

Bronchial Asthma

By Dr. Zahoor

Bronchial Asthma

- Bronchial Asthma is reversible obstructive lung disease
- It may be due to chronic air way inflammation and increased air way hyper-responsiveness

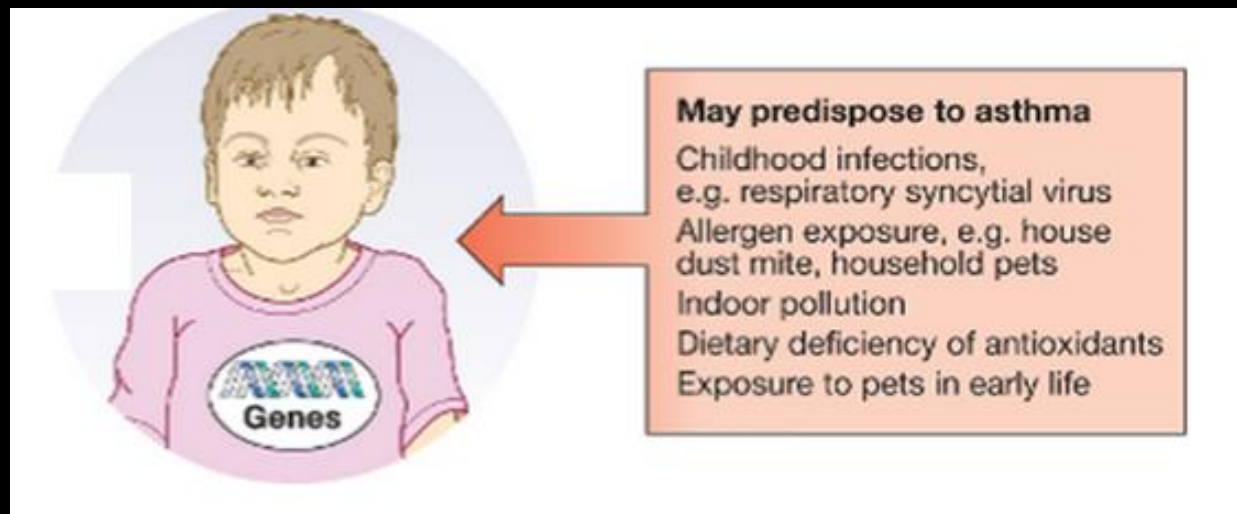
Bronchial Asthma

- Typical symptoms of bronchial asthma include
 - Wheeze
 - Cough
 - Chest tightness
 - Dyspnea
 - Air flow obstruction that is variable over short periods of time or is reversible with treatment

Bronchial Asthma

Epidemiology

- Bronchial Asthma affects 300 million people world wide
- Genetic and environmental factors are important



Factors implicated in development of asthma

Bronchial Asthma

Pathophysiology

- Airway hyper-reactivity (AHR) – means tendency of airways to contract too easily in response to triggers that have little or no effect in normal person
- In chronic asthma – remodeling of airway occurs, leading to fibrosis of the airway wall, fixed narrowing of airway .

Bronchial Asthma

Pathophysiology (cont)

- Relationship between IgE and bronchial asthma is well established
- Allergen inhalation is followed by broncho - constriction
E.g. Inhalation of house dust mites, pets e.g. cats, dogs, pests such as cockroaches and fungi (aspergillus)

Bronchial Asthma

Pathophysiology (cont)

- Allergic mechanism are also responsible in some cases of occupational asthma
- Aspirin sensitive asthma – due to production of leukotrienes

Bronchial Asthma

Pathophysiology (cont)

Exercise induced asthma

- Hyper ventilation results in water loss from respiratory mucosa, dehydration of airways, which triggers release of Leukotrienes from mast cell , which causes broncho constriction.

