

Primary Health Care Initiatives (PHCI) Project
Contract No. 278-C-00-99-00059-00
Abt. Associates Inc.

ASTHMA

LEARNING OBJECTIVES:

- Diagnose asthma correctly
- Describe the risks and triggering factors
- Describe an effective plan management for acute asthma.
- Describe an effective plan management for chronic asthma.
- Understand the treatment protocol based on level of severity
- Correct use of spacers and MDI in children and infants
- When to refer child for acute attack
- Communication with the patient and the family in understanding, control and prevention of the disease.

TEACHING STRATEGIES:

- Review technique of use of peak flow meter in older children and adolescents.
- Review the principal of spacers and their uses in children
- Use of lecture or informal presentation for material, small group discussion for prevention, counseling and patient education issues.

MATERIALS AND EQUIPMENT NEEDED:

- Portable peak flow meter for each group with disposable mouth pieces.
- Different types of spacers
- White board or flip chart and markers for summarizing major points

LEARNING POINTS:

Introduction:

Airway inflammation plays a central role in Asthma and its management:

- Asthma is a chronic inflammatory disorder of the airways. Many cells and cellular elements play a role, in particular, mast cells, eosinophils, T-lymphocytes, macrophages, neutrophils, and epithelial cells.
- Environmental and other factors provoke the airway inflammation in people with asthma, examples of these factors include allergens to which the patient is sensitive, some irritants and viruses. The inflammation is always present to some degree, regardless of the level of asthma severity.
- Airway inflammation causes recurrent episodes in asthma patients of wheezing, breathlessness, chest tightness and coughing, particularly at night and in the early morning.
- These episodes of asthma symptoms are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment. Airflow obstruction is caused by a variety of changes in the airway, including bronchoconstriction, airway edema, chronic mucus plug formation airway remodeling.

- Inflammation causes an associated increase in the existing airway hyperresponsiveness to a variety of stimuli, such as allergens, irritants, cold air and viruses. These stimuli or precipitants result in airflow obstruction and asthma symptoms in the asthma patient.

Diagnosis of Asthma – History and Physical Examination

- Many causes of wheezing in the first two years of life are not related to asthma:
 - Bronchiolitis
 - Cystic fibrosis
 - G. E. Reflux
 - Foreign body inhalation
 - Tracheal-Esophageal fistula
- After the first 2 years of life, asthma becomes the most common cause of recurrent wheezing
- Asthma should be strongly considered if:
 - The patient presents with episodic wheeze, chest tightness, shortness of breath, or cough
 - Recurrent coughing or wheezing episodes are the only symptom
 - Asthma symptoms vary throughout the day
 - Symptoms worsen at night, while exercising, or in the presence of aeroallergens or irritants
 - Allergic rhinitis or atopic dermatitis are present
 - Wheezing develops with known triggering factors, such as:
 - Infection (URTI)
 - House dust mites
 - Exercise
 - Smoking and other irritants
 - Animals
 - The patient has relatives with asthma, allergy, sinusitis, or rhinitis
 - A physical exam reveals:
 - Hyperextension of the thorax
 - Wheezing, or prolonged or forced exhalation
 - Nasal secretions, sinusitis, rhinitis, or nasal polyps
 - Atopic dermatitis or eczema, or allergic skin problems

However, in the absence of symptoms at the time of a physical exam does not exclude an asthma diagnosis.

- Be aware of the following danger signs in acute asthma:
 - Cyanosis
 - Exhaustion
 - Inability to talk
 - Silent chest
- To establish Asthma diagnosis:
 - Perform an asthma-specific medical history and physical exam as noted above

- Document by spirometry that airflow obstruction exists and is partially reversible, i.e.:
 - FEV1 is < 80% the predicted limit
 - FEV1 / FVC is < 65% the lower limit of normal
 - FEV1 increases > 12% and at least 200 mL after use of a short-acting inhaled beta2 - agonist (i.e., salbutamol).
 - Older adults may need to use oral steroids for 2-3 weeks before taking the spirometry test to measure the degree of reversibility achieved. Chronic Bronchitis and Emphysema may coexist with asthma in adults. Children younger than 7 years may not perform appropriate spirometry.
- Exclude alternative diagnoses (for example; vocal cord dysfunction, vascular rings, foreign bodies, other pulmonary diseases), using additional tests if necessary.

