



# Bronchial Asthma and management

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Community Medicine



# Introduction

*Asthma is one of the most common chronic diseases in the world.*

- Cause for considerable economic burden from Direct and Indirect medical costs
- Most important cause of elementary school absenteeism.
- Lack of availability of drugs in many areas around the world
- Western lifestyles and urbanized communities
- As urban population increases from 45 to 59%(projected for 2025), so likely marked increase in asthma cases from 300 million to an additional 100 million

# Problem Statement

## **GLOBAL**

287,000 (0.5% of total global deaths) deaths

-151,000 men and 136,000 women (WHO, 2006)

-16.7 million deaths in age 15–59 years (WHO, 2006)

-As many as 300 million people of all ages, and all ethnic backgrounds, suffer from asthma

-The burden to governments, health care systems, families, and patients is increasing worldwide.

-The number of disability-adjusted life years (DALYs) lost due to asthma worldwide has been estimated to be currently about 15 million per year.

\* High prevalence rates (15%–20%) in the United Kingdom, Canada, Australia, New Zealand and other developed countries

*Highest Asthma prevalence rates are in the:*

*United Kingdom (>15%) and New Zealand (15.1%)*

# Problem Statement

## INDIA

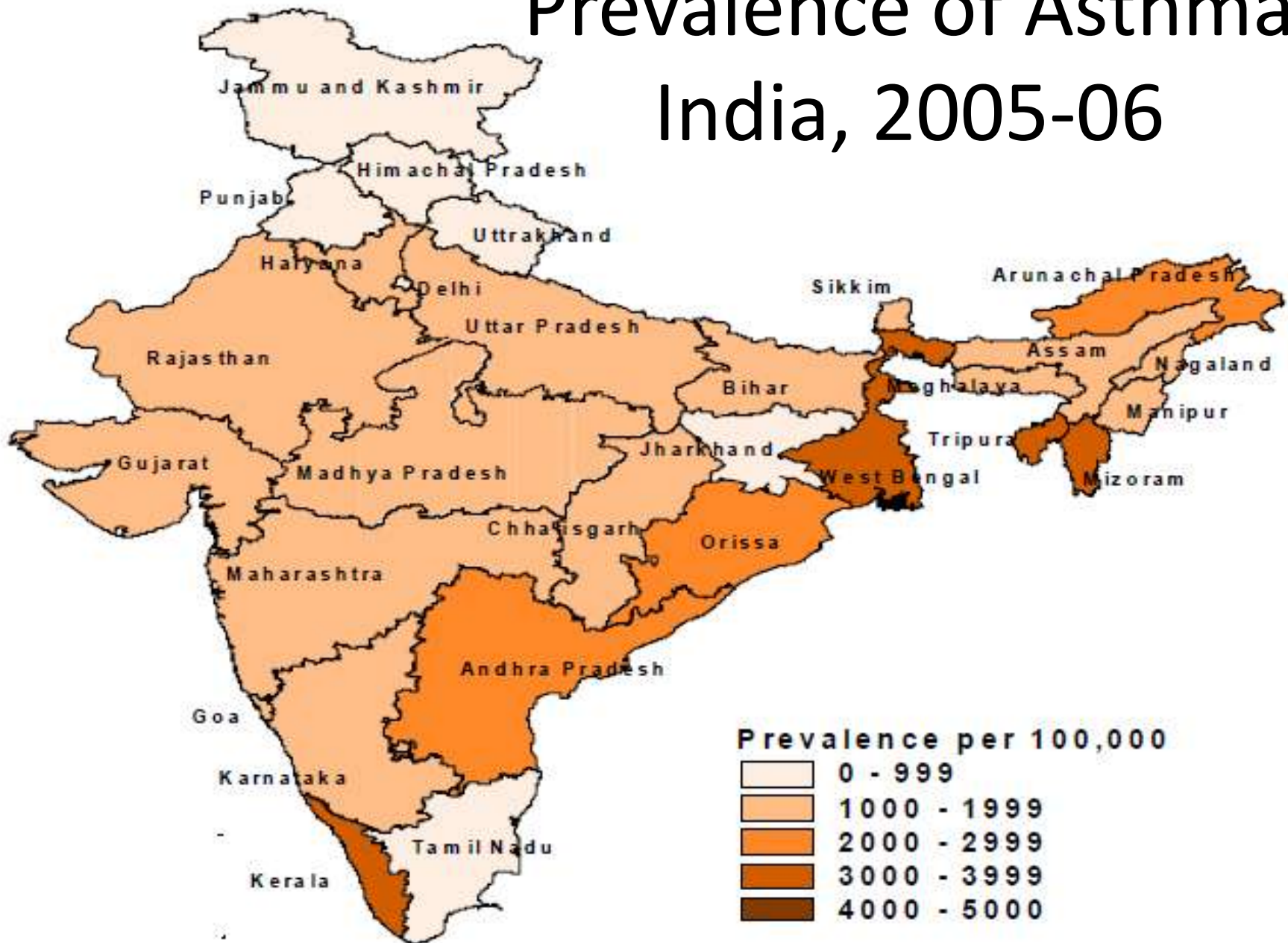
Prevalence of Asthma 7.24% with SD 5.42 (2006)

