF 80% of predicted

• Daily variability of PEF or FEV1 <20%

Mild persistent bronchial asthma

Clinical symptoms before treatment:

• Symptoms are more common 1 time / week but less than 1 time / day for more than 3 months

• Exacerbations of the disease can impair activity and sleep, need for symptomatic treatment almost daily.

• Nighttime asthma symptoms are more than 2 times a month

• FEV1 or PEF 80% of predicted

• Daily fluctuations of PEF or FEV1 - 20 - 30%

Moderate severity persistent bronchial asthma

Clinical symptoms before treatment

• Daily symptoms

• Exacerbations cause impaired activity and sleep

• Nighttime asthma symptoms occur more than 1 time per week

• Daily administration of short-acting β2 agonists

• FEV1 or PEF within 60 - 80% of predicted

• Daily fluctuations of PEF or FEV1> 30%

Severe persistent bronchial asthma

Clinical symptoms before treatment

• Constant presence of daily symptoms

• Frequent, severe exacerbations

• Frequent nocturnal symptoms of asthma

• Restriction of physical activity due to asthma

• FEV1 or PEF <60% of predicted

• Daily fluctuations of PEF or FEV1> 30%

Achieving BA control may be impossible.

Levels of asthma control

Characteristics	**Controlled duration (all of the following)**	**Partial control (any sign can be noted in any week)**	**Uncontrolled duration**
A. Assessment of current clinical control (last 4 weeks)			
Daytime Symptoms	None (< 2 / week)	> 2/ week	≥ 3 signs of partial control available any week
Activity Limitations	None	Anytime	
Nighttime Symptoms / Awakening About BA	None	Anytime	
Use of bronchodilators as needed to relieve symptoms	None (≤ 2 / week)	> 2 / week	
EBF (PEFR. or FEV1)	Normal rates	< 80 % of required or personal best (if known)	
B. Assessment of future risks (risks of exacerbations, instability, rapid deterioration of lung function, side effects). Signs associated with an increased risk of side effects in the future: poor control of clinical symptoms, frequent exacerbations during the last year of follow-up, need for resuscitation for asthma, low FEV1, secondhand smoke, high doses of anti-asthmatic drugs.			

Asthma Control Test (ACT; www.asthmacontrol.com) and Asthma Control Questionnaire (ACQ) are used to assess asthma control;

http://www.qoltech.co.uk/acq.html

Diagnosis of bronchial asthma

1. Potential risk factors for bronchial asthma

1.1. Leading

- genetic predisposition
- atopy
- bronchial hyperreactivity

1.2. Environmental factors that contribute to the development of bronchial asthma in susceptible individuals

1.2.1. Home allergens

- household dust allergens
- allergens of domestic animals
- cockroaches allergens
- allergens of fungi, mold, yeast

1.2.2. External allergens

- pollen of plants
- mushrooms, mold, yeast

1.2.3. Professional sensitization

1.2.4. Smoking tobacco

- active smoking
- passive smoke

1.2.5. Air pollutants

- external
- home

1.2.6. Respiratory infections (mostly viral)

1.2.7. Defects in the diet

1.2.8. Consumption of some drugs (non-steroidal anti-inflammatory, beta-blockers)

1.2.9. Adiposity

1.3. Factors that contribute to the development of exacerbations and / or chronicity of symptoms

1.3.1. Home and outdoor allergens

1.3.2. Domestic and outdoor air pollutants

1.3.3. Respiratory infections

1.3.4. Exercise and hyperventilation

1.3.5. Weather changes

1.3.6. Sulfur dioxide

1.3.7. Certain types of food, supplements, medicines

1.3.8. Excessive emotions

1.3.9. Tobacco smoking (active and passive)

1.3.10. Irritants at home

Clinical symptoms of BA

- Episodic shortness of breath with difficulty exhaling
- Cough, more at night and when exercising
- Episodic wheezing in the lungs
- Re-stiffness of the chest

Symptoms are mostly exacerbated at night and early in the morning and awaken the patient. Symptoms of BA occur and worsen with:

- physical activity
- viral infection
- exposure to allergens (food, pets, household dust, plant dust)
- smoking
- outside temperature differences
- strong emotions (crying, laughing)
- the action of chemical aerosols
- taking some medicines (non-steroidal anti-inflammatory, beta-blockers).