Bronchial Asthma

Drugs causing Bronchial Asthma

- β -blockers – given orally or even eye drops
- Aspirin
- NSAIDS
- Oral contraceptive pill
- Cholinergic agents
- Prostaglandin F_2

Bronchial Asthma

Clinical Features

Typical symptoms include

- Recurrent episodes of wheeze
- Chest tightness
- Breathlessness
- Cough

Bronchial Asthma

Churg-Struss Syndrome

- Bronchial asthma with systemic and pulmonary Vasculitis
- Eosinophilia ($> 1000/\text{mm}^3$) – Absolute count .
OR Eosinophil $> 10\%$ in peripheral blood.
- Systemic Vasculitis in small vessel associated with purpura, mononeuritis multiplex
- Rarely diffuse alveolar hemorrhage

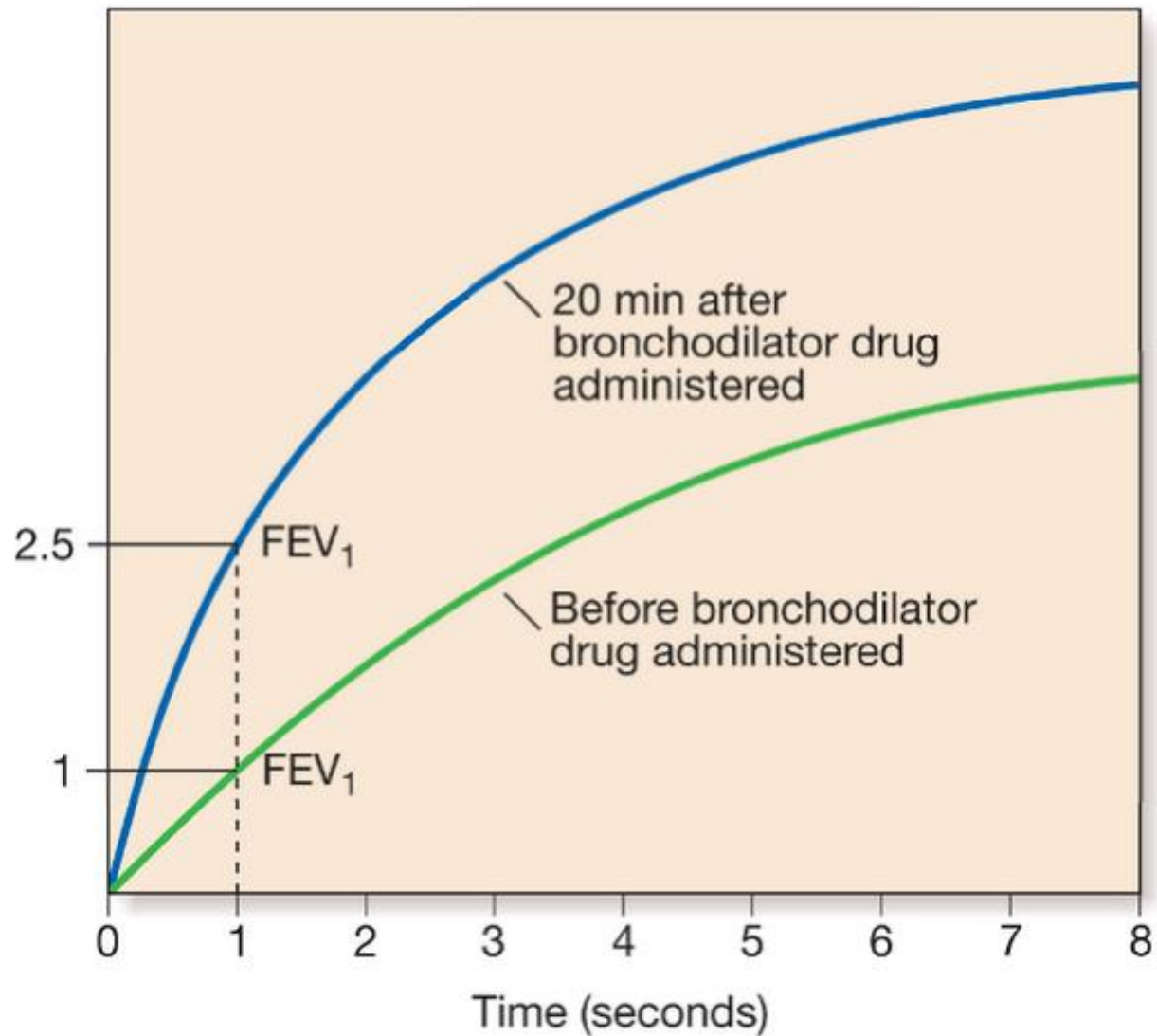
Bronchial Asthma

Diagnosis

- Diagnosis is mainly clinical based on history and examination
- Supportive evidence is provided by
 - Spirometry – FEV₁ is reduced than normal and there is $\geq 15\%$ increase in FEV₁ following administration of broncho dilator

Reversibility Test

Volume expired (L)

