THE DEFINITIONS OF ASTHMA SEVERITY AND CONTROL

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WHAT IS ASTHMA?
According to GINA (Global Initiative for Asthma) 2009:

• Asthma is a chronic inflammatory disorder of the airways, which is associated with airway hyperresponsiveness that leads to current episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning.

This episodes are usually associated with widespread, but variable airflow obstruction within the lung that is often reversible either spontaneously or with treatment.
UNFORTUNATELY...

Asthma is one of the most widespread chronic diseases in the world, which prevalence is increasing, especially among children.
FORTUNATELY ...

• Asthma can be treated and controlled.
• Almost all patients can:
  - Don’t have any symptoms, either night or day.
  - To prevent severe attacks.
  - To use minimal or don’t use reliever (drugs relieving symptoms).
  - To live active, productive lives.
  - To have normal or near normal lung function.
WHAT ARE THE RISK FACTORS OF ASTHMA?

Factors that influence the risk of asthma can be divided into those that cause the development of asthma and those that trigger asthma symptoms, some do both.

The former include host factors (which are primarily genetic) and the later are usually environmental factors.

All known and suspected risk factors of asthma are divided into two groups (Table 1):

- **INTERNAL (HOST) FACTORS**
- **EXTERNAL (ENVIRONMENTAL) FACTORS**
  - *Factors that contribute to the development of asthma*
  - *Factors that trigger pre-existing disease*
### Factors influencing the Development and Expression of Asthma

<table>
<thead>
<tr>
<th>HOST FACTORS</th>
<th>ENVIROMENTAL FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Genetic, e.g.,</em></td>
<td><strong>Allergens</strong></td>
</tr>
<tr>
<td>- genes pre-disposing to atopy</td>
<td><strong>Indoor:</strong></td>
</tr>
<tr>
<td>- genes pre-disposing to airway hyperresponsiveness</td>
<td>- Domestic mites</td>
</tr>
<tr>
<td></td>
<td>- Furred animals (dog, cat, mice, bird)</td>
</tr>
<tr>
<td><em>Obesity</em></td>
<td>- Cockroach allergen</td>
</tr>
<tr>
<td><em>Sex</em></td>
<td>- Fungi, molds, yeasts</td>
</tr>
<tr>
<td></td>
<td><strong>Outdoor:</strong></td>
</tr>
<tr>
<td></td>
<td>- pollens</td>
</tr>
<tr>
<td></td>
<td>- Fungi, molds, yeasts</td>
</tr>
<tr>
<td></td>
<td><strong>Occupational sensitizers</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Tobacco smoke:</strong></td>
</tr>
<tr>
<td></td>
<td>- Passive smoking</td>
</tr>
<tr>
<td></td>
<td>- Active smoking</td>
</tr>
<tr>
<td></td>
<td><strong>Outdoor/Indoor Air Pollution</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Diet</strong></td>
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</tbody>
</table>

Table 1.
Factors that cause worsening of asthma or perpetuate symptoms (triggers):

- Indoor and outdoor allergens
- Outdoor/Indoor Air Pollution
- Respiratory infections
- Exercise and hyperventilation
- Changes in weather conditions
- Sulfur dioxide
- Food, food additives, drugs
- Excessive emotional stress
- Smoking (active and passive)
- Irritants (home sprays, smells of paint)
Significant role in causing asthma, especially among children, is played by such external factors as: respiratory and parasitic infections, socioeconomic status, amount of family members, drugs and perinatal factors.
## How to Avoid the Risk Factors and Their Impact on the Patient with Asthma?

Table 2.

<table>
<thead>
<tr>
<th>Triggers</th>
<th>How to Avoid?</th>
</tr>
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</table>
| **Domestic mites** (they are so small that they can’t be seen with the naked eye) | To wash linens and blankets once a week in hot water, drying them in a hot dryer or the sun.  
To package of pillows and mattresses in special airtight (anti-allergy protection) cases.  
To remove carpets, especially from the dormitory.  
To use vinyl, leather, or a simple wooden furniture instead of upholstered.  
If it’s possible, to use a vacuum cleaner to clean the filter. |
| **Tobacco smoke** (if the patient smokes himself, or he is in a room where others smoke) | To avoid exposure to tobacco smoke. Patients and their parents should not smoke. |
HOW TO AVOID THE RISK FACTORS AND THEIR IMPACT ON THE PATIENT WITH ASTHMA?