Disorders of external respiration

- Bronchial obstruction: reduction of peak expiratory flow rate (PEFR) and forced expiratory volume in the first second (FEV1)
- Daily variability of PEFR and FEV1> 20%
- High reversibility of bronchial obstruction (increase of more than 12% (or 200 ml) PEFR and FEV1 in pharmacological tests with short-acting β2 agonists).

Allergic examination

- Allergic history: allergic rhinitis, eczema, hay fever or family history of asthma or atopic diseases
- Positive skin tests with allergens
- Increased levels of general and specific IgE

Hyperreactivity of the bronchi

Positive provocative tests at:

- histamine, methacholine, exercise.

The complications of asthma are divided into:

- pulmonary: pulmonary emphysema, respiratory failure, atelectasis, pneumothorax;
- extra- pulmonary: myocardial dystrophy, chronic pulmonary heart, heart failure.

Differential diagnosis.

BA should be differentiated with diseases accompanied by obstruction of the bronchi. This is ***chronic obstructive pulmonary disease (COPD***), tracheobronchial dyskinesia. In patients with COPD, unlike asthma, shortness of breath and difficulty in exhalation are constant, exacerbated after exercise, characterized by the absence of reversible obstruction of the bronchi even after treatment, no eosinophils in the blood, sputum and bronchial flushes, allergy tests.

Tracheobronchial dyskinesia (expiratory stenosis of the trachea and large bronchi) is manifested by painful, paroxysmal, bitonal cough and difficulty in exhalation. The attack of cough is provoked by physical activity, laughter, SARS. Cough is associated with weakness of the membranous part of the trachea. There are no signs of allergic changes, no scattered dry wheezing in the lungs. The diagnosis is confirmed during bronchoscopy.

It is often necessary to make a differential diagnosis of an attack of bronchial and ***cardiac asthma***. At cardiac asthma it is necessary to take into account the presence of shortness of breath on the breath or of mixed nature, cardiac history, characteristic position of the patient (orthopnoic), absence of the patient outside the pulmonary manifestations of allergy, eosinophilia.

Treatment.

Since 2019, GINA recommends that all adults and adolescents with asthma receive an ICS-containing drug for monitoring therapy to reduce the risk of serious exacerbation and control of symptoms.

A step-by-step approach to the correction of asthma treatment to meet the individual needs of the patient

STEP 1

Recommended Therapy: Low doses of ICS / formoterol if needed

Step 1 is recommended for patients who have symptoms less than twice a month and are free of exacerbation risk factors, this group of patients is rarely studied.

Other Control Therapy Options in Step 1

Use of low doses of corticosteroids every time when SABA is used

Children 6 to 11 years of age: a possible option is to use corticosteroids whenever a SABA is used.

STEP 2

Recommended Therapy: daily use of low doses of corticosteroids + SABA when needed, or low doses of corticosteroids / formoterol when needed

Daily use of low doses of ICS + SABA when needed: There is a large body of evidence from randomized clinical trials and descriptive studies indicating that the risk of severe exacerbations, the need for hospitalization, and mortality are significantly reduced by low to regular use ICS; symptoms and bronchial obstruction caused by exercise also become less pronounced when using such therapy. The number of severe exacerbations is halved even in patients who develop symptoms of the disease 0-1 days a week (Reddel et al., Lancet, 2017).

Use of low doses of ICS / formoterol: evidence is currently available for low doses of budesonide / formoterol.

Other Control Therapy Options in Step 2

Use of low doses of corticosteroids every time SABA is used, in the form of a combined preparation or separate inhalers. Leukotriene receptor antagonists

(LRAs) are less effective than conventional IGCs, especially in preventing exacerbations.