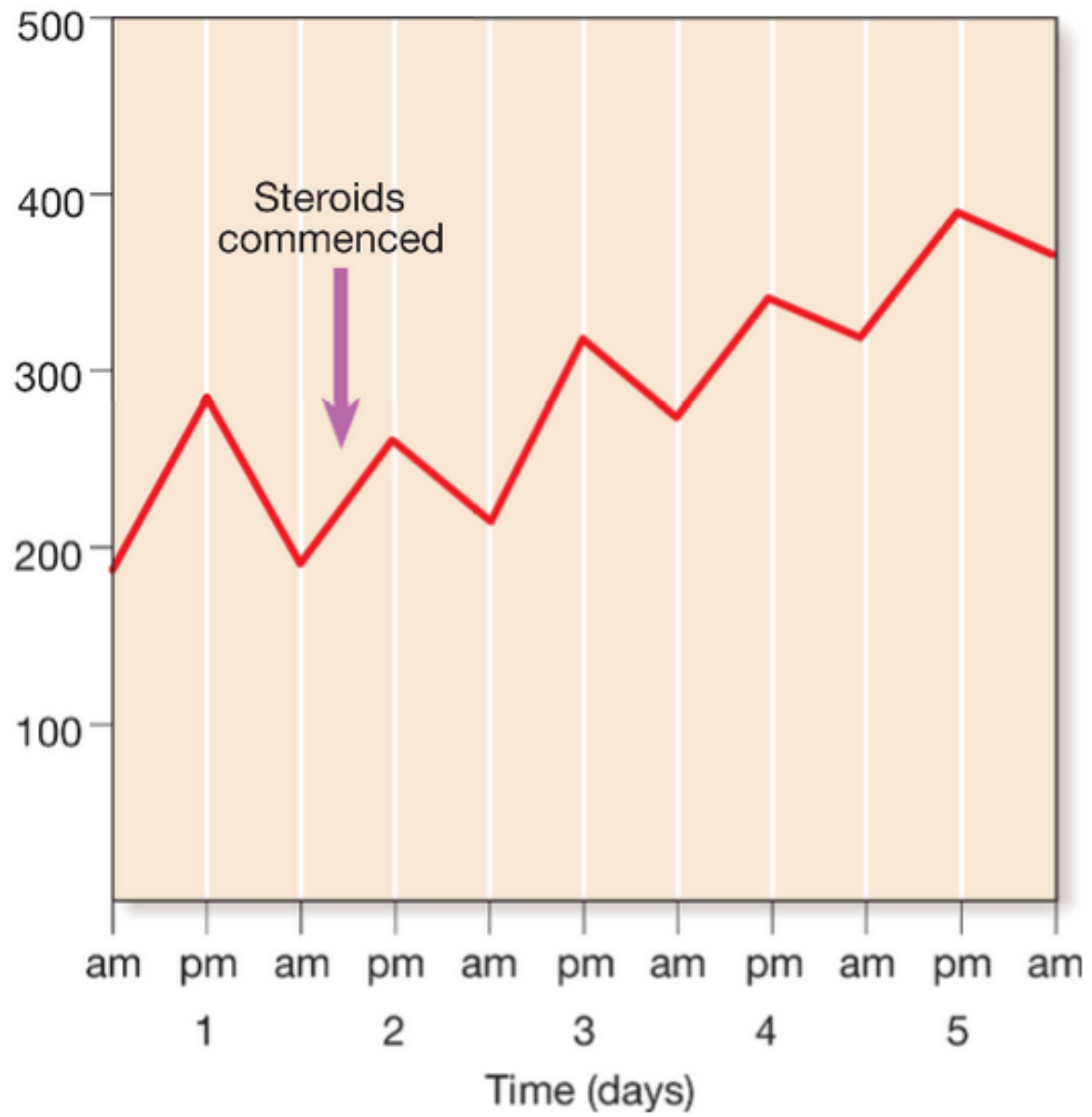


Bronchial Asthma

2- Peak Flow Meter at Home

- Patients are advised to record peak flow reading after arising in the morning and before retiring in the evening
- PEF (Peak Expiratory Flow) if reduced more than 20% in the morning is considered diagnostic of bronchial asthma

Peak flow (L/min)



Serial Recording of PEF in Patient with Asthma

Bronchial Asthma

Other useful test

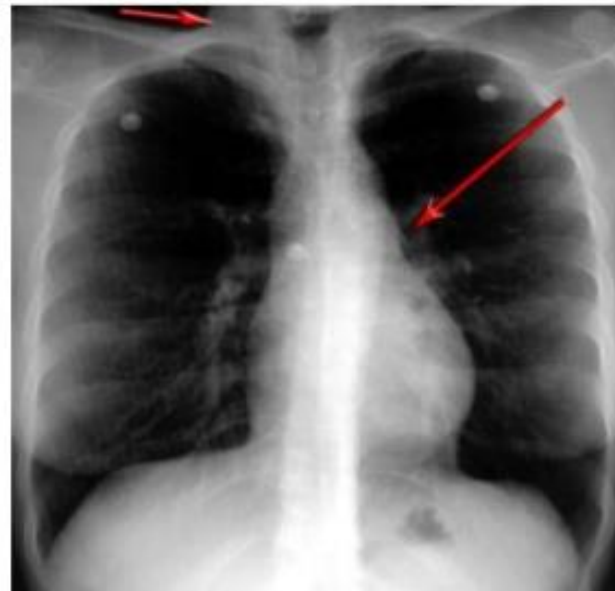
- Allergic status – skin prick test
- IgE measurement
- Blood CBC – may show increase Eosinophil count ,
- Radiological examination – normal or hyperinflation of lung fields

CHEST X-RAY

NORMAL



ASTHMA
(HYPERINFLATION)



Bronchial Asthma

Management

- Bronchial asthma is chronic condition

Aim of treatment is to obtain sustained complete control

- Control means
 - no symptoms during the day .
 - No nocturnal symptoms
 - No limitation of activities
 - Lung function test normal
 - No exacerbation

Bronchial Asthma

Management

- Patient should be encouraged to manage their own disease.

How ?

- By monitoring PEF (Peak Expiratory Flow) at home to guide their management
- Avoid aggravating factors like
avoid pet animal exposure, dust mite exposure by replacing carpets, eliminate cockroaches, stop smoking, avoid medicine which precipitate



Peak Flow Meter

Stepwise Approach To the Management of Asthma

Step 1

- Occasional use of inhaled short acting β_2 adrenoreceptor agonist – Broncho dilator eg ventolin

For whom ?

- For patients with mild intermittent asthma symptoms less than once a week .