<table>
<thead>
<tr>
<th>Allergens animals covered with hair</th>
<th>To remove animals from the house, at least - from dormitory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cockroach allergen</td>
<td>Thoroughly and frequently to clean the apartment. To use a pesticide spray. During the processing the patient should not be at home.</td>
</tr>
<tr>
<td>Pollen and moulds (outdoor allergens)</td>
<td>To close doors and windows and to stay indoors, when the amount of pollen and fungal spores in the air is maximum</td>
</tr>
<tr>
<td>Moulds (indoor allergens)</td>
<td>To maintain low humidity in the house, to clear frequently those areas where the humidity is raised</td>
</tr>
<tr>
<td>Physical activity</td>
<td><strong>Not to avoid physical activity.</strong> Asthma symptoms can be prevented, taking up exercise inhaled β2-agonist fast or long-acting or sodium cromoglycate.</td>
</tr>
<tr>
<td>Drugs</td>
<td>Not to take aspirin or beta-blockers, if these drugs cause asthma symptoms in a patient.</td>
</tr>
</tbody>
</table>
**KEY POINTS:**

- The development of asthma is related to the complex influence of internal and external factors.

- Internal (innate) factors contribute to genetic predisposition to the emergence of human asthma, atopy, bronchial hyperreactivity and today is unmanaged.

- External factors are numerous and controlled, directly trigger the manifestation of asthma or cause its aggravation. The major ones include exposure to allergens, viral and bacterial infections, diet, smoking, socioeconomic status and amount of family members.

- The most common factor responsible for the outbreak and exacerbation of asthma in children is exposure to allergens and respiratory infections.
KEY POINTS:

• Measurements of allergic status can help to identify risk factors that cause asthma symptoms in individual patients.

• Measures to prevent the development of asthma, asthma symptoms, and asthma exacerbations by avoiding or reducing exposure to risk factors should be implement wherever possible.
WHAT IS THE CLASSIFICATION OF ASTHMA?

In the form:
- Atopic
- Infectious-allergic
- Mixed

According to an inflammatory phenotype (GINA-Global Initiative for Asthma -2009):
- Eosinophilic phenotype
- Non- eosinophilic phenotype

It is recognized that different asthma phenotypes may have different levels of responsiveness to conventional treatment. As phenotype-specific treatment becomes available, asthma which was previously considered to be severe could become mild.

By the nature of the disease:
- Intermittent (episodic)
- Persistent (permanent)
Severity (measured before treatment):
- Intermittent
- Mild persistent
- Moderate persistent
- Severe persistent

According to GINA-2009:
Asthma severity is classified on the basis of the intensity of treatment required to achieve good asthma control.

Mild asthma is asthma that can be well-controlled with low intensity treatment such as low dose inhaled glucocorticosteroids, leukotriene modifiers or cromones.

Severe asthma is asthma that requires high intensity treatment, GINA Step 4, to maintain good control, or where good control is not achieved despite high intensity treatment.

Period of the disease:
- Exacerbation
- Remission
Possible Complications of Asthma:

- Pulmonary heart
- Chronic pulmonary emphysema
- Pneumosclerosis
- Segmental or polysegmental atelectasis
- Emphysema
- Spontaneous pneumothorax
- Asthmatic status
- Neurological complications
HOW TO ASSESS THE SEVERITY OF CURRENT ASTHMA?

To assess the severity of asthma is sometimes difficult, however, for clinicians it’s a key point, since the severity determines the solution of the substantive issues of medical tactics and plan of the patient’s treatment in the short and long-term programs.
Key indicators of severity of asthma:

- Characteristics of daytime and nighttime symptoms
- Exercise tolerance
- Frequency of β2-agonist short duration
- PEF (peak expiratory flow) or FEV1 (forced expiratory volume in 1 second) values
- Daily fluctuations (variability) PEF
Severe asthma is characterized by:

• frequent, several times a week or daily, several times a day, attacks, including frequent nighttime symptoms;
• usually severe attacks, stopped by the combined use of bronchodilatators and corticosteroids;
• significantly reduced exercise tolerance;
• disturbed sleep.

Patients will often perceive asthma as severe if they have intense or frequent symptoms, but it’s important to convey that this may merely represent inadequate treatment.
In clinical practice, sometimes there are extremely severe variants of asthma, in which all the criteria for severity is maximally expressed. Such patients often require intensive care. Severe course of asthma among children, and adults differs in a number of singularities, what allowed to offer to mark it out as a special phenotype (PRACTALL). The severity of asthma is caused by the persistence and resistance to treatment. The severity is also dependent on age. In early childhood persistent disease is regarded as severe, often requiring hospitalization.
However, it should be remembered that the severity of the attack doesn’t always determine the severity of asthma.

