Bronchial Asthma

presented by

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Expert Panel 2

Def.

National Asthma Education & Prevention Program USA 1997

5 Components

1. Nature of disease
2. Cardinal features
3. Reversible obstruction in pulmonary function test
4. Hyperresponsiveness to multiple stimuli
5. Causes of persistent asthma

1

Def. Nature of disease

- Chronic inflammatory disorder of airways
- Cellular elements which play role
  - Mast cells
  - Eosinophils
  - T-lymphocytes
  - Macrophages
  - Neutrophils
  - Epithelial cells

2

Def. Cardinal features

- Susceptible individual
- Recurrent
  - Wheezing
  - Breathlessness
  - Chest tightness
  - Coughing
- Marked at night and early morning

3 Def. Reversible obstruction of pulmonary function

- Widespread, variable airflow obstruction
- Reversible either spontaneously or drugs

4

Def.

Hyperresponsiveness to multiple stimuli

- Increase existing bronchial hyperresponsiveness
- To a variety of stimuli

5 Def.

Causes of persistent asthma

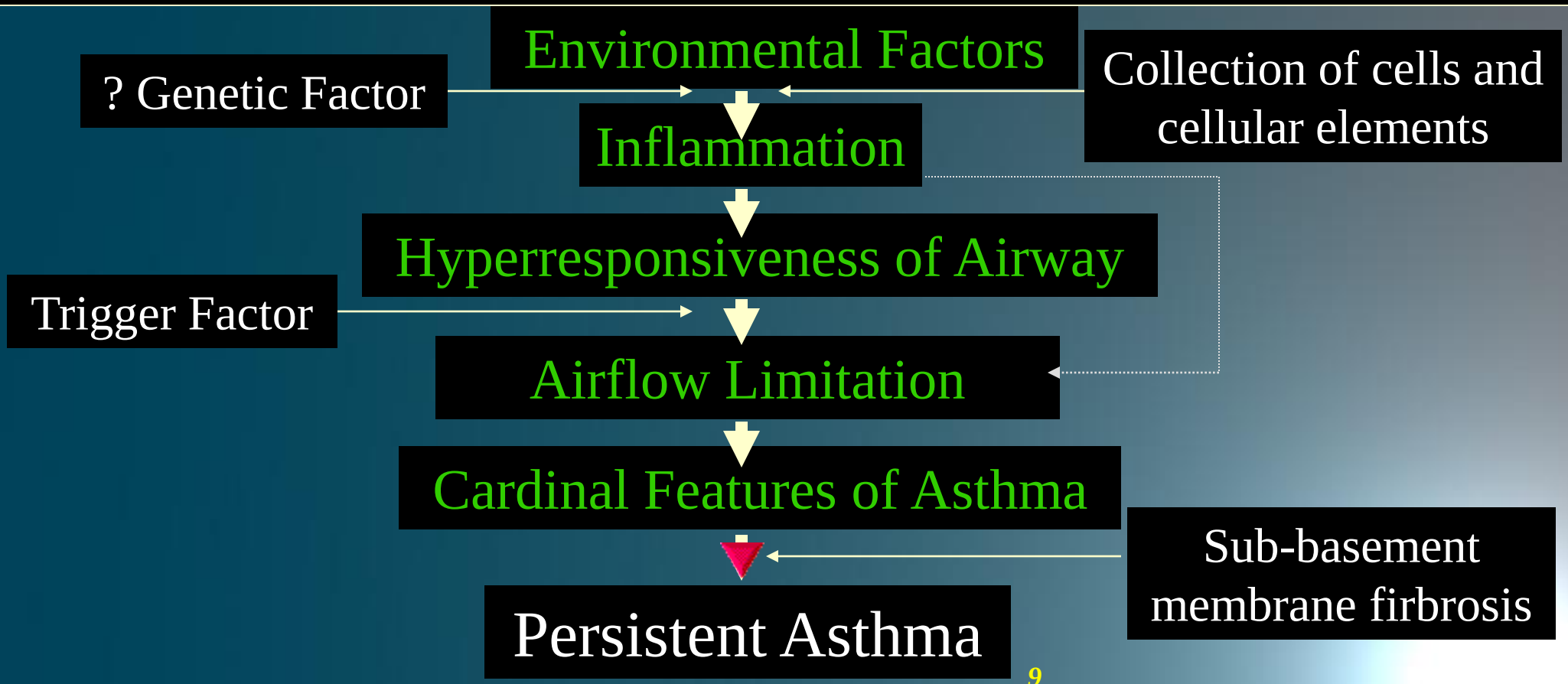
- Sub-basement membrane fibrosis
- Persistent abnormalities of lung function