The daily use of low doses of ICS + LABA initial therapy leads to a faster improvement in symptoms and FEV1 than the use of ICS alone, but such therapy is more expensive, although the incidence of exacerbations is similar.

Seasonal allergic asthma still needs evidence. A topical recommendation at this point is to start using ICS immediately after exposure to the allergen and to discontinue therapy 4 weeks after the contact with the allergen has been discontinued.

Children 6-11 years

The recommended monitoring drug for children in Step 2 is the regular use of low doses of ICS. Other less effective options for monitoring therapy for children are daily use of LRA or use of low doses of corticosteroids every time SABA is used.

STEP 3

Recommended Therapy: low doses of ICS / LABA as maintenance therapy + SABA for or ICS / formoterol as supportive and adjunctive therapy

Before considering the need for a step up in therapy, it is necessary to check whether the patient adheres to the prescribed treatment, the technique of using the inhaler and the presence of comorbid diseases. In patients who have an uncontrolled course of asthma due to low doses of corticosteroids, the combination of low doses of corticosteroids leads to a 20% reduction in the risk of exacerbation and improvement of lung function, but the difference in the use of emergency medications is small.

For patients who have had at least one exacerbation in the last year, low doses of beclomethasone dipropionate / formoterol or budesonide / formoterol as a means of supportive care and adjuvant therapy are more effective in reducing the incidence of severe exacerbations or therapy the symptomatic control was similar.

Other control therapy options are: average doses of ICS or low doses of ICS + LRA. For adult patients with rhinitis and allergy to household dust mites with

exacerbations, in spite of ICS therapy, sublingual immunotherapy (SLIT) should be considered; FEV1 is expected to be> 70% of the projected level.

Children (6–11 years of age): The recommended control drug for this age group is medium doses of IGCS or low doses of ICS / LABA with similar efficacy.

STEP 4

Recommended Therapy: Low doses of ICS / Formoterol as maintenance and adjunctive therapy, or medium doses of ICS / LABA as maintenance therapy and SABA as needed

Although low doses of corticosteroids are considered to be the most effective at the group level, individual sensitivity to corticosteroids varies, so some patients who have not achieved control of the course of asthma with low doses of corticosteroids / LABA, may need to increase their treatment and use the correct technique. maintenance dose to medium doses.

Other control therapy options include: tiotropium additionally using an aerosol inhaler for children from 6 years with a history of exacerbation of asthma; additionally ARL; high doses of ICS / LABA, however, a potential increase in the side effects of ICS should be taken into account. SLIT should be considered for adult patients with rhinitis and allergy to domestic dust mites; FEV1 is estimated to be> 70% of the predicted level.

Children 6–11 years old: Continue supervising therapy, refer a specialist to evaluate the condition and prescribe treatment.

STEP 5

Send the patient for an examination of the BA phenotype and for additional treatment

Patients with uncontrolled symptoms and / or exacerbations, despite treatment in accordance with Step 4, should be screened for contributory factors, optimized for treatment, and referred for expert judgment, including severe asthma phenotype, and possible additional treatment required. Additional therapy is to administer tiotropium using an aerosol inhaler to patients older than 6 years with a history of exacerbations, an anti-IgE drug (subcutaneously omalizumab to patients ≥ 6 years

of age) in the case of severe allergic BA and anti-IL5-drug 6 or intravenously reslizumab ≥18 years), anti-IL5R drugs (subcutaneously benalizumab ≥12 years), or anti-IL4R drugs (subcutaneous dupliumab ≥12 years) in severe eosinophilic BA. Other options: Some patients may be advised to administer low doses of oral CS, but there is a risk of distant systemic side effects.

Evaluation of therapy response and treatment correction

Patients should see their doctor 1-3 months after starting treatment, and then every 3-12 months, and should be inspected every 4-6 weeks during pregnancy. In case of exacerbation, the examination should be scheduled after 1 week. The frequency of visits to the doctor depends on the initial level of control of asthma, the patient's previous response to therapy, the ability and willingness to engage in self-monitoring and self-care according to the plan of action.

