

# PHC

432 Handouts

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## Bronchial Asthma



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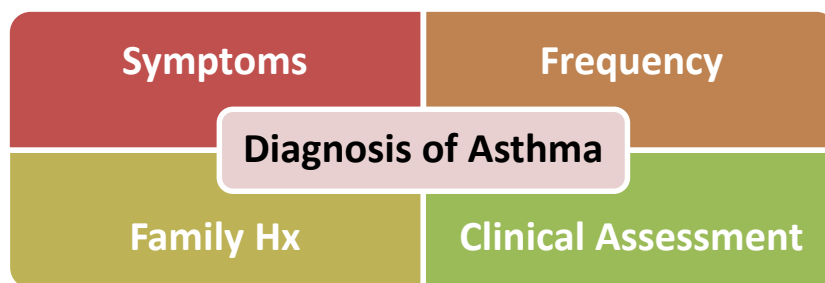
# Objectives

## Diagnosis of Asthma in children and adults

- a. History
- b. Clinical
- c. Use of PEFR to assess in diagnosis
- d. Investigations “PFT; Spirometry”
- e. Factors trigger Asthma Highlight on COPD “Diagnosis by PFT and Treatment”
- f. How to assess the severity of Asthma Exercise induced asthma (triggers and management)
- g. Management of Asthma
- h. Rescue management
- i. Prophylaxis
- j. How to use different types of inhalers
- k. Asthma education for patient and how patient can use inhalers properly
- l. Practical: Examination of Respiratory system (chest), How to do?

## **Asthma:**

- ♣ Asthma is a common heterogeneous chronic disorder of the airways, characterized by variable usually reversible and recurring symptoms related to one or more of airflow obstruction, bronchial hyper-responsiveness, and underlying inflammation.
- ♣ Affecting more than 2 million Saudis.
- ♣ Its impact is manifested in patients, their families, and the community as a whole in terms of lost work and school days, poor quality of life, frequent emergency department (ED) visits, hospitalizations, and deaths.



## **Symptoms:**

- ♣ The symptoms of wheezing, cough, shortness of breath, and chest tightness are not specific for asthma and can be seen with other pulmonary diseases. However, the combination of these symptoms increases the probability of asthma.
- ♣ The pattern of symptoms is usually variable over time, and the patient may be entirely asymptomatic between exacerbations.
- ♣ Symptoms are usually worse at night, particularly in children, and can be provoked by exercise or other triggering factors such as viral infections and/or smoke.
- ♣ Wheezing associated with at least two of the three nocturnal symptoms (nocturnal dyspnea, nocturnal cough or nocturnal chest tightness) had a sensitivity of 80% to diagnose asthma.
- ♣ Asthma control may be worsened by coexisting symptomatic gastro-esophageal reflux disease (GERD), rhinosinusitis, obesity, sleep disorders,

or the use of some medications such as beta blockers and nonsteroidal anti-inflammatory drugs (NSAIDs) including aspirin (ASA.) Asthma and rhinosinusitis commonly coexist.

## **Classification of Asthma and assessment of severity:**

Classifying asthma severity and initiating treatment in youths greater than or equal to 12 years of age and adults