Exacerbation may occur as an acute attack or the prolonged state of bronchial obstruction. Asthma exacerbations may be caused by a variety of risk factors, sometimes referred to as «trigger», including allergens, viral infections, pollutants, and drugs.
Clinical parameters that characterize the severity of acute asthma:

- Respiratory rate
- Participation of the auxiliary muscles in the act of breathing
- Intensity of wheezing
- Swelling of the chest
- The nature and conduct of breathing in the lungs (auscultation)
- Heart rate
- Forced position
- The degree of restriction of physical activity
- The amount of therapy (drugs and methods of administration), used for cupping
Assessment of asthma in children is held with the visiting physician based on:

- Survey of patients
- The nature of clinical manifestations
- Study the functional state of respiratory
- Patient diary
The PEF measurement using a peak flow meter in school age children helps in objectively assessing the degree of bronchial obstruction and compiling the treatment guidelines.

In each case, the doctor should give the patient an individualized plan of his actions during exacerbations and in the future.

The study of respiratory function among children under 5 years is limited and difficult, therefore, determining the severity of asthma is mainly based on clinical criteria, results of questionnaire data, patient’s treatment diary.
KEY POINTS:

- Measurements of lung function (spirometry or peak expiratory flow) provide an assessment of the severity of airflow limitation, its reversibility, and its variability, and provide confirmation of the diagnosis of asthma.

- Asthma severity may change over time, and depends not only on the severity of the underlying diseases but also its responsiveness to treatment.

- From a practical point of view, the most appropriate classification of asthma according to severity, since such approach provides the optimal selection of therapeutic activities and plan of the patient’s treatment.
**KEY POINTS:**

- The identification of the severity of asthma before treatment is based on the evaluation of clinical and functional indices; the severity of illness on the background of the treatment is determined by the volume required therapy.

- The severity of asthma and the severity of the attack must be distinguished.
HOW TO MAKE MONITORING AND CONTROL ASTHMA?
Each patient is assigned to one of five «treatment steps» depending on their current level of control and treatment is adjusted in a continuous cycle driven by changes in their asthma control status.

**This cycle involves:**

- Assessing Asthma Control
- Treating to Achieve Control
- Monitoring to Maintain Control

Another «treatment steps» relates to the treatment and level of control for asthma exacerbations.
ASSESSING ASTHMA CONTROL

Each patient should be assessed to establish their current treatment regimen, adherence to the current regimen, and level of asthma control. A simplified scheme for recognizing controlled, partly controlled, and uncontrolled asthma in a given week is provided in Table 3 (GINA-2009).
## LEVELS OF ASTHMA CONTROL

### Table 3.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Controlled (all of the following)</th>
<th>Party Controlled (any measures present in any week)</th>
<th>Uncontrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime symptoms</td>
<td>Twice or less/week</td>
<td>More than twice/week</td>
<td>Three or more features or partly controlled asthma present in any week*,**</td>
</tr>
<tr>
<td>Limitations of activities</td>
<td>None</td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td>Nocturnal symptoms/awakening</td>
<td>None</td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td>Need for reliever/rescue treatment</td>
<td>Twice or less/week</td>
<td>More than twice/week</td>
<td></td>
</tr>
<tr>
<td>Lung function (PEF or FEV1)***</td>
<td>Normal</td>
<td>&lt; 80% predicted or personal best (if known)</td>
<td></td>
</tr>
</tbody>
</table>
B. **Assessment of Future Risk** (risk of exacerbations, high instability, rapid decline in lung function, side-effect)

Patients with any of the following features are at increased risk of adverse events in the future: poor clinical control, frequent exacerbations in past year*, ever admitted to critical care for asthma, low FEV1, exposure to cigarette smoke, high dose medication requirement.

* - Any exacerbation should prompt review of maintenance treatment to ensure that it is adequate.

** - By definition, exacerbation in any week makes that an uncontrolled asthma week.

*** - Lung function is not reliable for children 5 years and younger.
Conduct analysis of treatment every 3-6 months after the control under asthma is placed.

Consult a specialist if the patient has clinical signs complicate asthma (for example, sinusitis), or if the patient doesn’t respond to the ongoing optimal therapy or if a treating needed by schemes 3, 4 and 5 stages.
To achieve control of asthma it is necessary:

- to select appropriate medications
- to carry out long-term treatment
- to treat exacerbation of asthma
- to establish risk factors that worsen asthma, and avoid them
- to educate patients to manage their condition
- to monitor and modify the treatment of asthma in order to achieve effective long-term control
LONG-TERM CONTROL OF ASTHMA

To classify the severity of asthma and the plan of treatment there used the stepped approach.

This approach involves the increasing of number and frequency of drug use («step up») with increasing severity of asthma and decrease («step down») when asthma control is achieved.
«Step up»

If asthma control is not achieved or if it’s not constant. Usually, improvement should be achieved within 1 month. However, before you climb on a «step up», check patient inhalation technique, compliance with doctor’s recommendations, check whether the possible impact of risk factors is excluded.