Management of chronic asthma

(NOTE: management of acute respiratory distress from asthma is described later)

1. Define Goals of management:
 - Prevent chronic asthma symptoms and asthma exacerbations during day and night:
 - No sleep disruptions
 - No missed school or work
 - No visits to the Emergency department
 - No hospitalization
 - Maintain normal or near-normal activity, including exercise and other physical activities
 - Achieve normal or near-normal lung function
 - Ensure patient satisfaction with the asthma care received
 - Significantly reduce or eliminate attacks and enhance long-term prognosis by ensuring that the patient takes anti-inflammatory medicines regularly
2. Assess the severity of asthma according to the following classification:

Classification of chronic Severity: Clinical Features Before Treatment

	Day with Symptoms	Nights with Symptoms	PEF or FEV₁ *
Step 1 Mild Intermittent	<2 symptomatic episodes/week	<2 nights/month	>80%
Step 2 Mild Persistent	3-6 symptomatic episodes/week	3-4 nights/month	>80%
Step 3 Moderate Persistent	Daily symptoms	>5 nights/month	>60%- <80%
Step 4 Severe Persistent	Continual symptoms	Frequent	<60%

* percent predicted values for forced expiratory volume in 1 second (FEV1) and percent of personal best for peak expiratory flow (PEF) (relevant for children 6 years old or older who can use these devices).

Notes:

- Patients should be assigned to the most severe step in which any feature occurs
- An individual's classification may change over time
- Patient at any level of severity of chronic asthma have mild, moderate or severe exacerbations of asthma. Some patients with intermittent asthma experience severe and life-threatening exacerbations separated by long periods of normal lung functions and no symptoms
- Patients with two or more asthma exacerbations per week (ie., progressively worsening symptoms. That may last hours or days tend to have moderate-to-severe persistent asthma

3. Develop management plan for long-term control based on severity classification, as follows:

For all levels of severity	Use short acting inhaled β_2 agonist (salbutamol or albuterol inhaler) as needed with other long-term control medications (1-3 puffs every 4 hours)
Step 1: mild intermittent asthma (<2 symptomatic episodes/week)	No daily medication needed Use short acting inhaled β_2 agonist (salbutamol or albuterol) as needed (1-3 puffs every 4 hours)
Step 2: mild persistent asthma (3-6 symptomatic episodes/week)	One daily medication : Anti-inflammatory drug <ul style="list-style-type: none"> • Low-dose inhaled corticosteroid (40 mcgm. 1-4 puffs/day) • Cromolyn (Intal) or nedocromil (Tilade). • Zafirlukast (Accolate) or Zileuton (Zyflo) may also be considered in patients 12 years or older. <p style="text-align: center;">OR</p> Sustained –release theophylline to serum concentration of 5-15 (but not preferred therapy)
Step 3: moderate persistent asthma (Daily symptoms)	One daily medication : <ul style="list-style-type: none"> • Medium-dose inhaled corticosteroid. (80 mcgm. 2-4 puffs twice daily) <p style="text-align: center;">OR</p> Two daily medications: <ul style="list-style-type: none"> • Low-to-medium dose inhaled corticosteroid <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> • Long-acting bronchodilator especially for night time symptoms (Salmeterol (serevent), sustained-release theophylline or long-acting β_2 agonist tablets).
Step 4: severe persistent asthma (continual symptoms)	Three daily medications: <ul style="list-style-type: none"> • High-dose inhaled corticosteroid (80 mcgm. 4-5 puffs twice daily) <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> • Long-acting bronchodilator (Salmeterol,