Components of severity		Classification of asthma severity ( $\geq 12$ years of age)			
		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment Normal FEV <sub>1</sub> /FVC: 8 to 19 years 85 percent 20 to 39 years 80 percent 40 to 59 years 75 percent 60 to 80 years 70 percent	Symptoms	$\leq 2$ days/week	$> 2$ days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	$\leq 2$ x/month	3 to 4x/month	$> 1$ x/week but not nightly	Often 7x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	$\leq 2$ days/week	$> 2$ days/week but not daily, and not more than 1x on any day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	<ul style="list-style-type: none"> <li>• Normal FEV<sub>1</sub> between exacerbations</li> <li>• FEV<sub>1</sub> <math>&gt; 80</math> percent predicted</li> <li>• FEV<sub>1</sub>/FVC normal</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> <math>\geq 80</math> percent predicted</li> <li>• FEV<sub>1</sub>/FVC normal</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> <math>&gt; 60</math> but <math>&lt; 80</math> percent predicted</li> <li>• FEV<sub>1</sub>/FVC reduced 5 percent</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> <math>&lt; 60</math> percent predicted</li> <li>• FEV<sub>1</sub>/FVC reduced <math>&gt; 5</math> percent</li> </ul>
Risk	Exacerbations requiring oral systemic glucocorticoids	0 to 1/year (see footnote)	$\geq 2$ /year (see footnote)		
		Consider severity and interval since last exacerbation			
		Frequency and severity may fluctuate over time for patients in any severity category			
		Relative annual risk of exacerbations may be related to FEV <sub>1</sub>			
Recommended step for initiating treatment		Step 1	Step 2	Step 3	Step 4 or 5
		And consider short course of oral systemic glucocorticoids			
		In two to six weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

## Assessment of Asthma Exacerbation:

	<i>Mild\Moderate</i>	<i>Severe</i>	<i>Life threatening</i>
<i>Talking</i>	Phrases	Words	Drowsy Confused Silent Chest
<i>Agitated</i>	No	Yes	
<i>Position</i>	Sitting\lying	Sit in forward	
<i>RR</i>	High	> 30\min	
<i>Pulse</i>	100-120 bpm	>120 bpm	
<i>Accessory muscle</i>	Not used	In use	
<i>O2 Sat</i>	90-95%	<90%	
<i>FEV1</i>	>50%	<=50%	

### Respiratory Examination:

#### Clinical findings in case of Asthma:

- ♣ Trachea: **central**
- ♣ Chest expansion: **decreased**
- ♣ Percussion: **resonant**
- ♣ Breath sound: asthmatic
- ♣ Add sound: **wheezing**

#### Status Asthmaticus Clinical Presentations: **Emergency**

- ◆ Patients are usually **tachypneic** upon examination.
- ◆ An inability to speak more than one or two words at a time.
- ◆ The chest is hyperexpanded, and accessory muscles, particularly the sternocleidomastoid and intercostal muscles, are used.
- ◆ Auscultation often reveals bilateral expiratory and possibly inspiratory **wheezes and crackles**.

## **Investigation**

### **1) Pulmonary Function Tests (PFTs):**

#### **1.1 Spirometry**

It's done **for all Asthma patients** to support diagnosis and set a baseline.

**Important findings in the flow-volume curve:**

- A. Forced Vital Capacity (FVC): Deep breath in, blow as fast and as complete as possible. Normal is  $\geq 80\%$  predicted value.
- B. Forced Expiratory Volume in 1 sec (FEV1)
- C. FEV1/FVC Ratio. Normal is  $\geq 0.7$  (or 70%). This ratio is reduced in Asthma but not diagnostic of it.

**Spirometry is diagnostic when:** FEV1  $\geq 15\%$  (or 200 mL) increase following administration of a bronchodilator (short acting Beta2 agonist e.g. salbutamol) or trial of corticosteroids. (ie breathing improves after a bronchodilator)

#### **1.2 Peak Flow Meter**

A cheap and convenient method but mainly used to monitor effectiveness of asthma treatment. It measures the peak expiratory flow rate.

#### **1.3 Exercise test:**

Spirometry before and after exercise. It is done to diagnose **exercise-induced asthma** (that appears normal on regular spirometry). *More details about exercise-induced asthma at pg11.*

### **2) Radiology:**

- A. **Chest X-ray:** Findings in asthma  $\rightarrow$  normal or hyperinflation.

CXR is indicated in asthma patients presenting with: fever or chronic purulent sputum production (pneumonia), red flags such as: hemoptysis or weight loss, or signs of severe disease such as clubbing or significant hypoxemia.

- B. **HRCT:** done for asthma complicated by other pathologies.

### **3) Other investigations:**

- Allergy measures: skin prick test and peripheral blood eosinophilia
- For exacerbations (acute asthma): pulse oximeter (ABGs are measured if O2

sat is less than 90%.)

