Calma Study

RS & GI SYSTEMS course



"ACHIEVE THE BEST ...

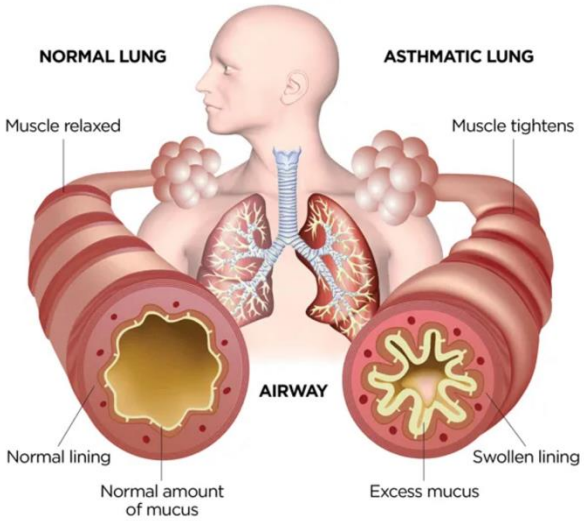
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Asthma

Pathophysiology:

- An airway **narrowing** and **inflammation** primarily in medium-sized bronchi
- The inflammation is triggered by an allergen such as cold air, strong odors, pollen, animal dander, or dust.

- Asthma is divided into two phases:
  - **Early phase**: acute bronchoconstriction that lasts approximately 1 hour after allergen exposure.
  - **Late Phase**: occurs 4 to 6 hours after the allergen exposure and results in less intense bronchoconstriction, increased airway hyperresponsiveness and airway inflammation



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Clinical presentation and diagnosis

Symptoms

- Patients usually complain of wheezing, shortness of breath, coughing (usually worse at night), and chest tightness.
- Patients may be anxious and agitated.
- In acute severe asthma, patients may be unable to communicate in complete sentences.
- Mental status changes (eg, confusion, irritability, agitation) may indicate impending respiratory failure.
- The presence of precipitating factors (eg, smoke, mold, or viral illness worsens symptoms.
- Symptoms usually have a pattern (eg, sores at night, seasonal symptoms)

Signs

- Vital signs may reflect tachypenia, tachycardia, and hypoxemia.
- On inspection, there may be hyperexpansion of the thorax, and use of accessory muscles.
- Auscultation of the lungs may detect end-expiratory wheezes in mild exacerbations or wheezing throughout inspiration and expiration in severe exacerbations.
- Bradycardia and absence of wheezing may indicate impending respiratory failure.
- In acute asthma, patients may present with pulsus paradoxus, diaphoresis, and cyanosis.

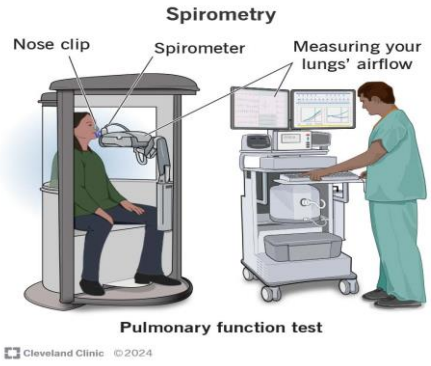
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Spirometry

- The most widely available and useful pulmonary function test **(PFT).**
- It takes only 15 to 20 minutes, carries no risks, and provides information about obstructive and restrictive disease
- It allows assessment of forced vital capacity **(FVC)**, forced expiratory volume in the first second of expiration **(FEV1)** and peak expiratory flow **(PEF).**

  - **FVC**: which represents the total amount of air that can be exhaled
  - **FEV_1** :the volume of air exhaled during the first second of the FVC maneuver
  - **PEF**: also called maximum forced expiratory flow (FEFmax), is the maximum flow obtained during FVC.

- In obstructed patients, a measurement is the ratio FEV1/FVC. Most pulmonary laboratories state that FEV1/FVC <70% of the predicted value is diagnostic for obstruction
- All lung volumes and flows are compared to normal values obtained from healthy subjects. There are significant variations based on ethinicity and race.



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Laboratory Tests

- Spirometry demonstrates reversible airway obstruction with an EFV_1/FVC((forced expiratory volume in 1 second/forced vital capacity) less than 80% (0.80) and either:

(a) An increase in FEV, of 12% or 200 mL after receiving a bronchodilator, or

(b) An increase of 10% in the predicted FEV, after receiving a bronchodilator. Spirometry may be normal if the patient is not symptomatic.

- A complete blood count with differential should be obtained in patients with fever or purulent sputum. The eosinophil count may be elevated, reflecting an allergic component.
- Elevated serum immunoglobulin E **(IgE)** levels may be present.
- **Immunoassays** are serologic tests used to detect allergies in patients that may have sensitivities to molds, dust mites, pollen, and other triggers that worsen asthma control.
  The test is an interaction between **antigens**, in the form of a protein from the trigger and the patient's antigen-specific antibody.
  The test is used when skin testing is not available or cannot be used because it is a **less sensitive** test than skin testing.