	<p>sustained-release theophylline or long-acting β2 agonist tablets).</p> <p>AND</p> <ul style="list-style-type: none">• Oral corticosteroid in dosage of 0.25 – 1 mg per Kg per day with the dose generally not exceeding 60 mg/day
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For rapidly worsening symptoms of asthma at any level of severity (emergency treatment)	Begin oral corticosteroid (Prednisolone) in dosage of 1-2 mg/kg./day AND Increase dosages of inhaled short acting β 2 agonist
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4. When patient has been symptom free for over 2 months, consider “Step Down Therapy”
 - Gradually reduce or “step down” long-term control medications after several weeks or months of controlling persistent asthma when goals of asthma therapy are achieved.
 - Inhaled steroids may be reduced about 25% every 2-3 months until the lowest dose required to maintain control is reached.
 - Continuous attempts should be made to reduce daily use of oral steroids when asthma is controlled. For patients who are taking steroids daily on a long-term basis, referral or consultation or care by an asthma specialist is recommended.
 - Maintain patients on the lowest possible dose of oral steroids (single dose daily or on alternate days).
 - Use high doses of inhaled steroids to eliminate or reduce the need for oral steroids.

5. Reduce effects of specific allergens on a patient with persistent asthma:
 - Identify specific allergens to which patient is exposed
 - Determine and confirm sensitivity to the allergens
 - Method: skin or in vitro tests, medical history
 - Obtain agreement with the patient to begin one or two simple control measures
 - Follow up with patient, adding control measures after the first ones are implemented.

6. Develop a strategy for home management:
 - Discuss with parents whether home management is appropriate.
 - Provide a small supply of oral Prednisolone for emergency home use.
 - Give a spacer device (Volumatic / Nebuhaler) and MDI of β 2 agonist.
 - If the child can use a peak flow meter, make sure that they have one and understand how to interpret the results. Give them a target PFR below which they should seek help.
 - Tell them of the danger signs, which should make them seek help immediately. (inability to talk, poor color, exhaustion)
 - **Make sure that the child and parents know how to use a spacer device**
If not available, use the “open mouth” technique of the MDI, as follows:
 - Remove the cap, hold the inhaler upright and shake it
 - Tilt your head back slightly and exhale
 - Put the inhaler 4-5 cm. away from your **open** mouth
 - Press down on the plunger and take a full, deep, slow breath through the mouth
 - Hold your breath for 10 seconds, then exhale slowly through your nose
 - Wait 15-30 seconds before taking next puff
 - Rinse your mouth afterward to prevent possible fungal infection
 - Keep mouth piece clean

7. Schedule regular monitoring and followup visits every 1-6 months, with spacing dependent on level of control of the asthma and understanding of the patient and parents, because:
- Asthma symptoms change over time, requiring changes in therapy
 - Patients' exposure to precipitants of asthma will change
 - Patients' memories and self management practices will fade with time
reinforcement, review, and reminders are needed.

Elements to include in each monitoring visit:

- o Organize a system in the office to make each visit effective
- o Give patient an assessment questionnaire to complete in the waiting room
- o Have patients come back to the office more often, especially in the beginning, in order to provide time for assessment and patient education
- o Use nurses and office staff to do some of the tasks like checking the patient's inhaler technique and peak flow numbers before the patients' see the doctor
- o Identify patient's concerns about asthma & expectations for the visit
- o Assess achievement of the patient's goals and the general goals of asthma therapy :
 - prevent chronic asthma symptoms and asthma episodes during day and night
 - maintain normal activity levels
 - have normal or near-normal lung function
 - be satisfied with asthma care received and the level of control
- o Review medication usage and skills in using inhalers and peak flow meters correctly
- o Use the patients' own personal best peak flow as the standard against which peak flow measurements should be compared
- o Use the same peak flow meter and , when needed, replace with the same brand
- o Teach patients to measure peak flow fist thing in the morning before medications
 - a drop in peak flow below 80% of personal best indicates a need for added medications
 - a drop in peak flow below 50% of personal best indicates a severs exacerbation

PREVENTION AND HEALTH EDUCATION MESSAGES

- When possible, immunize against pneumococcus, and yearly against influenza
- Discontinue all smoking in the house of the patient and avoid smoke filled areas
- Avoid known allergens or asthma triggers when possible
 - o Dust
 - o Mold
 - o Animals with fur in the house
- Reinforce the following messages with each monitoring visit:
 - o Asthma can be managed and the patient can live a normal life.