## **Bronchial Asthma Triggers:**

Asthma attack happens when patient is exposed to “asthma triggers.” the asthma triggers can be very different among the patients. Identifying and avoiding those "triggers" is essential in preventing asthma flare-ups.

♠ ***Respiratory Infections*** — Colds, influenza, bronchitis, ear infections, sinus infections, and pneumonia are the commonest asthma triggers.

♠ ***Allergens***

### **A- Inhalant allergens**

- Animal allergens
- House dust mites
- Cockroaches
- Indoor and outdoor fungi
- Outdoor plant allergens

**B-Food allergens** (seafood-, egg-, or cow's milk or wheat) — Food allergens RARELY cause isolated asthma without other symptoms, Usually it shows asthma as a part of food induced anaphylaxis.

### **C-Occupational allergens**

♠ ***Irritants*** (Cigarette Smoke).

♠ ***Temperature And Weather*** Hot, humid and cold air can cause bronchoconstriction

♠ ***Physical Activity*** — Exercise is a potential asthma trigger that should not be avoided.

“Warm up gradually before beginning strenuous activity. Consult your clinician about taking medication prior to physical activity. Avoid exercising outdoors in extremely cold weather”.

♠ ***Hormonal Fluctuations*** — Hormonal fluctuations associated with the menstrual cycle and with pregnancy can affect the frequency and severity of asthma symptoms in some patients.

♠ ***Medications:*** non-selective beta blockers, Aspirin and NSAIDs

♠ ***Emotional Factors*** — like Depression and chronic stress.

## How to avoid these triggers?

- ♣ Complete avoidance of the trigger
- ♣ Limit exposure to the trigger if it cannot be completely avoided.
- ♣ Extra dose of bronchodilator and an antihistamine before trigger exposure.

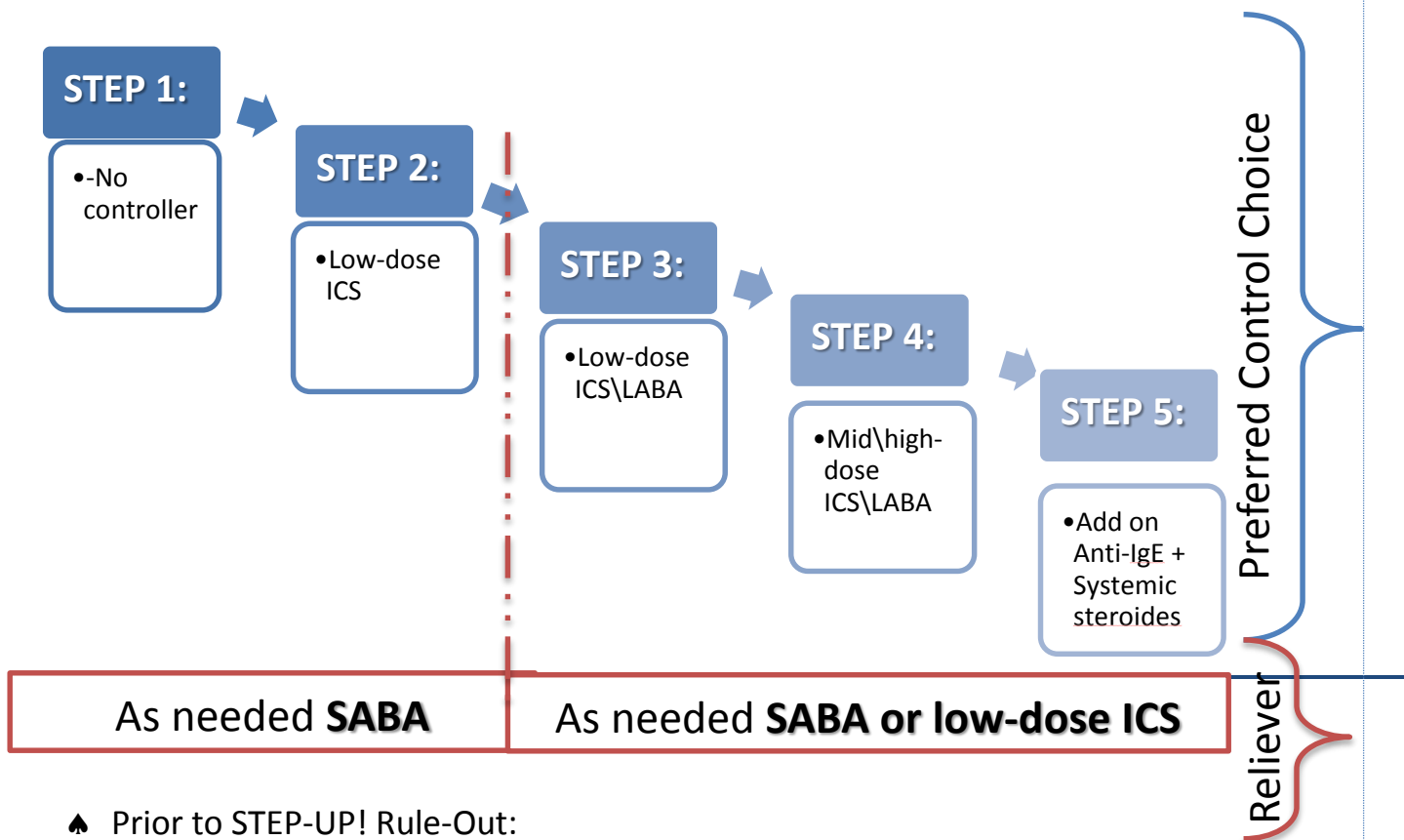
## Management Of Asthma:

Goals: Symptom Control and Risk reduction

### 1-Pharmacological:

#### A) Severity Assessment (Stepwise approach):

**SABA:** Short-acting beta2 agonist  
**LABA:** Long-acting beta2 agonist  
**ICS:** Inhaled corticosteroids



- ♣ Prior to STEP-UP! Rule-Out:
  - Incorrect inhaler technique
  - Poor adherence
  - Modifiable risk factors, Smoking
- ♣ Review response after 2-3 months
- ♣ Consider STEP-DOWN if symptoms controlled for 3 months




## B) Rescue Management:

### 1-Assess

	<i>Mild\Moderate</i>	<i>Severe</i>	<i>Life threatening</i>
<i>Talking</i>	Phrases	Words	Drowsy Confused Silent Chest
<i>Agitated</i>	No	Yes	
<i>Position</i>	Sitting\lying	Sit in forward	
<i>RR</i>	High	> 30\min	
<i>Pulse</i>	100-120 bpm	>120 bpm	
<i>Accessory muscle</i>	Not used	In use	
<i>O2 Sat</i>	90-95%	<90%	
<i>FEV1</i>	>50%	<=50%	

### 2-Treat

<i>Mild\Moderate</i>	<i>Severe and Life threatening</i>
<ul style="list-style-type: none"> <li>✓ SABA</li> <li>✓ Oral Prednisolone</li> <li>✓ O2</li> </ul>	<p>TRANSFER TO ACUTE CARE FACILITY!!!</p> <p>.....WHILE WAITING.....</p> <ul style="list-style-type: none"> <li>✓ Inhaled SABA</li> <li>✓ Systemic Corticosteroids</li> <li>✓ O2</li> <li>✓ Ipratropium bromide</li> </ul>



## 2-Non-Pharmacological:

### Patient education:

Patient education is an important step in any management plan.

*You need to explain to the patient:*

- What is asthma?
- What are **triggers**? How to **avoid** them?
- How to **use inhalers**? When to use them?
- What are **Side effects** of medications?
- What are the **benefit** from the medications?

### What's the difference between controller and reliever?

- **Controller:** They are medications taken daily on a long-term basis to keep asthma **under clinical control** mainly through their **anti-inflammatory** effects.
- **Reliever:** They are medications used on an "as-needed basis" that act **quickly** to reverse bronchoconstriction and relieve symptoms.