277 DALYs per 100,000

- Constitutes 0.2% of all deaths and 0.5% of National Burden of Diseases (Smith 2002)
- In developing regions (Africa, Central and South America, Asia, and the Pacific), Asthma prevalence, is rising sharply with increasing urbanisation and westernisation (Masoli *et al.* 2004).

\*Low prevalence rates (2%–4%) in Asian countries (especially China and India), although reporting relatively lower rates than those in the West, account for a huge burden in terms of absolute numbers of patients

# Prevalence of Asthma India, 2005-06



Source: NFHS-3, 2005-06

Current asthma prevalence is higher  
among:

- Children than Adults
- Boys than Girls
- Women than Men

Source: **Impact of gender on asthma in childhood and adolescence:**

**a GA<sup>2</sup>LEN review**

C. Almqvist<sup>1</sup>, M. Worm<sup>2</sup>, B. Leynaert<sup>3</sup>,



# DEFINITION

Bronchial asthma is a chronic inflammatory disorder of the airways associated with airway hyper responsiveness presents with:

- Wheezing
- Breathlessness
- Chest tightness
- Nighttime or early morning cough

Airway obstruction is reversible either spontaneously or with treatment.

# Risk Factors

- **Prenatal:**

*Maternal smoking, stress, use of antibiotics and delivery by Caesarean section.*

- **Childhood:**

*Allergens, environmental tobacco smoke, exposure to animals, impaired lung function in infancy, lack of Breastfeeding, family size and structure, socio-economic status, infections, sex and gender.*

- *Occupational exposures constitute a common risk factor for **Adult asthma.***

\*Children of parents with lower socio-economic status have greater morbidity from asthma  
Source: Asthma epidemiology, etiology and risk factors -- Canadian Medical Association Journal  
[Padmaja Subbarao](#), MD MSc, [Piush J. Mandhane](#), MD PhD, [Malcolm R. Sears](#), MB ChB



# Risk Factors



**1. Evidence suggests an association between environmental tobacco smoke exposure and exacerbations of asthma among school-aged, older children, and adults.**

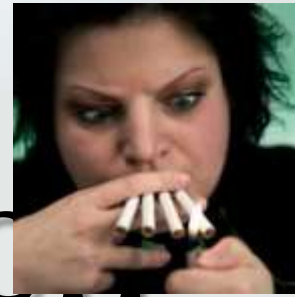
**2. Evidence shows an association between environmental tobacco smoke exposure and asthma development among pre-school aged children.**