Step Up Therapy

BA is a variable disease, so periodically there may be a need to evaluate the condition by a doctor and / or patient.

Continuous step up therapy (at least for 2-3 months): if symptoms and / or exacerbation occur despite control therapy within 2-3 months; Before changing the treatment, the following general questions are clarified: Is the inhalation technique correct whether there is a low adherence to therapy; whether there are modified risk factors such as smoking; whether the symptoms are associated with comorbidities, such as allergic rhinitis.

Short-term step-up therapy (1-2 weeks) prescribed by the doctor or patient according to the available plan of action, for example, during viral infection or allergen exposure.

Daily self-correction by the patient when prescribing low doses of beclomethasone / formoterol or budesonide / formoterol as supportive and adjunctive therapy.

Going to therapy a step down in the case of a well controlled course of BA Consider switching to a lower stage of treatment if good control of asthma is observed within 3 months, prescribe a minimal amount of treatment that would

control the symptoms, prevent the development of exacerbations, and have minimal side effects.

• Adequate time should be chosen for the transition to a lower stage of therapy (absence of respiratory infections, travel, pregnancy).

• Register the baseline data (symptom control and lung function), provide the patient with a recorded action plan, close observation, and set a date for the next visit.

• Go to the lower stage of therapy by reducing the dose of IGCS by 25-50% at intervals of 2-3 months.

• If the course of BA is well controlled by low doses of IGCS or ARL, the use of ICS / formoterol as needed may be a step down, based on 2 large clinical trials of budesonide / formoterol in adults and adolescents. Smaller studies have shown that using low doses of corticosteroids every time using SABA (combination drug or monotherapy) is more effective as a step back than using only SABA.

• Do not completely abolish ICS (in adults and adolescents), except temporarily to confirm the diagnosis of asthma.

• Make sure the patient is scheduled for the next visit.

Inhalation technique and adherence to therapy

Most patients (up to 80%) are not able to use the inhaler properly. This leads to poor symptom control and exacerbation. In order to ensure efficient use of the inhaler:

• The device that best suits the patient should be selected: the medications he or she is taking, physical issues such as arthritis, patient skills, and cost are taken into account; spacers should be recommended when prescribing ICS metered dose inhalers.

• The inhalation technique should be checked at all times. The patient should be asked to demonstrate how he or she is using the inhaler, checking that the technique is correct according to the instructions in the device.

• Errors should be corrected by demonstration, paying attention to the stages that the patient is doing wrong. Check for inhalation again, 2-3 times if necessary.

• Make sure you have instructions for using each of the inhalers you prescribe and can demonstrate how to use it properly.

About 50% of children and adults do not adhere to the prescription. Low adherence to therapy leads to a poor role-play of symptoms and exacerbation. Failure to prescribe may be accidental (for example, due to forgetfulness, high cost of drugs, misunderstanding of prescriptions) and / or intentional (eg, misunderstanding of treatment need, fear of side effects, cultural issues, high cost of treatment).

To identify patients with poor compliance:

• Formulate questions with empathy, such as: “Most patients do not adhere to the prescriptions for using an inhaler. In the last 4 weeks, how many days per week have you used it? Never, 1, 2 or more days? " or: "Is it easier for you to remember the need for an inhaler in the morning or in the evening?"

• check the use of drugs by date of appointment, dose meters on inhalers, spraying recorders;

• Ask patients their attitudes and beliefs about BA and treatment.

Non-pharmacological methods of treatment

In addition to medications, other agents may be prescribed to help control and reduce the risk factors:

• *advice to quit smoking;*

• *physical activity;*

• *Occupational asthma*: All patients who have asthma have their first adult debut and have a thorough medical history. Identify and eliminate professional sensitizers as soon as possible. If possible, refer the patient to the appropriate specialist;

• *NSAIDs*, including aspirin: always ask for BA before making an appointment.