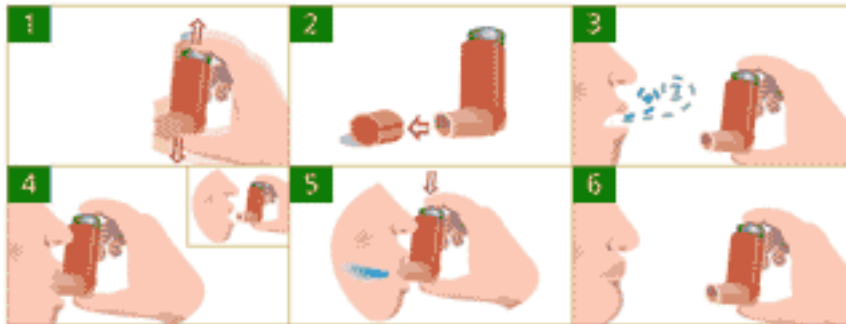
### Types Of Asthma Inhalers:

- ◆ Metered dose inhalers (with or without spacer).
- ◆ Metered dose inhaler with a face mask.
- ◆ Dry powder inhaler.
- ◆ Nebulizer.

### How to use Metered Dose Inhaler?

1. Shake the inhaler well before use (3 or 4 shakes).
2. Remove the cap.
3. Breathe out, away from your inhaler.
4. Bring the inhaler to your mouth. Place it in your mouth between your teeth and close your mouth around it.
5. Start to breathe in slowly. Press the top of you inhaler once and keep breathing in slowly until you have taken a full breath.
6. Remove the inhaler from your mouth, and hold your breath for about 10 seconds, then breathe out.

If you need a second puff, wait 30 seconds, shake your inhaler again, and repeat steps 3-6. After you've used your MDI, rinse out your mouth and record the number of doses taken.



### **How to use Dry Powder Inhaler?**

1. Remove all candy, food or gum from your mouth.
2. Stand up straight.
3. Hold the inhaler level to the floor.
4. Open the inhaler with the mouthpiece facing you.
5. Slide the lever away from you until you hear it click. This means the medicine has been released. Be careful not to tip the inhaler or slide the lever again; the medicine will fall out and it will be wasted.
6. Take a deep breath in and breathe out.
7. Place the inhaler in your mouth, seal your lips tightly around it and take a quick, deep breath in.
8. Hold your breath for 10 seconds, and then breathe out.
9. Rinse your mouth with water and spit water out.

### **Outcomes of asthma education program:**

1. Creation of partnership between the patient and the healthcare worker.
2. Understanding clinical presentation of asthma and methods of diagnosis.
3. Ability to differentiate between “relievers” and “controllers” medications and their appropriate indications.
4. Recognition of potential side effects of medications and the appropriate action to minimize them.
5. Performance of the proper technique of different inhaler devices.
6. Identification of symptoms and signs that suggest worsening of asthma and the appropriate action to be taken. (Asthma Action Plan).

# Asthma Action Plan

## Asthma Action Plan

For: \_\_\_\_\_ Doctor: \_\_\_\_\_ Date: \_\_\_\_\_  
 Doctor's Phone Number: \_\_\_\_\_ Hospital/Emergency Department Phone Number: \_\_\_\_\_

GREEN ZONE	Take these long-term control medicines each day (include an anti-inflammatory).		
Doing Well	Medicine	How much to take	When to take it
<ul style="list-style-type: none"> <li>No cough, wheeze, chest tightness, or shortness of breath during the day or night</li> <li>Can do usual activities</li> </ul> <p><b>And, if a peak flow meter is used,</b></p> <p><b>Peak flow:</b> more than _____ (80 percent or more of my best peak flow)</p> <p>My best peak flow is: _____</p>	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	Before exercise	<input type="checkbox"/> _____ <input type="checkbox"/> 2 or <input type="checkbox"/> 4 puffs _____	5 minutes before exercise