Definition summarized

Asthma is a chronic inflammatory  disorder causing hyperresponsiveness of airways to certain stimuli resulting in recurrent variable airflow limitation, at least partly reversible, presenting as *w*heezing, *b*reathlessness *C*hest *t*ightness and *C*oughing.

Definition

Flow Chart



Prevalence

- Globally - 100 million
- Bangladesh
  - About 7 million
    - According to NAPS study
- Directly related to
  - Exposure to allergens
  - Smoking, air pollution
  - Infection, diet, overall nutrition.

Common Triggers

- Allergens
  1. Outdoor allergen
  2. Indoor allergens
  3. Food allergen
- Irritants
- URTI: viral, bacterial
- Exercise
- Certain drugs
- Changes in season, weather and temperature
- Stress

Expert Panel 2

National Asthma Education & Prevention Program USA 1997

Classification of Asthma

- Intermittent asthma
- Persistent asthma
  - Mild
  - Moderate
  - Severe
- Acute exacerbation
  - Mild
  - Moderate
  - Severe
- Special variants
  - Seasonal
  - Exercise induced
  - Drug induced
  - Cough variant
  - Occupational

Diagnostic Criteria in Adults

- Cardinal features
  - Paroxysmal respiratory distress
  - Recurrent cough
  - Wheeze
  - Chest tightness
- Recurrent attacks due to multiple stimuli
- Features of eosinophilic inflammation
- PET : obstructive defect, partially reversible by drugs

Differential Diagnosis

- COPD
- CCF
- Pulmonary eosinophilia
- Mechanical obstruction by tumor
- Pulmonary tuberculosis
- Interstitial lung disease
- Bronchiectasis
- Gastro-esophageal reflux disease
- Post-nasal drip syndrome

Why Do We Investigate?

- Classification and assessment of severity
- Diagnosis of concomitant illness
- Exclusion of differential diagnosis