Although allergens can cause symptoms of asthma in sensitized patients, the elimination of allergens is not recommended as a general strategy for managing patients with asthma. Such strategies are often complex and costly, and there are no approved methods for identifying prevalent sensitizers.

Asthma exacerbation

Exacerbation of asthma is an acute or subacute deterioration of the symptoms and function of the lungs compared to the normal condition of the patient, sometimes it may be the first manifestation of the disease.

When talking to a patient, the term "exacerbation" should be used. The terms "episodes", "attacks", "severe acute asthma" are often used, but they have different meanings, especially for patients.

Treatment for the worsening or asthma exacerbation should be considered as a continuous chain, beginning with the patient's self-care with a recorded plan of action, then with relief of severe symptoms by a primary care physician, and in the emergency department, ICU.

Identification of the patients with increased risk of death

Patients of this category should be identified and more frequently examined, such as the following cases:

• anamnesis: a history of asthma that threatened life and required intubation with artificial lung ventilation; hospitalization or provision of emergency care for asthma during the last 12 months;

• medication: no use of ICS or low adherence to therapy with ICS; current use or recent cancellation of oral CS (indicates the severity of recent events); abuse of the SABA, especially more than 1 balloon of oral inhalator per month;

• comorbid illnesses: history of psychiatric diseases or psychosocial problems; confirmed food allergy in patients with asthma;

• Absence of a recorded plan of action for BA.

The degree of bronchial asthma exacerbations.

Symptoms	Mild	Moderate	Severe	Threat of respiratory arrest
Shortness of breath	At walking May lie	At talking, difficulty eating Mostly sitting	At rest Forced position - tilt forward	
Talking	Sentences	Phrases	Words	-
Consciousness	Possible	Usually	Usually excited	Confusion

	excited	excited		
Respiratory rate	Increased	Increased	> 30 / min	-
Participation in ancillary muscles	Usually none	Usually present	Usually present	Paradoxical thoracoabdominal breathing
Whistling breathing	Moderate, usually at the end of exhalation	Loud	Usually loud	Lack of whistling
Pulse / min	< 100	100 - 120	>120	Bradycardia
Paradoxical pulse	None < 10 mm Hg	None 10 - 25 mm Hg	None > 25 mm Hg	None at muscle fatigue
PEFR after bronchodilator administration,% appropriate values or best for the patient	> 80 %	60 – 80 %	< 60 % (<100 l / min) or the response continues <2 hours	
PaO_2	Norm	> 60 mm Hg	< 60 mm Hg	-
$PaCO_2$	< 45 mm Hg	< 45 mm Hg	> 45 mm Hg	-
SaO_2	> 95 %	91 – 95 %	< 90 %	-

Treatment of bronchial asthma exacerbation:

<table>
<tr><th colspan="3">Outpatient stage</th></tr>
<tr><td colspan="3">Assessment of severity of exacerbation
PEFR<80% personally the best or proper for 2 consecutive days or> 70% in the absence of bronchodilator response
Clinical symptoms: cough, shortness of breath, wheezing, chest tightness, accessory muscles participation in breathing, suprasternal retraction</td></tr>
<tr><td colspan="3">Initial therapy - inhaled β2 agonists up to 3 times per hour (every 20 minutes)
It is recommended to use a metered dose inhaler via spacer or bronchodilator solution through a nebulizer</td></tr>
<tr><td>Good answer
Exacerbation of mild degree
If PEFR> 80% of predicted or personally the best
The ß2 agonist response is maintained for 4 hours:
- continue inhalation of the β2</td><td>Incomplete answer
Exacerbation of moderate severity
If PEFR 60 - 80 % of predicted or personally the best:
- Add steroids orally</td><td>Bad answer
Severe episode
If PEFR < 60 % of predicted or personally the best:
- Add steroids orally
- immediately repeat the administration of β2 agonists</td></tr>
</table>