YELLOW ZONE	Asthma Is Getting Worse	
<ul style="list-style-type: none"> <li>Cough, wheeze, chest tightness, or shortness of breath, or</li> <li>Waking at night due to asthma, or</li> <li>Can do some, but not all, usual activities</li> </ul> <p><b>-Or-</b></p> <p><b>Peak flow:</b> _____ to _____ (50 to 79 percent of my best peak flow)</p>	<p><b>First</b> Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.</p> <p>_____ <input type="checkbox"/> 2 or <input type="checkbox"/> 4 puffs, every 20 minutes for up to 1 hour  <small>(short-acting beta<sub>2</sub>-agonist)</small> <input type="checkbox"/> Nebulizer, once</p> <p><b>Second</b> If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:</p> <p><input type="checkbox"/> Continue monitoring to be sure you stay in the green zone.</p> <p><b>-Or-</b></p> <p>If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:</p> <p><input type="checkbox"/> Take: _____ <input type="checkbox"/> 2 or <input type="checkbox"/> 4 puffs or <input type="checkbox"/> Nebulizer  <small>(short-acting beta<sub>2</sub>-agonist)</small></p> <p><input type="checkbox"/> Add: _____ mg per day For _____ (3–10) days  <small>(oral steroid)</small></p> <p><input type="checkbox"/> Call the doctor <input type="checkbox"/> before/ <input type="checkbox"/> within _____ hours after taking the oral steroid.</p>	

RED ZONE	Medical Alert!	
<ul style="list-style-type: none"> <li>Very short of breath, or</li> <li>Quick-relief medicines have not helped, or</li> <li>Cannot do usual activities, or</li> <li>Symptoms are same or get worse after 24 hours in Yellow Zone</li> </ul> <p><b>-Or-</b></p> <p><b>Peak flow:</b> less than _____ (50 percent of my best peak flow)</p>	<p><b>Take this medicine:</b></p> <p><input type="checkbox"/> _____ <input type="checkbox"/> 4 or <input type="checkbox"/> 6 puffs or <input type="checkbox"/> Nebulizer  <small>(short-acting beta<sub>2</sub>-agonist)</small></p> <p><input type="checkbox"/> _____ mg  <small>(oral steroid)</small></p> <p><b>Then call your doctor NOW.</b> Go to the hospital or call an ambulance if:</p> <ul style="list-style-type: none"> <li>You are still in the red zone after 15 minutes AND</li> <li>You have not reached your doctor.</li> </ul>	

**DANGER SIGNS**  Trouble walking and talking due to shortness of breath  Take  4 or  6 puffs of your quick-relief medicine AND  
 Lips or fingernails are blue  Go to the hospital or call for an ambulance \_\_\_\_\_ NOW!  
(phone)

## Exercise-induced Asthma:

- Exercise-induced asthma occurs when the airways narrow as a result of exercise. The preferred term for this condition is exercise-induced bronchoconstriction (EIB).
- Typical symptoms are shortness of breath, chest tightness, and cough which develop 10 to 15 minutes after exercise and resolve with rest over 30 to 60 minutes.
- Preventing usually include use of an inhaled medication. Several options are available as:
- Rapid-acting bronchodilator may be taken approximately 10 minutes before exercise.

## **COPD:**

Chronic obstructive pulmonary disease represents a spectrum of abnormalities from emphysema to chronic bronchitis.

**COPD affects both the airways and the parenchyma, whilst asthma affects only the airways.**

### **How to diagnose a COPD patient and differentiate them from a bronchial asthma patient?**

**1- A *history*** of heavy smoking and a chronic productive cough and elderly.

#### **2- *Physical examination***

- a- Inspection (barrel-shaped chest; with increased antero-posterior diameter)
- b- Palpation (reduced expansion with the hyper-inflated chest )
- c- Breath sounds (decreased with early inspiratory crackles)
- d- Wheeze is often absent.

**3- *PFT (spirometry)***: it is a definitive diagnostic method.

\*decreased FEV1 and FEV1/FVC ratio ; if FEV1 is reduced to 70%, mild disease is suggested , if FEV1 is reduced to 50%, severe disease is suggested.