Source: 1. Association between Exposure to Environmental Tobacco Smoke and Exacerbations of Asthma in Children  
Barbara A. Chilmonczyk, Luis M. Salmun, Keith N. Megathlin, Louis M. Neveux, Glenn E. Palomaki, George J. Knight, Andrea J. Pulkkinen, and James E. Haddow N Engl J Med 1993; 328:1665-1669 [June 10, 1993](#)

2. Association between environmental tobacco smoke exposure and wheezing disorders in Austrian preschool children  
Elisabeth Horak a, Bernhard Morassa, Hanno Ulmer b

SWISS MED WKLY 2007; 137:608-613 · [www.smw.ch](http://www.smw.ch)

# Approach to BRONCHIAL ASTHMA



# Clinical Scenario



- Young or middle-aged patient presenting with progressive,
  - wheezing
  - breathlessness
  - cough
  - chest tightness

With or without a h/o exposure to allergens

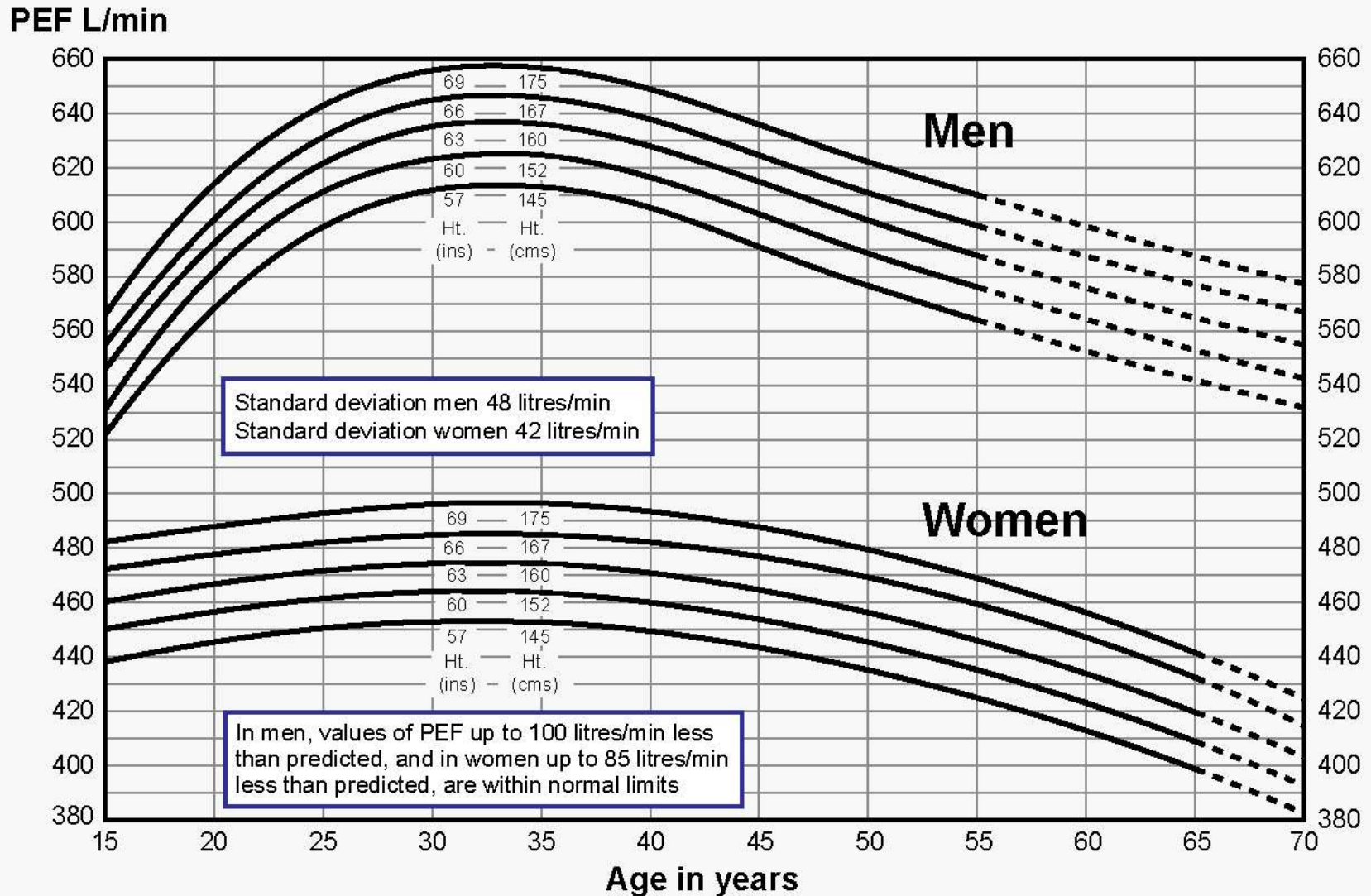
# Diagnosis

- **Pulse oximetry and ABG analysis**
- **Chest Xray**
- **Blood Test**
- **Peak Flow meter + Spirometry-**  
PEFR + FEV1 decrease
- PEFR + FEV1 increase >15% after  
 $\beta$  agonist inhalation
- **Skin Testing**



# Assessment of PEF

## Peak expiratory flow in normal adults





# Indicators of Severe Asthma

- ✓ **Anxious and diaphoretic appearance, upright position**
- ✓ **Breathlessness at rest and inability to speak in full sentences**
- ✓ **Tachycardia (HR>120) and Tachypnoea (RR>30)**
- ✓ **Pulse oximetry <91% (on room air)**
- ✓ **PaCO<sub>2</sub> normal or increased**
- ✓ **PEFR <150 L/min or <50% predicted**

# Managing Asthma: Goals

- Achieve and maintain control of symptoms
- Maintain normal activity levels, including exercise
- Maintain pulmonary function as close to normal levels as possible
- Prevent asthma exacerbations
- Avoid adverse effects from asthma medications
- Prevent asthma mortality



Table 1. Classifying Asthma Severity in Children 5-11 Years

- Classifying severity in children who are not currently taking long-term control medication.







Components of Severity		Classification of Asthma Severity (Children 5–11 years of age)			