<table>
<tr><td>agonist every 3 to 4 hours for 24 to 48 hours.</td><td>- continue the administration of ß2 agonists</td><td>- add cholinolytics
- see a doctor, call an ambulance</td></tr>
<tr><td colspan="3">Hospital treatment</td></tr>
<tr><td colspan="3">Initial assessment of severity of exacerbation: Physical. examination (auscultation, auxiliary muscles participation in the respiration, respiratory rate, heart rate, PEFR, FEV1, SaO2, measurement of arterial blood gases in extremely severe cases, other studies on indications</td></tr>
<tr><td colspan="3">The initial stage of treatment:
- short-acting inhaled β2 agonists continuously for one hour via the nebulizer
- oxygen therapy for SaO2 90%
- systemic steroids, if there is no immediate response to treatment, recent history of steroids intake, severe attack</td></tr>
<tr><td colspan="3">Reappraisal after 1 hour - physical examination, PEFR, SaO2, other indicated tests</td></tr>
<tr><td colspan="2">Moderate severity attack:
- Speed 60 - 80% proper / personally best
- ph. examination: moderate symptoms, ancillary muscles participation
- glucocorticosteroids are recommended
- inhaled β2 agonists, cholinolytics every hour for 3 hours
- continue treatment for 1 - 3 hours until improvement.</td><td>Severe attack:
- PEFR <60% proper / personally better
- nat. examination: severe symptoms at rest, chest retraction
- high-risk patients
- no clinical improvement after initial treatment
- inhalation β2 agonists every hour + cholinolytics
- Oxygen therapy
- systemic steroids
- β2 agonists v/v, s/c, i/m
- Methylxanthines i/v are recommended
- Recommended magnesium i/v</td></tr>
<tr><td>Good answer
the answer is stored within 60 minutes after the last manipulation
- ph exam: norm
- PEFR> 70%
- there is no distres syndrome
- SaO2> 90% (children 95%)</td><td>Incomplete response within 1 - 2 hours
- high-risk patients
- ph exam: mild to moderate symptoms
- SEASON <70%
- SaO2 does not improve</td><td>Poor response within 1 hour
- high-risk patients
- ph. examination: severe symptoms, confusion
- PEFR <30%
- PCO2> 45 mmHg.
- PO2 <60 mmHg</td></tr>
<tr><td>Statement home</td><td>Directions to the hospital</td><td>Intensive care</td></tr>
</table>

- continue treatment with inhaled β2 agonists - Oral CSs are recommended in most cases - patient education: correct administration of drugs viewing the individual plan close medical observation	- inhaled β2 agonists + cholinolytics - system GCS - oxygen therapy - Methylxanthines are recommended - monitoring of PEFR, SaO2, pulse, serum theophylline concentrations	- inhaled β2 agonists + cholinolytics i/v - the GCS recommended s/c, i/m, i/v, -inhaled β2 agonists - oxygen therapy - Methylxanthines are recommended - intubation and ALV are possible
Improvement		**No answer**
Statement home - PEFR > 60 % proper / personally best -continue oral / inhalation therapy		**Intensive care unit** - if no answer within 6 - 12 hours

Prevention

Primary: prevention of contact with allergens, rational nutrition, timely rehabilitation of foci of chronic infection, active lifestyle, tempering, physical education and sports. Detection of family history, prevention of intrauterine sensitization, postnatal sensitization by allergens coming from breast milk, other foods, from the environment; promoting the maturation of the immune system, minimizing the impact of nonspecific factors.

6. Materials for self-control.

Test tasks:

1. According to WHO recommendations, the daily dose of inhaled corticosteroids in persistent mild bronchial asthma in adults is:

A. 150-300 mcg

B. 200-500 mcg

C. 800-2000 mcg

D. More than 2000 mcg

2. The patient is diagnosed with “bronchial asthma, a moderate persistent course”. Which drug will you prefer for the planned treatment of the disease?

A. Intal

B. Becotide Mitte

C. Budesonide Fort

D. Salbutamol

E. Berotech

3. The patient complains of constant asthma attacks, which often occur at night, physical activity is significantly limited due to respiratory discomfort. The PEFR is less than 60% of the proper level, the daily variability > 30%. What is the likely diagnosis for this patient?