\*increase TLC and residual volume (indicating air trapping)

### **Management of COPD:**

COPD therapy is directed primarily to the relief of symptoms and the prevention of disease progression.

- 1-Smoking cessation.
- 2-Oxygen therapy
- 3-Inhaled B2 agonists (like Salmeterol).
- 4-Inhaled anti-cholinergic (like ipratropium bromide)
- 5- A combination of B2-agonist and anti-cholinergic
- 6-Inhaled corticosteroid (fluticasone)

## History of Asthma Items

- **Introduction:**
  - Greeting and Introducing oneself
  - Patient's personal information: name, age
  - Identify reason for consultation
  - Avoids interruption
- **Gathering information:**
  - The use of Open questions
  - Symptoms: Cough - Sputum – Wheezing (Detailed Hx if +ve)
  - Night Symptoms
  - Severity
  - Triggers (Dust, Animal, exertion)
  - Similar episode before
  - Red flags, e.g. Hemoptysis
  - Constitutional symptoms: fever, weight loss, appetite
  - Family History
  - Past Medical, Surgical and Hospitalization Hx
  - Medications (NSAIDS, ASA, ... etc)
  - Correct inhaler technique
  - Times of inhaler use per week (how many or how frequent)
  - Emergency visits/Last follow up
  - Social Hx (Smoking, Alcohol and Allergies)
  - Work exposure
- **Explore patients ideas, concerns and expectations regarding Asthma**
- **Review of Systems**
- **Summarizes appropriately**

## Resources:

- Medscape Reference: <http://emedicine.medscape.com/article/296301-workup#c1>
- Uptodate: <http://www.uptodate.com/contents/asthma-symptoms-and-diagnosis-in-children-beyond-the-basics#H11>
- <http://www.uptodate.com/contents/diagnosis-of-asthma-in-adolescents-and-adults>
- <http://www.uptodate.com/contents/exercise-induced-asthma-beyond-the-basics>
- [http://www.uptodate.com/contents/trigger-control-to-enhance-asthma-management?source=search\\_result&search=asthma+triggers&selectedTitle=1~47](http://www.uptodate.com/contents/trigger-control-to-enhance-asthma-management?source=search_result&search=asthma+triggers&selectedTitle=1~47)
- <http://www.cdc.gov/asthma/triggers.html>
- Davidson's Principles and Practice of Medicine – 22nd Edition
- [GINA guidelines](#)
- Article: Airway disease: similarities and differences between asthma, COPD and bronchiectasis
- Nicholas J Tally and Simon O'Conner, clinical examination book.
- **Saudi Thoracic Society**
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## Questions

- 1) **Findings in chest examination of asthmatic patient?**
  - a. Dull percussion, deviated trachea and wheezing
  - b. Resonant percussion, central trachea and wheezing
  - c. Resonant percussion, deviated trachea and wheezing
  - d. Resonant percussion, deviated trachea
  
- 2) **The best method of Oxygen administration for a patient with COPD is?**
  - a. Simple face mask
  - b. Nasal cannula
  - c. Non re-breather mask
  - d. Partial re-breather mask
  
- 3) **A diagnosis of asthma can be made by?**
  - a. Low peak flow rate measured with peak flow meter
  - b. HRCT showing air trapping on expiration
  - c. An improvement of FEV1 after the use bronchodilator seen on spirometry
  - d. Peripheral blood eosinophilia



**4) Asthma patient came to the ER with acute exacerbation, he could not complete sentences and he was sitting in position. His O<sub>2</sub> Saturation was 90% and his RR was high. The appropriate management would be?**

- a. Short acting beta agonist
- b. Systemic Corticosteroids
- c. Oxygen
- d. All of the above

**5) What is the most common cause of chronic obstructive pulmonary disease (COPD)?**

- a. Chronic bronchitis
- b. Cigarette smoking
- c. Emphysema
- d. Asthma

**Answers:**

1st Question:B

2nd Question:B

3rd Question:C

4th Question:D

5th Question:B