Basic Investigations For all Patients

1. Blood for TC, DC, ESR, Hb% & TCE
2. Sputum for AFB and eosinophils
3. CXR P/A view
4. Pulmonary Function Test

After 40 yrs

i) Blood glucose

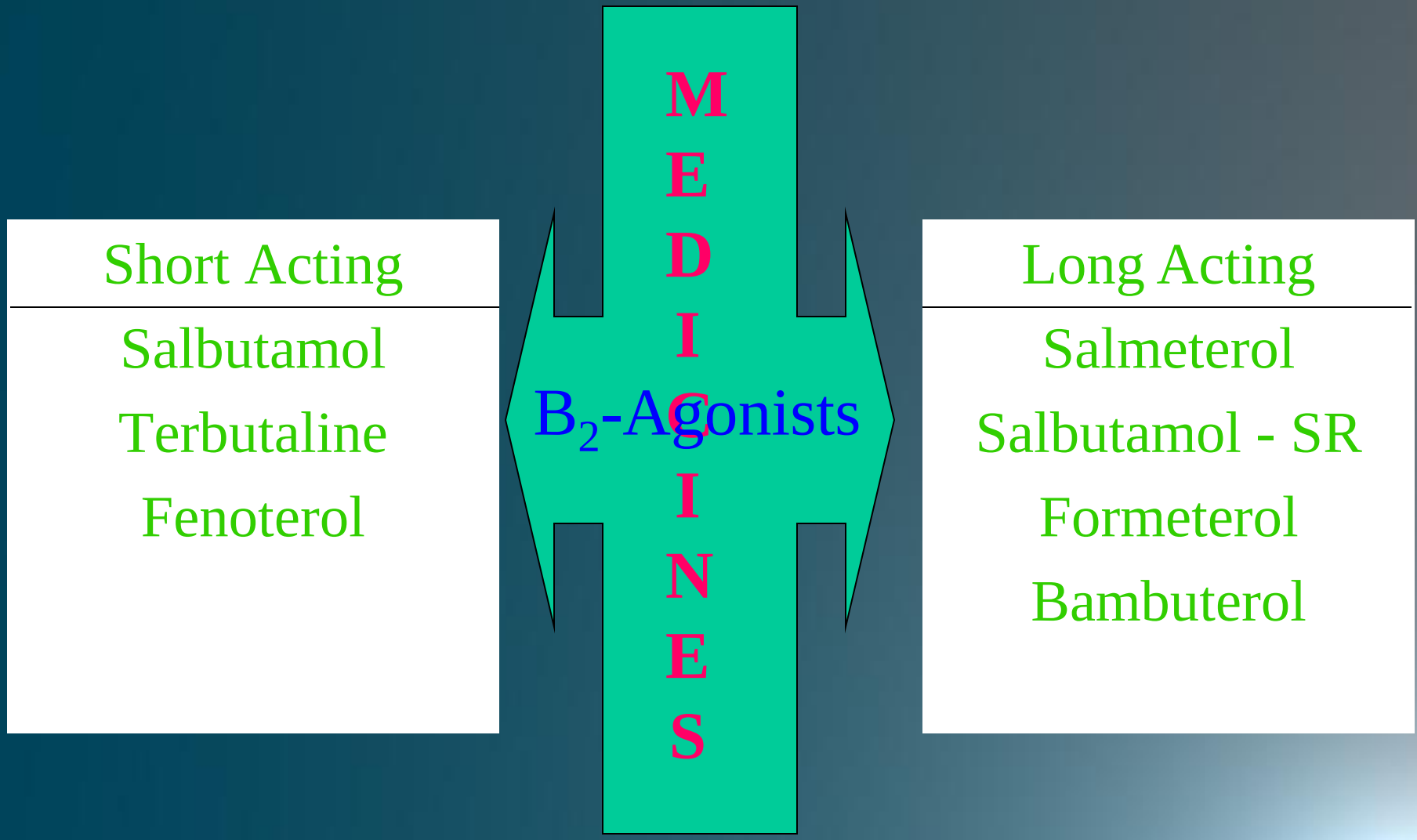
ii) ECG and echocardiograph

Bronchial Responsiveness

- Broncho-provocation tests
  - Fall of FEV_1 > 20%
  - After inhalation: methacholine/hypertonic saline
- Exercise challenge test
  - Fall of FEV1 or PEFR≥ 15% after vigorous exercise

Medicines

- Relievers: Bronchodilators
  - Short acting beta-agonist
  - Short acting aminophylline
  - Ipratropium
- Preventors: Anti-inflammatory
  - Steroids
  - Cromons
  - Anti-leukotrienes
- Protectors: Symptom controllers
  - Salmeterol, Bambuterol
  - Long acting theophylline
  - Sustained release salbutamol


Short Acting
Salbutamol
Terbutaline
Fenoterol
MEDICINES
B_2-Agonists
Long Acting
Salmeterol
Salbutamol - SR
Formeterol
Bambuterol