- Remove the cap and shake the inhaler
- Breathe out gently and place the mouthpiece into the mouth
- Incline the head backwards to minimise oropharyngeal deposition
- Simultaneously, begin a slow deep inspiration, depress the cannister and continue to inhale
- Hold the breath for 10 seconds

How to use a metered dose inhaler

Stepwise Approach To the Management of Asthma (cont)

Step 2

- Introduction of regular prevention therapy
- Regular therapy with inhaled corticosteroids (ICS) such as beclometasone in addition to inhaled β_2 agonist is taken on required basis

For whom ?

- Patients who have mild persistent asthma

Stepwise Approach To the Management of Asthma

Step 3

- If patient remains poorly controlled on regular ICS (inhaled Corticosteroid), then add inhaled long acting β_2 agonist (LABA) salmeterol, still not controlled add oral salbutamol

Step 4

- If still poor control, give high dose inhaled corticosteroid plus inhaled long acting β_2 agonist , plus add oral therapy with leukotrine receptor antagonist e.g. montelukast (Singulair) or add theophylline .

Step 5- Severe symptoms , deteriorating

- Add prednisolone 40 mg daily to step 4. OR I/V Corticosteroids may be required.

Stepwise Approach To the Management of Asthma

What are leukotrienes ?

- Leukotrienes are inflammatory mediators of asthma, produced by leucocyte/ mast cells .
- Leukotrine cause bronhoconstriction .

What are Antileukotrine agents ?

- These are drugs which function as leukotrine receptor antagonist e.g. montelukast

OR

- leukotrine enzyme inhibitor – 5 lipooxygenase inhibitor like zileuton



19.23 Asthma in pregnancy

- **Unpredictable clinical course:** one-third worsen, one-third remain stable and one-third improve.
- **Labour and delivery:** 90% have no symptoms.
- **Safety data:** good for β_2 -agonists, inhaled steroids, theophyllines, oral prednisolone, and chromones.
- **Oral leukotriene receptor antagonists:** no evidence that these harm the fetus and they should not be stopped in women who have previously demonstrated significant improvement in asthma control prior to pregnancy.
- **Steroids:** women on maintenance prednisolone > 7.5 mg/day should receive hydrocortisone 100 mg 6–8-hourly during labour.
- **Prostaglandin F₂ α :** may induce bronchospasm and should be used with extreme caution.
- **Breastfeeding:** use medications as normal.
- **Uncontrolled asthma represents the greatest danger to the fetus:** Associated with maternal (hyperemesis, hypertension, pre-eclampsia, vaginal haemorrhage, complicated labour) and fetal (intrauterine growth restriction and low birth weight, preterm birth, increased perinatal mortality, neonatal hypoxia) complications.

Exacerbation of Asthma

- Exacerbation are characterized by increased symptoms, deterioration in lung function, PEF<60% of patient's best recording
- Exacerbation are precipitated by
 - Viral infection
 - Pollen
 - Air pollution
- Management – short course of oral prednisolone 30-60mg/day

Management of Acute Severe Asthma

What is acute severe asthma ?

- The features of acute severe asthma are
 - Respiratory rate $\geq 25/\text{min}$
 - Heart rate $\geq 110/\text{min}$
 - Inability to complete sentence in 1 breath
 - PEF 33-50% predicted ($< 200\text{L}/\text{min}$)

Life Threatening Features of Acute Severe Asthma

- Silent chest
- Cyanosis
- Feeble respiratory effort
- Bradycardia or arrhythmias
- Hypotension
- PEF < 33% predicted (<100 L/min)
- SpO₂ < 92% or PaO₂ < 8 kPa (60mmHg)
- Exhaustion
- Coma

Management of Acute Severe Asthma

Treatment

- Oxygen – high concentration of oxygen to maintain oxygen saturation above 92%
- Inhaled Broncho dilator – β_2 agonist e.g. ventolin via Nebulizer
 - Apratropium bromide (Atrovent) – anticholinergic drug, should be added to ventolin
 - Systemic corticosteroid – oral or intravenous
- IV fluids