Other Diagnostic Tests

- Full pulmonary function tests should be performed at **baseline** in patients 5 years or older to rule out other disorders.
- Arterial blood gases (to evaluate PCO,) should be obtained for patients in severe distress, suspected hypoventilation, or when PEF or FEV, is at least 30% less than the percent predicted after initial treatment.
- **Pulse oximetry** is performed at each visit to assess for hypoxemia.
- Methacholine challenge test or bronchoprovocation may be performed if the diagnosis of asthma is questionable.

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➢ **Fraction of exhaled nitric oxide (FeNO)** changes from baseline may indicate inflammation or a response to an inhaled corticosteroid (ICS). A normal value in adults is lessva than 25 parts per billion (ppb)

➢ Chronic Asthma

• Classification is based on

1. Current disease impairment

   The **frequency** and **severity** of symptoms, use of short-acting B2-agonists **(SABA)** for quick relief of symptoms, pulmonary function, and impact on normal activity and quality of life.

2. Future risk

   The potential for future severe exacerbations and asthma-related death, progressive **loss** of lung function (adults) or **reduced** lung **growth** (children), and the occurrence of drug-related adverse effects.

➢ Acute Asthma

- Symptoms include:
- Wheezing, coughing, and shortness of breath increase.
- Most exacerbations can be treated at home and some require hospitalization.
- The severity of the asthma exacerbation does not depend upon the classification of the patient's chronic asthma.
- Patients with intermittent asthma can have life-threatening acute exacerbations.

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Desired outcomes of treatment

- **Chronic Asthma**

- Control chronic symptoms
- Require infrequent use or fewer days/week) of short acting beta-agonist **(SABA)** for quick relief of symptoms
- Maintain normal or near-normal pulmonary function
- Maintain normal activity levels
- Meet patients' and families' expectations of satisfaction with asthma care
- Prevent acute attacks and decrease hospitalizations
- Prevent damage of the lungs
- Provide effective treatment with no or minimal side effects.

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Nonpharmacologic Therapy

- Table 14-1

Table 14–1

Nonpharmacologic Interventions to Improve Symptom Control in Patients with Asthma

Tobacco use
- Strongly encourage smokers to quit
- Advise parents/caregivers of children with asthma to not smoke and not allow smoking in rooms or cars that children use
- Assess smokers/ex-smokers for COPD or overlapping features of asthma and COPD

Physical activity
- Encourage regular physical activity for its general health benefits
- If exercise-induced bronchospasm, use a SABA 5–30 minutes prior to physical activity
- Encourage stretching and warm-up exercises prior to physical activity

Occupational exposures
- Ask patients with adult-onset asthma about work history and other exposures
- Record when work-related exposures and symptoms occur, when bronchodilator is needed, and peak airflow at work vs. home
- Use respiratory protective devices such as air-purifying masks to help protect against noxious occupational inhalants
- Identify and eliminate occupational sensitizers and remove sensitized patients from further exposure

Medications
- Ask about asthma before prescribing NSAIDs and advise patients to stop NSAIDs if asthma worsens after use
- If β-blockers are indicated, choose cardioselective agents (eg, atenolol). Asthma is not an absolute contraindication to β-blocker use, but consider the risk vs. benefit

Indoor allergens
- Animal dander: Remove carpet from bedroom if possible; keep pets out of bedroom; consider removal of pets from the home
- Mold: Consider reducing indoor humidity to 30%–50%; dehumidify basements; fix water leaks and eliminate water sources associated with mold growth
- Dust mites: Encase mattress and pillows in allergen-impermeable covers; wash sheets and blankets in hot water weekly (> 130°F [54.4°C])
- Cockroaches: Do not leave food or garbage exposed; use poison bait or traps to control insects

Diet
- Encourage a diet high in fruits and vegetables for its general health benefits
- Avoid foods for which there is a confirmed allergy
- Encourage weight reduction if overweight or obese
- Avoid foods containing sulfites if they cause symptoms (eg, beer, wine, shrimp, dried fruit, processed potatoes)

Vaccinations
- Administer yearly influenza vaccine to patients with moderate-to-severe asthma[9]
- Follow CDC recommendations for administering the pneumococcal vaccine[10]

Emotional stress
- Identify goals and strategies (eg, relaxation, breathing exercises) to deal with emotional stress if it worsens asthma

Weather conditions
- Avoid strenuous outdoor activities during unfavorable weather conditions
- Cover the nose and mouth with a scarf on cold or windy days

Outdoor allergens
- When pollen counts are high, remain indoors and keep windows and doors closed
- If time is spent outdoors, shower afterward to remove allergens on the skin
- Avoid being outdoors in areas of high pollution

CDC, Centers for Disease Control and Prevention; COPD, chronic obstructive pulmonary disease; NSAID, nonsteroidal anti-inflammatory dru
SABA, short acting β_2 agonist.

Data obtained from Global Initiative for Asthma: Global Strategy for Asthma Management and Prevention, 2017 (www.ginasthma.org) and National Asthma Education and Prevention Program, Third Expert Panel on the Diagnosis and Management of Asthma. Expert Panel Repor Guidelines for the Diagnosis and Management of Asthma. Bethesda (MD): National Heart, Lung, and Blood Institute (US); 2007 August. (https://www.ncbi.nlm.nih.gov/books/NBK7232/).

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