		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	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> &gt;80% predicted</li><li>• FEV<sub>1</sub>/FVC &gt;85%</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> = &gt;80% predicted</li><li>• FEV<sub>1</sub>/FVC &gt;80%</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> = 60–80% predicted</li><li>• FEV<sub>1</sub>/FVC = 75–80%</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> &lt;60% predicted</li><li>• FEV<sub>1</sub>/FVC &lt;75%</li></ul>
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year (see note)	≥2 in 1 year (see note) 		
		 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>			

Table 2. Classifying Asthma Severity in Youths and Adults

- Classifying severity for patients who are not currently taking long-term control medications.

Components of Severity		Classification of Asthma Severity (Youths ≥12 years of age and adults)			
		Intermittent	Persistent		
			Mild	Moderate	Severe
<b>Impairment</b>  Normal FEV <sub>1</sub> /FVC: 8–19 yr 85% 20–39 yr 80% 40–59 yr 75% 60–80 yr 70%	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not >1x/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> &gt;80% predicted</li><li>• FEV<sub>1</sub>/FVC normal</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> ≥80% predicted</li><li>• FEV<sub>1</sub>/FVC normal</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> &gt;60% but &lt;80% predicted</li><li>• FEV<sub>1</sub>/FVC reduced 5%</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> &lt;60% predicted</li><li>• FEV<sub>1</sub>/FVC reduced &gt;5%</li></ul>
<b>Risk</b>	<b>Exacerbations requiring oral systemic corticosteroids</b>	0–1/year (see note)	≥2/year (see note) 		
		 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>			

Source: National Heart, Lung, Blood Institute EPR-3, 2007. See figure 3-4c, pg. 74 for classifying severity in patients after asthma becomes well controlled.