«Step Down»

If control is maintained for the last 3 months, in this case the gradual reduction of medication is possible. The aim – is to reduce the drug use to a minimum level, providing asthma control.
Achieving control is possible in two ways:

• **1th way (preferred):**
  Quickly get asthma under control through the appointment of maximum therapy (for example, to conventional treatment, corresponding to the severity of asthma in a patient, additionally assign a short course of prednisolone or a higher dose of inhaled corticosteroids) with subsequent transition to «step down».

• **2nd way:**
  Begin treatment with a stage, which corresponds to the severity of asthma in this patient with the transition if necessary to «step up».

  Anti-inflammatory drugs, particularly inhaled corticosteroids are currently the most effective drugs for long-term preventive treatment of asthma.
MONITORING AND MODIFICATION OF ASTHMA TREATMENT TO ACHIEVE EFFECTIVE LONG-TERM CONTROL

- Control of asthma requires a consistent and long-term treatment and monitoring.
- Monitoring includes an assessment of symptoms and, if possible, measurement of functional indices of lung.
- Monitoring indicators pick expiratory flow measure at each visit to a doctor (spirometry is preferable, but it is not always available). Monitoring along with an assessment of symptoms helps to assess the patient’s response to treatment and adjust the treatment. The value of PEF > 80% of the best individual performance means that the asthma is under control.
MONITORING AND MODIFICATION OF ASTHMA TREATMENT TO ACHIEVE EFFECTIVE LONG-TERM CONTROL

- Long pick flow monitoring at home can help patients identify the early signs of deterioration in asthma (PEF < 80% of the best individual performance) before the onset of symptoms. The patient can take immediate action in accordance with individual treatment plans in order to avoid serious attacks. Pick flow monitoring at home is not always possible, however, for patients who can’t recognize the symptoms, or for those who have already had cases of hospitalization, it is extremely important.

- Regular visits to the doctor (intervals from 1 to 6 months) are necessary even after the control of asthma.
The goal of treatment is to achieve asthma control:

- Minimal chronic symptoms (ideally - the lack thereof), including night
- Minimal (infrequent) episodes
- Lack of conditions requiring emergency
- Minimal need for $\beta_2$-agonists emergency
- No limitation of activity, including exercise
- Fluctuations PIF $\leq 20\%$
- (Near) normal PEF
- Minimal side effects from medicines (or absence of such effects).
IMPORTANT:

• To establish asthma control as quickly as possible (use the 1-st way of control), then to reduce the medication to the minimum level, providing control over the symptoms.

• Patients to avoid risk factors (triggers) or to control contact with them at every stage.

• At each stage of treatment education program for patients should be included
STEPPEP APPROACH TO LONG-TERM CONTROL OF
ASTHMA IN INFANTS AND YOUNG CHILDREN
(5 YEARS AND YOUNGER) has its own characteristics

The goal of treatment is to achieve asthma control
(difference - the lack of the value of PIF):
- Minimal chronic symptoms (ideally - the lack thereof), including night
- Minimal (infrequent) episodes
- Lack of conditions requiring emergency
- Minimal need for β2-agonists emergency
- No limitation of activity, including exercise
- (Near) normal lung function
- Minimal side effects from medicines (or absence of such effects).
IMPORTANT TO REMEMBER:

- There is few research on treatment of asthma in infants.
- Assign treatment to the patients from the steps, which is appropriate to their condition. Short course of prednisolone may help in achieving rapid control of asthma.
- Patients to avoid risk factors (triggers) or to control contact with them at every stage.
- At each stage of treatment the education program for patients and/or their parents should be included.
Clinical control of asthma is defined as:

- No (twice or less/week) daytime symptoms
- No limitations of daily activities, including exercise
- No nocturnal symptoms or awakening because of asthma
- No (twice or less/week) need for reliever treatment
- Normal or near-normal lung function
- No exacerbations
**KEY POINTS:**

- To aid in clinical management, a classification of asthma by level of control is recommended.

- Treatment should be adjusted in a continuous cycle driven by the patients’ asthma control status. If asthma is not controlled on the current treatment regimen, treatment should be «stepped up» until control is achieved. When control is maintained for at least three months, treatment can be «stopped down».
KEY POINTS:

• In treatment-naive patients with persistent asthma, treatment should be started at Step 2, or, if very symptomatic (uncontrolled), at Step 3. For Step 2 through 5, a variety of controller medications are available.

• Ongoing monitoring is essential to maintain control and establish the lowest step and dose of treatment to minimize cost and maximize safety.

• Reducing a patient’s exposure to some categories of risk factors improves the control of asthma and reduces medication needs.
Thank you for attention!