MEDICINES
Xanthines Derivatives

1 Theophylline

2 Aminophylline

3 Enprophylline

Medicine

Anticholinergics

types

Ipratropium

Oxitropium

Triotropium

Atropine

Medicine

Cromones

1. Nedocromil sodium
2. Sodium cromoglycate

Medicine

Corticosteroids

- Triamcinolone
- Beclomethasone
- Budesonide
- Fluticasone
- Prednisolone
- Dexamethasone
- Hydrocortisone
- Betamethasone

MEDICINES
Anti-leukotrienes

- Zafirlukast
- Montelukast

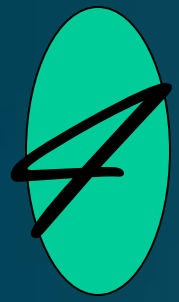
MEDICINES
Disease Modifying Agents

1. Methotrexate
2. Cyclosporine A
3. Gold salts

Asthma Management

- Goals of management
  1. Almost asymptomatic
  2. Can perform near normal activities
  3. Reliever bronchodiloator ≤once/day
  4. Diurnal Variability of peak flow ≤ 10%
  5. No nocturnal symptoms
  6. No emergency visit to doctors or hospital
  7. No or minimal side effects

Asthma Management



things

1. Step care management
2. Which step appropriate for specific patient
3. Self management plan
4. Rescue steroid therapy

Asthma Management

Step Care Management

Step-I : Inhaled short acting B_2 agonist as per need

Step-II : Low dose inhaled steroid (or other anti-inflammatory agents) + step-I

Step-III : High dose inhaled steroids/ low dose steroid & long acting inhaled B_2 agonist + Step-II

Step-IV : High dose inhaled steroid & regular bronchodilators + step-III

Step-V : Addition of regular oral steroid + Step-IV

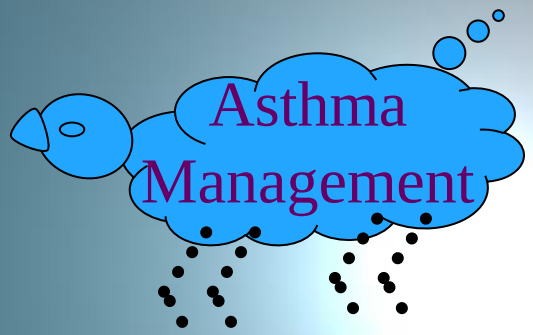
Step Care Management (Economic Schedule)

Step-I : Short acting B_2 against tablet/syrup

Step-II : Oral Plain Aminophyllin/Theophyllin
± Ketotifen + Step-I

Step-III : Oral plain aminophyllin/Theophyllin
+ Long acting Salbutamol + Step-II

Sept-IV: Oral steroid + Step-III



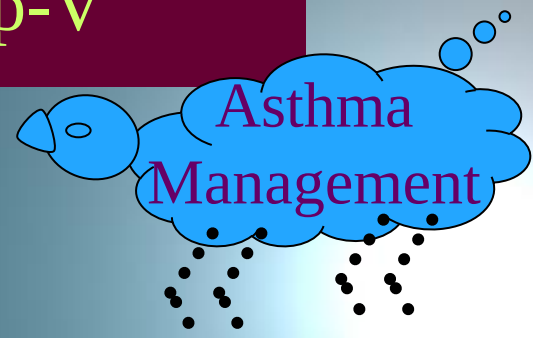
Step Care Management *scoring system*

Criteria	Score	
1. Dyspnoea every day?	Yes=1	No= 0
2. Nocturnal attack (>2 per mo.)	Yes=1	No= 0
3. Severe enough for steroid tab, nebulizer, aminophylline inj. hospital admission	Yes=1	No= 0
4. Dyspnoea ≥6 months Steroid tab ≥1 yr.	Yes=3	No= 0
5. Baseline PEFR<60%	Yes=1	No= 0

Step Care Management *scoring system*

5 years to adults

Score	Recommended Step
0	Step-I
1	Step-II
2	Step-III
3	Step-IVA
4	Step-IVB
5-7	Step-V