# Classification of Asthma Severity in Children(5yrs) to Adults [Symptom Based]

Components of Severity	Intermittent	Persistent		
		Mild	Moderate	Severe
1.Symptoms	=<2 days/week	>2 days/week but not daily	Daily	Throughout the day
2.Nighttime awakenings	=<2x/month	3-4x/month	>1x/week but not nightly	Often 7x/week
*3.Using Short-acting Beta2-agonists for symptom control	=<2 days/week	>2 days/week But not daily	Daily	Several times per day
4.Interference with normal activity	None	Minor Limitation	Some Limitation	Extremely Limited

# Classification based on Lung Function for Children 5-11 Yrs

Severity Component	Intermittent	Persistent		
		Mild	Moderate	Severe
Lung Function	Normal FEV1 between exacerbations			
	FEV1 >80% predicted	FEV1 =>80% predicted	FEV1 =60-80% predicted	FEV1 <60% predicted
	FEV1/FVC >85%	FEV1/FVC >80%	FEV1/FVC = 75-80%	FEV1/FVC <75%

# Classification based on Lung Function for Youths >12 Yrs of age and Adults

Severity Component	Intermittent	Persistent		
		Mild	Moderate	Severe
<b>Lung Function</b> Normal FEV1/FVC= 8-19 yr 85% 20-39 yr 80% 40-59 yr 75% 60-80 yr 70%	Normal FEV1 between exacerbations			
	FEV1 >80% predicted	FEV1 =>80% predicted	FEV1 >60% but <80% predicted	FEV1 <60% predicted
	FEV1/FVC normal	FEV1/FVC normal	FEV1/FVC reduced 5%	FEV1/FVC reduced >5%



# Making it Simple

## **Mild Acute Asthma:**

Characterized by cough with or without wheeze, some difficulty in respiration but no problems of speech or feeding

Oxygen Saturation of  $>95\%$  and PEF  $>80\%$  predicted

## **Moderate to Severe Asthma:**

Characterized by tachypnoea, tachycardia, mild chest indrawing, difficulty in feeding and speech

Oxygen Saturation may be as low as  $90\%$ , PEF  $30-60\%$

## **Life Threatening Asthma:**

Characterized by poor respiratory effort, cyanosis, exhaustion, agitated or depressed

Oxygen Saturation low as  $90\%$ , PEF  $<30\%$



# Treatment steps for achieving control

## Total of 5 steps for control

Steps 1-5 provide options for increasing efficacy with exception of step 5 where issues of availability and safety INFLUENCE selection of treatment.

- **Step 1-** Inhaled short acting b-2 agonist as required
- **Step 2-** is the Initial treatment for most treatment-naïve patients with persistent asthma symptoms – PLUS inhaled steroid BDP 200-800 mcg/day (400 mcg)
- **Step 3-** If symptoms suggest asthma is severely uncontrolled, this step is commenced– PLUS long acting b-2 agonist(LABA).... Assess...

Source : Expert Panel Report 2: Guidelines for the diagnosis and management of asthma: National Institute of Health- National Heart, Lung and Blood Institute 1997; NIH publication number 97-4051





# Treatment steps for achieving control

- **Step 4-** Persistent poor control  
Increase steroid upto 2000 mcg/day PLUS LRA, SR theophylline, Beta-2 agonist tablet
- **Step 5-** Continuous or Frequent use of oral steroids  
Use daily steroid tablet in lowest dose providing adequate control

Refer to Specialist

\*At each treatment step, a reliever medication(Rapid onset Bronchodilator either short or long acting) should be provided for quick relief of symptoms, however, regular use of reliever medication is one of the elements defining uncontrolled asthma, and indicates that controller treatment should be increased.\*

# Treatment:

## Maintain control

- Establish a lowest step and dose that minimises cost and maximises safety of treatment  
Conversely, asthma is a variable disease and dose needs to be adjusted periodically in response to loss of control indicated by worsening of symptoms and exacerbation
- Frequency of healthcare visits and assessment depends on patients clinical severity and confidence in playing a role in ongoing control of his/her asthma

\*Usually patients are seen 1-3 months after the initial visit and every 3 months thereafter  
After an exacerbation, follow-up should be offered within 2 weeks to 1 month.