- o Asthma can be controlled when the patient works together with the medical staff. The patient plays a big role in monitoring asthma, taking medications, and avoiding things that can cause asthma episodes.
- o Asthma is a chronic lung disease characterized by inflammation of the airways. There may be periods when there are no symptoms, but the airways are swollen and sensitive to some degree all the time. Long- term anti-inflammatory medications are important to control airway inflammation.
- o Many things in the home, school, work, or elsewhere can cause asthma attacks (e.g., secondhand smoke, allergens, irritants). An asthma attack (also called episodes, flare-ups, or exacerbations) occurs when airways narrow, making it harder to breathe.
- o Asthma requires long-term care and monitoring. Asthma cannot be cured, but it can be controlled. Asthma can get better or worse over time and requires treatment changes.

Emergency Management of Acute Exacerbations

Goals for treating asthma exacerbations are rapid reversal of airflow obstruction, reduction in the likelihood of recurrence, and correction of significant hypoxia.

- Assess patient's peak flow or FEV1 and administer medications upon patient's arrival without delay.
- Administer short-acting inhaled beta2-agonists (salbutamol or albuterol inhalation) and supplemental oxygen to patients who have signs & symptoms of asthma. Subcutaneous epinephrine or terbutaline are NOT recommended but can be used if inhaled medication is not available.
- Oxygen for most patients to maintain SaO₂ > 90% (>95% in pregnant women, infants and patients with coexistent heart disease). Monitor oxygen saturation until a significant clinical improvement has occurred.
- Short-acting inhaled beta2-agonists (salbutamol or albuterol inhalation) every 20 to 30 minutes for three treatments for all patients. Onset of action is about 5 minutes. Subsequent therapy depends on response. Subcutaneous beta2-agonists (salbutamol or albuterol) provide no proven advantage over inhaled medication.
- Oral steroids (dose of 1-2 mg/kg to a maximum of 60 mg) should be given to most patients, such as those with moderate-to-severe exacerbations, patients who fail to respond promptly and completely to an inhaled beta2-agonists (salbutamol or albuterol), and patients admitted into the hospital. Oral steroids speed recovery and reduce the likelihood of recurrence. Onset of action is greater than 4 hours. Often a 3-to-10- day course of oral steroids at discharge is useful.
- Assess the patient with a severe exacerbation after the first dose and the third dose (about 60 to 90 minutes after initiating treatment) of short-acting beta2 – agonists.
- Evaluate the patient's subjective response, physical finding, and lung function. Consider arterial blood gas measurement for evaluating arterial carbon dioxide (PCO₂) in patients with suspected hypoventilation, severe distress, or with FEV1 or peak flow < 30% of predicted after treatment.
- Patients can be discharged from the Emergency Department or hospital when peak flow or FEV1 is > 70 % of predicted of personal best and symptoms are minimal.

Before Discharge Provide Patients with the following:

- Sufficient short-acting beta₂-agonists (salbutamol or albuterol inhaler) and oral steroids to complete course of therapy or to continue therapy until follow-up visit. Patients given oral steroids should continue taking them for 3 to 10 days.
- Written and verbal instructions on when to increase medications or return for care.
- Training on how to monitor peak flow
- Training on necessary environmental control measures and inhaler technique, whenever possible
- Referral for a follow-up medical appointment

CRITERIA FOR REFERRAL OF PATIENTS TO THE HOSPITAL

- Central cyanosis (lips, face)
- Decreased responsiveness to stimuli
- Silent chest on auscultation (no air movement audible)
- Unable to drink or talk
- Peak Flow meter < 50% of best or ideal peak flow
- Respiratory distress that does not **completely** improve with emergency treatment

CASE STUDIES AND EXERCISES

For each of the following patients, indicate the correct classification of asthma (ie, mild intermittent, mild persistent, moderate persistent, or severe persistent), and the most appropriate treatment:

1. Fatima – 6 years old, currently taking no medicines
Night cough for past 3 months, difficulty breathing after walking fast or running, noted to have rapid and difficult breathing at least 3–4 times each week.
Currently RR 24, no visible difficulty breathing. Chest sounds coarse rhonchi and mild bilateral wheezing
 - a. What is the classification of asthma for this patient?
 - b. What treatment should you prescribe for this patient?
2. Ahmad – 12 years old, currently uses an salbutamol inhaler occasionally
Only complaint is occasional chest tightness and cough when running, usually not more than once or twice per week. Salbutamol inhaler gives good relief of tightness and cough.
 - a. What is the classification of asthma for this patient?
 - b. What treatment should you prescribe for this patient?

3. Jihan – 10 years old, currently using salbutamol inhaler 2 –3 times daily, but still complaining of chest tightness and cough.
She is currently showing some difficulty breathing.
RR – 24, using neck muscles slightly in respiration. No cyanosis. Chest sounds – bilateral wheezing and rhonchi
 - a. What is the classification of asthma for this patient?
 - b. What treatment should you prescribe for this patient?
4. Ali – 3 years old. Currently using no medications. Developed URI with clear nasal mucous, occasional cough, and mild fever 3 days ago. Yesterday his cough increased and respiratory rate increased, but he did not appear ill.
Temp. – 37.5, RR – 24, no cyanosis, no difficulty breathing, active and playful.
Chest, occasional wheezing, no rhonchi or rales
 - a. What is the classification of asthma for this patient?
 - b. What treatment should you prescribe for this patient?

CRITICAL ELEMENTS OF COMPETENCE FOR EVALUATION

- Correct diagnosis and classification of severity of asthma
- Use of Peak Flow for older children
- Use of spacer or correct open mouth technique for inhaler
- Appropriate management of acute and chronic asthma, depending on classification of severity
- Appropriate patient education about asthma and its management plan.
- Knowledge of need for referral and hospital admission

How to Use Your Metered-Dose Inhaler

First, it's important to make sure the canister holds enough medicine. Check the label to see how many inhalations are in each canister. Throw away the canister when you have used 90% of the medicine. This means that if the canister holds 100 inhalations and you use 10 inhalations a day, you should throw that canister away on the 10th day and start a new canister. You can mark a calendar every day to keep track of the inhalations you have used for each canister.

Steps for using an inhaler

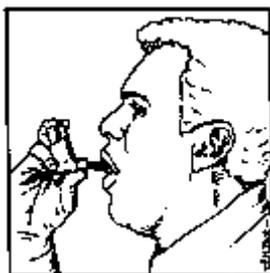
1. Remove the cap, hold the inhaler upright and shake the inhaler.
2. Tilt your head back slightly and breathe out all your air. Don't force the air out.
3. Hold the inhaler one to two inches from your open mouth, as shown in Picture A. Picture A shows the right way to use most inhalers. Picture B shows how to use an inhaler with a spacer. Spacers are useful for all patients. They are very helpful for young children and older adults. They are also helpful to use with inhaled steroid medicines. Picture C shows a method for people who can't use A or B.
4. Press down once on the inhaler to release the medicine as you start to breathe in slowly (this is a "puff").
5. Breathe in slowly for three to five seconds. The slower you breathe in, the more medicine will go into your lungs.
6. Hold your breath for 10 seconds to allow the medicine to go deep into your lungs.

7. Repeat puffs as directed by your doctor. Wait one minute between puffs to allow the next puff to get into your lungs better. Note: inhaled dry powder capsules are used differently. If you use a spacer, wash it and the mouthpiece once a week.

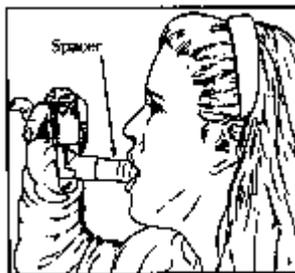
Preferred Method
Preferred

Preferred Method

Not



A. Open mouth. Hold inhaler one to two inches away.



B. Use spacer attached to inhaler.



C. Hold inhaler in your mouth.

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