Asthma Management

Self Management Plan

Green Zone

- Safe zone
- PEFR – 80 – 100%
- Continue prescription

Red zone

- Zone of emergency
- PEFR ≤ 50%
- Start rescue steroid drugs
- Consult physician immediately

Yellow zone

- Zone of alert
- PEFR – <80 – >50%
- Double preventor drugs
- Add 1 / 2 protector drug

Asthma *Management*

Rescue Steroid Therapy

- Symptoms and PEFR progressively worse by day
- PEFR below < 60% of pt's best
- Sleep disturbance
- Morning symptoms persist till midday
- Diminishing response to inhaled bronchodilator
- Nebulized or injectable bronchodilators needed for emergency use

When a patient should contact his or her Doctor?

- Cough increases severely
- Wheeze loud or absent
- Breathlessness at rest
- Pulse >120/min
- PEFR ≤ 50% predicted/personal best
- Non-sustained response to bronchpdilator<3 hrs
- No improvement with oral rescue steroid (within 2-6 hrs)
- Peak flow at red zone

Acute Asthma

Assessment of Severity IN ADULTS

Symptoms	Mild	Moderate	Severe
Breathlessness during	Working	Taking	Resting
Talks in	Sentences	Phrases	Words
Consciousness	Alert	Agitated	Confused/ Unconscious

Acute Asthma Assessment of Severity

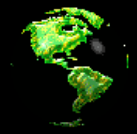
SIGNS	MILD	MODERATE	SEVERE
Respiratory rate	<25/min	≥25/min	>30/min
Accessory muscle use	No	Yes	Prominent
Wheeze	+	++	+++/ silent
Pulse	<100/min	110 – 120/min	>120/min
Pulsus paradoxus	absent	absent	present
Cyanosis	absent	absent	May be present
PEFR or FEV_1	>70 %	<70 - >50%	<50%
SaO_2(Oxymetry)	>95%	91-95%	<90%

Features of Acute Severe Asthma

- Inability to complete sentences in one breath
- Respiratory rate ≥ 25 breaths/min
- Heart rate ≥ 110beats/min
- PEF 33-50%predicted (<200L/min)

Life threatening Features

- Cannot speak
- Central cyanosis
- Feeble respiratory effort
- Exhausion, confusion, reduced conscious level
- Bradycardia
- Silent chest
- PEF <33%
- ABG: Normal or high CO_2, severe hypoxemia, low P^H



Near Fatal asthma

- Raised $PaCO_2$
- And/or Requiring mechanical ventilation

*M*anagement *of* Acute Asthma

4 *i*mportant *C*omponents

- Initial & periodic observations
- B_2 agonist inhalation
- O_2 inhalation
- Systemic corticosteroids

Management of Acute Asthma

Consists of Following Protocols

1 Home

4 Hospital and ICU

2 Physicians chamber

3 Emergency department

Management of Acute Asthma

Role of B_2 agonists

- Important basic component
- From nebulizer or MDI
- Nebulizer; 2.5-5 mg salbutamol + 2ml NS
- Stat & internal as pr need
- 1 – 4 hr interval as per need
- Sometimes continuous nebulization 10 - 15 mg/hr or 0.5mg/kg/hr
- Nebulizer not available: multiple accentuation

Management of Acute Exacerbation

- Role of anticholinergic drugs
  - Not all asthma exacerbation get benefit
  - Helpful for
    - *Age below 2 yrs
    - * H/o smoking >10 pack yr
    - * Severe attack with poor response to nebulizer
  - Refractory asthma

Management of Acute Exacerbation

- Role of Oxygen Inhalation
  - Acute asthmatic hypoxia
  - Goal: arterial O_2 saturation >90%
  - Inspired O_2 concentrations – 35-40%