# Managing Acute Exacerbations

Main aim is to relieve airflow obstruction and hypoxaemia as quickly as possible, and to plan prevention of future relapses.

1. **Oxygen** inhalation 4 L/min(6-8 children) to maintain SpO<sub>2</sub> >90%
2. **Inj. Terbutaline** 10mcg/kg(7-10mcg children) [OR Inj. Adrenaline(1:1000) 0.01 ml/kg] subcutaneously or IV (max. 40 mcg/day) every 20-30 minutes with a total of 2-3 doses
3. **Inhaled Salbutamol/Terbutaline** preferably by nebulizer/ MDI with spacer with/without facemask  
1-2 puffs every 2-4 minutes upto 10 puffs and repeat every 20-30 minutes

# Managing Acute Exacerbations

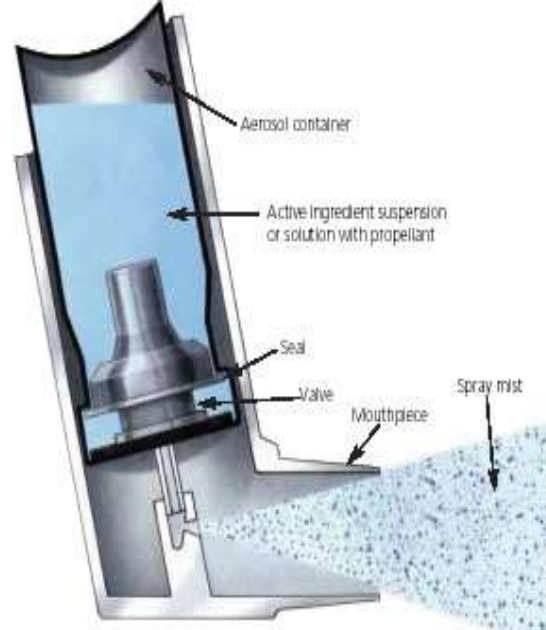
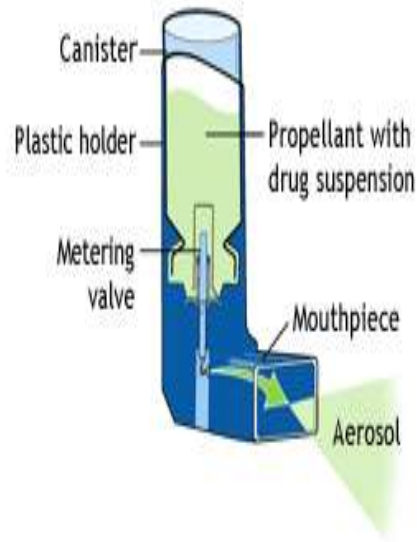
4. **Ipratropium Bromide** 250 mcg by nebulizer with Salbutamol
5. **Inj. Hydrocortisone** 10mg/kg IV
6. **Inj. Aminophylline** 5 mg/kg bolus slowly followed by 0.8-1.2 mg/kg/hr slow infusion
7. **Inj. Magnesium sulphate** 40mg/kg in 50 ml 5% dextrose as slow infusion over 30 minutes(?)  
---- NO RESPONSE?---- ABG—X-ray chest---Serum electrolytes

# Managing Asthma in Community Setting

CS is best for Mild Exacerbations:

- Metered doses of short-acting bronchodilators delivered via an MDI, ideally with a spacer.
  - \*This produces atleast an equivalent improvement in lung function as the same dose delivered via nebuliser
- Glucocorticosteroids. Oral glucocorticosteroids (0.5–1 mg/kg of prednisolone or equivalent during a 24-h period) should be used to treat exacerbations, especially if they develop after instituting the other short-term treatment options recommended for loss of control
  - \*If patients fail to respond to bronchodilator therapy, as indicated by persistent airflow obstruction, prompt transfer to an acute care setting is recommended, especially if they are in a highrisk group.