Monitoring of Acute Severe Asthma

Treatment

- PEF should be recorded 15-30mins initially and then every 4-6 hours
- Pulse oxymetry – SaO₂ should remain > 92%
- Arterial blood gases to be monitored

Indications for assisted ventilation in Acute Severe Asthma

- Respiratory arrest
- Coma
- Deterioration of Arterial blood gas tensions despite therapy
- $\text{PaO}_2 < 8 \text{ kPa}$ (60mmHg) and falling
- $\text{PaCO}_2 > 6 \text{ kPa}$ (50 mmHg) and rising
- pH low and falling (H^+ high and rising)
- Exhaustion, confusion, drowsiness

Acute Bronchial Asthma

Prognosis

- Outcome of acute severe asthma is good. Death is rare
- Death can occur when failure to recognize the severity of attack by physician or the patient

Acute Severe Bronchial Asthma

When to discharge the patient who is admitted with severe acute asthma

- Nebulized therapy has been stopped for at least 24 hours
- Peak expiratory flow (PEF) has reached 75% of predicted value
- Give follow up appointment with GP within two days and specialist hospital in a month

Occupational Asthma



19.26 Occupational asthma

Most frequently reported causative agents

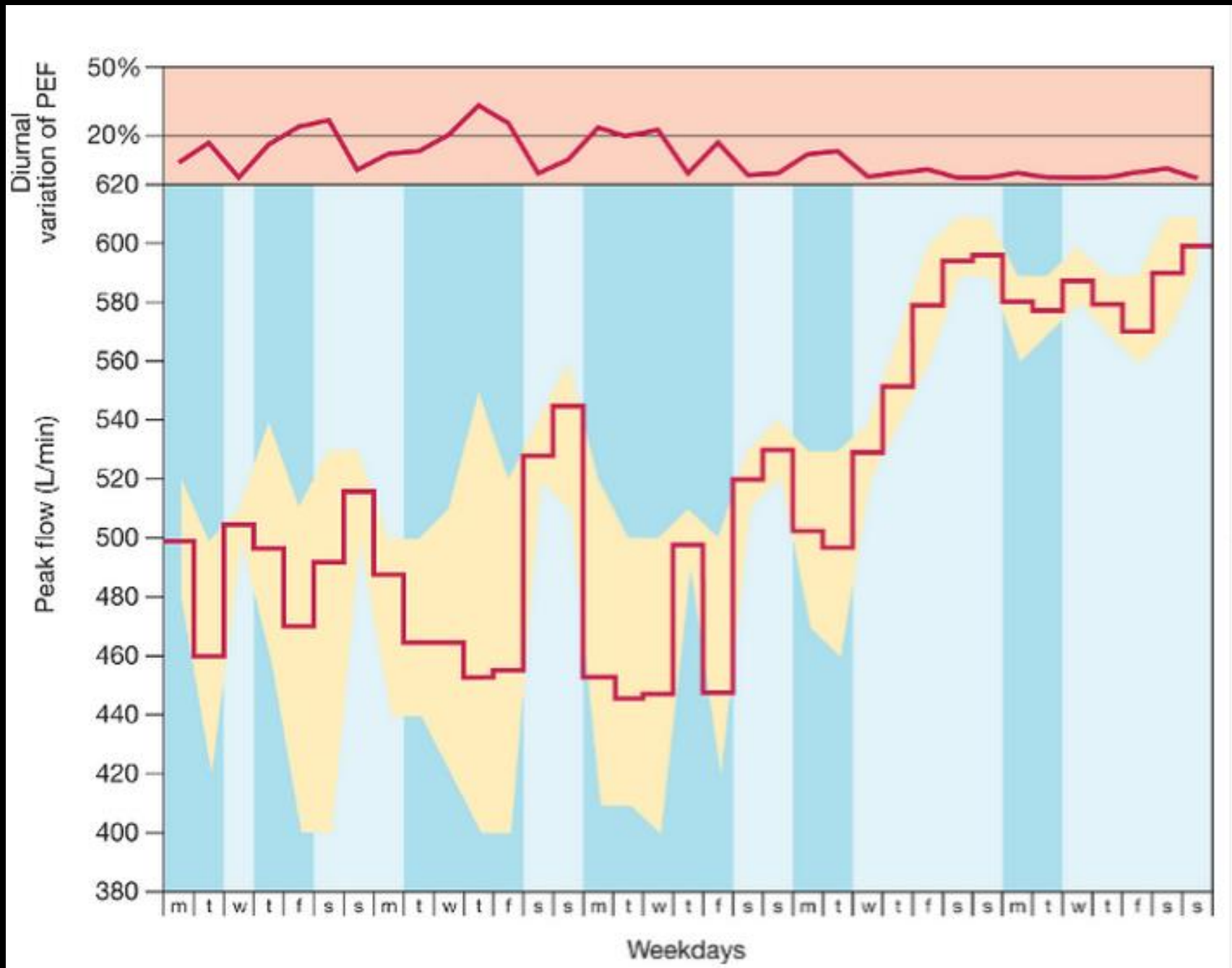
- Isocyanates
- Flour and grain dust
- Colophony and fluxes
- Latex
- Animals
- Aldehydes
- Wood dust