A. Chronic obstructive bronchitis in the acute phase

B. Intermittent bronchial asthma

C. Mild persistent bronchial asthma

D. Moderate persistent bronchial asthma

E. Severe persistent bronchial asthma

4. The patient with mild persistent bronchial asthma has exacerbation. What are your recommendations?

A. Increase the short-acting beta-2-agonist dose without increasing the dose of inhaled glucocorticosteroid.

B. Test with bronchodilator and then increase the dose of inhaled glucocorticosteroid and beta-2 agonist.

C. Carry out a provocative trial with histamine and then increase the dose of inhaled glucocorticosteroid and beta-2 agonist.

D. Increase the dose of inhaled glucocorticosteroid, beta-2 agonist, and then conduct a provocative trial with histamine.

E. Increase the dose of inhaled glucocorticosteroid, a short-acting beta-2-agonist.

5. A 35-year-old patient experiences infrequent (at least once a week) attacks of asthma, which are easily removed by short-acting beta2 sympathomimetics. During the attack, dry whistling wheezes are heard in the lungs, FEV1 more than 80% of the predicted between the attacks. At this patient:

A. Intermittent bronchial asthma.

B. Mild persistent asthma

C. Persistent asthma of moderate severity

D. Severe persistent asthma

E. This information is insufficient to determine bronchial asthma severity

6. A patient of 42 years complains of asthma attacks stops with 1-2 doses of salbutamol. The end of the attack is accompanied by a cough with a small amount of viscous vitreous sputum. The patient has been ill for 8 years. There is acute urticaria in anamnesis. Objectively: the temperature is 36.7º; RR - 21 / min; HR-90 / min .; BP - 130/80 mm Hg.; FEV1 - 77%. There is a small amount of dry wheezing above the lungs. Blood test: HB - 120 g / l; erythrocytes - 4.7 * 10^{12} / l; leukocytes - 7.9 * 10^{9} / l; P - 6%; E - 6%; C - 60%; L - 24%; M - 4%; ESR - 12 mm / h. What drugs are "basic" in the treatment of the patient?

A. Cholinolytics.

B. Mucolytics

C. Anti-inflammatory drugs

D. Antihistamines.

E. B2-adrenomimetics.

7. In a patient, a severe attack of bronchial asthma lasts more than 1 hour, despite the use of beta-adrenomimetics inhalation and prescription, euphylline and anticholinergic agents. What medications should be used to supplement emergency treatment?

A. Beta-blockers IV

B. Corticosteroids by inhalation

C. Antihistaminic agents

D. Corticosteroids IV

E. Nonsteroidal anti-inflammatory drugs

Task 1. Patient D., 43, was admitted to hospital with complaints of asthma attacks, mainly at night, the presence of distant dry wheezing. Chronic bronchitis is in anamnesis. During the last year, attacks of asthma began to worry. Blood Test: WBC-. 9.0 x 10^9 / l; ESR- 20 mm / h.

What is the preliminary diagnosis? What additional methods of examination should be performed for the patient?

Task2. Patient K., 32 years old, was admitted to the hospital with complaints of asthma attacks up to 3-4 times a day, which were not removed with salbutamol, shortness of breath during exercise, dry cough. Objectively: the box sound at percussion, hard breathing scattered dry wheezing at auscultation.

What is the preliminary diagnosis? What additional methods of examination should be performed for the patient? What is the treatment plan?

Test answers:

1-B, 2-C, 3-E, 4-E, 5-A, 6-D, 7-D.

Task 8.

1) Bronchial asthma, persistent course of moderate severity.

2) Chest Radiography, spirography, sputum analysis.

Task 9.

1) Bronchial asthma, persistent course of moderate severity.

2) Chest Radiography, spirography, sputum analysis.

3) Seretide 250 μg 2 times a day.

Recommended literature. Basic:

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).