Management of Acute Exacerbation

- How Steroid is used?
  - Given to non-responder to bronchodilator
  - Inj. Hydrocortison 3-4mg/kg stat
  - Same dose 4-6 hourly
  - Inj. can be replaced by oral prednisolone (30-60mg)
  - Efficacy same for oral and inj. steroid

Management of Acute Exacerbation

- Role of methylxanthines
  - Given in severely ill patients or poor response to B_2 against
  - For diagnosis of concomitant illness
  - Inj. Aminophylline (5kg/B.W.)over 20 min
  - Infusion 0.5mg/kg/hr
- Role of antibiotic
  - Rarely indicated
  - Used in pneumonia, sinusitis

Management of Acute Exacerbation

Periodic Assesment and Follow up

Good response

- Improvement almost complete
- No distress
- Normal physical examination
- PEF >70%

Incomplete response

- Partial improvement
- Mild to moderate distress
- Presence of ronchi
- PEFR : > 50% - <70%

Poor response

- No improvement
- Severe symptom persists
- Extensive rhonchi /silent chest
- PEF<50%

Management of Acute Exacerbation

When to Hospitalize a patient

- Breathless at rest
- Very loud wheeze/silent chest
- Accessory respiratory muscles marked
- Respiratory rate > 25/min
- Pulse >120/min
- PEFR <40% predicted
- Pulsus paradoxus
- Pt. cyanosed, confused, comatose

Management of Acute Exacerbation

Indications of Artificial Ventilation

- Required in 2% asthma pts
- $PaCO_2$ > 50 mmHg & rising
- PaO_2 < 60 mmHg & falling
- SaO_2 < 90% even after 40% O_2 inhalation

Management of Acute Exacerbation

Therapies not Recommended

- Sedatives (avoid strictly)
- Mucolytic drugs
- Chest physical therapy
- Hydration
- Antibiotics
- Antihistamines

Management of Asthma Attacks

Hospital Based Care

Initial Assessment

Initial Treatment

Repeat Assessment

Moderate Episode

Treatment

Severe Episode

Treatment

Good Response

Discharge

Incomplete Response

Hospitalization

Poor Response

Admit to ICU

Management of Asthma Attacks
Hospital Based Care

Initial Assessment

- History
- Physical examination
- Investigations

Management of Asthma Attacks

Hospital Based Care

Initial Treatment

- Inhaled short-acting B_2-agonist, usually by nebulization, one dose every 20 minutes for 1 hour
- Oxygen to achieve O_2 saturation > 90%
- Systemic corticosteroids
- Sedation is contraindicated

Management of Asthma Attacks
Hospital Based Care

Repeat Assessment

- PFT
- PEFR
- SaO_2
- Other tests as needed

Management of Asthma Attacks
Hospital Based Care

Moderate Episode

On assessment

- PEFR 50-80% predicted/personal best
- Physical exam: moderate symptoms, accessory muscle use

Treatment

- Inhaled B_2-agonist every 60 minutes
- Consider corticosteroids
- Continue treatment 1-3 hours, provided there is improvement

Management of Asthma Attacks

Severe Episode

Hospital Based Care

On assessment

- **PEFR <50% predicted value/personal best**
- **Physical exam: severe symptoms of rest,chest retraction**
- **High-risk patient**
- **No improvement after initial treatment**

Treatment

- **Inhaled B_2-agonist, hourly or continuous + inhaled anticholinergics**
- **Oxygen – 40% (5 Lit/min)**
- **Systemic corticosteriod**
- **Consider subcutaneous, intramuscular, or intravenous B_2-agonist**

Management of Asthma Attacks
Hospital Based Care

Good Response

On assessment

- Response sustained 60 minutes after last treatment
- Normal Physical examination
- PEFR > 70%
- No distress
- 02 saturation >90% (95% childred)

Discharge 

Management of Asthma Attacks
Hospital Based Care

Incomplete Response Within 1-2 hours

On assessment

- High-risk patient
- Physical exam: mild to moderate symptoms
- PEFR > 50% but
- 02 saturation not improving

Admit to Hospital

- Inhaled B_2-agonist ± inhaled anticholinergics
- Systemic corticosteroid
- Oxygen
- Consider I.V. aminophylline
- Monitor PEFR, 02 saturation, pulse.