Workers most commonly reported to occupational asthma schemes

- Paint sprayers
- Bakers and pastry-makers
- Nurses
- Chemical workers
- Animal handlers
- Welders
- Food processing workers
- Timber workers

How to Diagnose Occupational Asthma?

- Record PEF- 2 hourly
- Skin prick test
- Specific IgE test
- Bronchial provocation test with suspected agent



Peak Flow Reading in Occupational Asthma

CASE HISTORY – An asthmatic patient with dyspnoea and wheeze

A 25 year old male with long standing asthma is admitted with 2 days history of dyspnoea and wheeze. He has been unable to sleep because of cough and wheeze and his inhalers have run out. On examination, he appears dyspnoeic at rest, his respiratory rate is 28/min and oxygen saturation on air is 90%. There is reduced but equal expansion of chest with audible wheeze. There is no evidence of Pneumothorax clinically or on X-ray chest. Patient is given a nebulizer and put on 60% oxygen.

Arterial blood gases show

pH	7.53
PaO ₂	11kPa
PaCO ₂	3.5kPa
HCO ₃	20mmol/L
SaO ₂	96%

Questions:

1. Which of the following does the patient have?
 - a. Acute respiratory acidosis
 - b. Acute respiratory alkalosis
 - c. Acute metabolic acidosis
 - d. Acute metabolic alkalosis

2. Which of the following is true?
 - a. Patient is hypoxemic
 - b. Patient requires intubation
 - c. Oxygen should be reduced as pH is abnormal
 - d. Patient should be given steroids

3. Patient did not improve and appears more drowsy and no wheeze is audible. Repeat blood gas pH 7.22, PaO₂ 10.5kPa, PaCO₂ 10.1kPa, HCO₃ 26mmol/L, SaO₂ 90%. Which of the following may the patient has developed?
 - a. Acute respiratory acidosis
 - b. Acute respiratory alkalosis
 - c. Acute metabolic acidosis
 - d. Acute metabolic alkalosis

Answers:

Answer to Question 1:

b. Acute respiratory alkalosis
pH is above 7.45 (alkalosis) and PaCO₂ is low

Answer to Question 2:

d. Patient should be given steroids.
Steroids will treat underlying Bronchospasm

Answer to Question 3:

a. Acute respiratory acidosis
Because muscle pump has exhausted due to increased work of breathing. Patient requires intubation and mechanical ventilation

Thank you