Management of Asthma Attacks

Hospital Based Care

Poor Response Within 1 hours

On assessment

- High-risk patient
- Physical exam: symptoms severe, drowsiness, confusion
- PEFR > 50% but
- PCO_2>45mm Hg
- PO_2 < 60 mm Hg
- O_2 saturation < 90%

Admit to ICU

- Inhaled B_2-agonist ± anticholinergics
- Inhaled corticosteroid
- Consider s.c., i.m., or i.v. B_2 -agonists
- Oxygen
- Consider i.v. aminophylline
- Possible intubation and mechanical ventilation

Refractory Asthma

definition

1) High medication requirements to maintain good disease control
2) Persistent symptoms, asthma exacerbation or airflow obstruction e high medication use

Presentation

1. Widely varying peak flow (type-I brittle asthma) > 40% diurnal variation

2. Severe, but chronic airflow limitation

3. Rapidly progressive loss of lung function (type-II brittle asthma)

4. Mucus production –absent - copius

5. Varying response to corticosteroids

Refractory Asthma

Diagnosis

Step-IV or V treatment plus one of

1. Daily requiring short acting B_2 – agonist
2. Persistent airway obstruction
3. One or more urgent care visit per year
4. Three or more oral rescue steroid per year
5. Prompt deterioration with <25% reduction in oral or inhaled steroid
6. Near fatal asthma event in the past

Refractory Asthma

Management

1. Pitfalls of management
2. Intensive patient education
3. Home mobilization
4. Vaccination
5. Addition
    - Ipratropium
    - Leukotriene antagonist
    - Disease modifying agents

Asthma *Management*

Pitfalls

- Incorrect diagnosis
- Inappropriate management plan
- Inadequate education
- Improper inhalation technique
- Avoidance of spacer and nebulizer
- Non compliance
- Reluctance in using rescue therapy
- Environments hazards

Asthma *Education*


Basic facts about asthma


Medicines


Skills


Precaution measures for environmental control

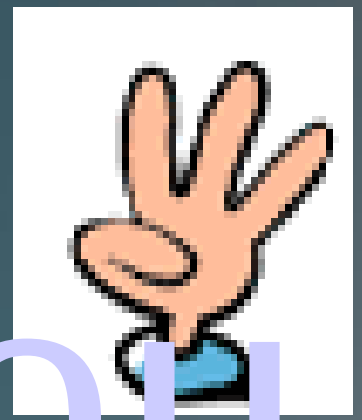

Rescue action

Treatment goal

Alleviation of misconceptions


Formation of asthma clubs

Thank You



Bronchial Asthma

presented by

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Role of Combination Therapy in the Pharmacological Management

Bronchial Asthma

Management of Bronchial Asthma

Most effective objectives are to

- Prevent local bronchial inflammation
- Reverse airway obstruction
- Eliminate causal factors

B_2-Adrenoceptor Agonists

Reversal of Airway Obstruction

Prevent chronic airway inflammation

Corticosteroids

Salmeterol

Long acting B_2 agonist

- Indicated in step – III, IV & V of bronchial asthma management
- Inhaled conticosteroid's are indicated in the step II and above

combination

of

Long acting B_2 adrenoceptor

Inhaled corticosteroid

Positioned in

Step III, IV & V of standard concept of step-up & step-down drug treatment of Asthma

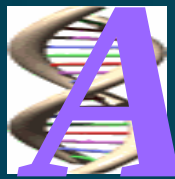
A mechanism of Action of salmeterol

- Stimulate the intracellular adenyl cyclase activity
- Increased $_{C}$AMP causes
  - Relaxation of bronchial smooth muscle
  - Inhibition of release of mediators
- Satmeterol induces
  - Potent and long lasting inhibition of mast cell degranulation: Histamine, Leukotrenes, PG-D_2

Selectivity of B_2 Agonists

For B_2 Receptors in relation to B_1 receptors

B_2-agonist	Selectivity ratio B_2/B_1
Isoprenaline	1
Salbutamol	1375
Fenoterol	120
Formoterol	400
Salmeterol	85000



mechanism of Action of fluticasone propionate

- Inhibits enzyme phospholipase and thus inhibit arachidonic acid metabolism
  - Reduce bronchial reactivity
  - Reduce frequency of asthma exacerbation
  - Reduce number of inflammatory airway cells
  - Reduce hyperresponsiveness of the airway smooth muscle
  - Reduction of mucosal oedema

Pharmacokinetics of inhaled steroid

- 90% swallowed (reduced by spacer)
- 10% deposited only in the lungs
- First-pass inactivation in liver
- Systemic side effects are less

Advantage of Fluticasone Propionate

- Potent topical glucocorticoid
- Inhalation of fluticasone at 1500 mg/day for 1yr on 2000 μg/day for 6 weeks did not significantly inhibit the pituitary adrenal axis
- Effective in asthma at 50% dose of beclomethasone or budesonide

Advantage of Fluticasone Propionate…

- 18 times more affinity to receptor than dexamethasone
- 3 times potent that of budesonide
- Improved therapeutic ratio
- Greater oral steroid sparring effect
- Low risk of systemic side-effects when used appropriately

Advantage of Salmeterol Xinafoate

- Long T ½ life i.e., 9-12 hrs
- Provide long time symptom control (i.e. 12hrs)
- Prevention of night time asthma attack
- Best useful in nocturnal asthma
- Having a long lipophilic side chain

  -Increase affinity of drug to B_2 adnenoceptor

  -Slowing washout from the receptor

Seretide

combination of

salmeterol

&

fluticasone

Advantages of Seretide

- Greater convenience for the patients
- Facilitates compliance with long-term therapy
- Reduce cost to patient & health service
- Improved asthma control
- Lower does of I.C.S needed
- Potentially reduces airway remodeling

Indication of seretide

- Regular treatment of asthma both adult & children where use of combination therapy (bronchodilators & inhaled steroid is appropriate)
- Patient not adequately controlled with inhaled steroids & as needed inhaled short acting B_2-agonist

Dosage & Administration

For adult & over 12 yrs of age

Inhalation of seretide 100, 250 & upto 500, are one puff 12 hourly

Children between 4 to 12 – 100, one puff 12

In pregnancy, same as adult

Patient Compliance & Seretide

- It’s simple easy dose schedule, one puff 12 hrly
- Effective from day one
- Limit the number of medication
- Great control effect in comparison to other
- Single or multiple treatment therapy
- Revolutionary product in revolutionary device

Side Effects of Steroid

- Hoarseness of voice
- Oral candidiasis
- Hypersensitivity reaction
- Paradoxical bronchospasm
- Adrenal suppression
- Osteoporosis

Side Effects B_2 Agonist

- Fine tremor
- Headache
- Palpitation, tachycardia
- Arrhythmia
- Sleep disturbance
- Muscle cramp
- Hypersensitivity reaction
- Paradoxical bronchospasm

COMPUTER Graphics design aimatioN

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&

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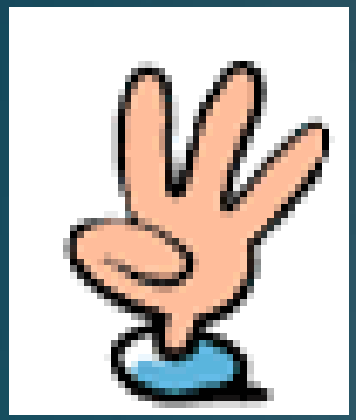

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