## How to use your Rotahaler



**1.** Insert the transparent end of the Rotacap into the raised square hole of the Rotahaler.



**2.** Hold the top of the Rotahaler firmly with one hand. Rotate the base until the capsule breaks.




**3.** Breathe out through your mouth. Then, placing the Rotahaler between your lips (as shown), breathe in through your mouth as deeply as possible.



**4.** Remove the Rotahaler from your mouth. Hold your breathe for 10 seconds or as long as you find comfortable. Breathe out.







# STUDIES

# Intermittent versus Continuous Nebulization



## Small benefit from continuous nebulization

- Gibbs et al. Acad Emerg Med, 2000

## No increased side-effects

- Moler et al. Am J Respir Crit Care Med, 1995

## Reduction of staff time

- Fink et al. Respir Care 2000
  - More interesting in severe exacerbations

# Meter-Dose Inhalers Vs. Holding Chambers



## As effective as nebulizers

(Cates et al. *Cochrane Database Syst Rev*, 2000)

- Similar hospital admission rate
- Similar improvement in PEFR and FEV1
- Children:
  - ↓ HR more important
  - ↓ duration of the treatment in the ED
- Progressive administration of the medication
- Interesting for children < 3 years

# Anticholinergics + $\beta_2$ Agonists in Children



Schuh S et al. *Pediatr* 1995:

- 5-17 y.o.
- $\uparrow$  FEV1,  $\uparrow$  PEFR,  
 $\downarrow$  hospitalization stay:
  - Salbutamol < salbutamol + 1 ipratropium < Salbutamol + 3 ipratropium
  - More interesting in severe exacerbations



# Anticholinergics + $\beta_2$ Agonists

## Meta-analyses Adults



- Rodrigo et al. Am J Med 1999
  - n = 1483
  - Randomized studies, double-blind, controlled
  - Results:
    - Pulmonary function improvement
    - ↓ Hospital admission
- Stoodley et al. Ann Emerg Med 1999
  - N = 1377
  - Slight clinical improvement
  - No side-effects

# Corticosteroid Use

- **Corticosteroids Decrease hospital admission if administered within 1st hour:**

Equal benefit of orally and IV administration-Rowe et al. *Cochrane Database Syst Rev*, 2000

- **Dose range from 30-400 mg methylprednisolone adequate:**
  - Manser et al. *Cochrane Database Syst Rev*, 2000
- **Inhaled Vs Systemic Corticosteroids:**
  - (Edmonds et al. *Cochrane Database Syst Rev*. 2003)
  - ↑ PEFR and FEV<sub>1</sub> as compared with placebo
  - as effective as systemic corticosteroids
  - Combination better than systemic route alone

# MgSO<sub>4</sub>

- **Inhalation:**
  - Improvement in clinical score (Fischl),  
    ↑ PEFR, ↑ PP
  - Nannini LJ Jr. *Am J Med* 2000
  - Mangat HS *Eur Respir J* 1998
- **IV:**
  - Boonyavorakul C. *Respiratology* 2000
  - Rowe BH. *Ann Emerg Med* 2000
    - ↓ admission rate in severe asthma exacerbations



# Antibiotics

- **No benefit when comparing antibiotics to placebo**  
*Graham et al. Cochrane Database Syst Rev. 2001*
- **Indications: GOLD-guideline**  
(Pauwels et al. *Respir Care* 2001)
  - Worsening dyspnea and cough
  - Increased sputum volume and purulence
  - Infiltrates on the chest X-ray

# PREVENTION

- ❖ Primary
- ❖ Secondary
- ❖ Tertiary

# Prevention: Primary

- **Patient awareness/education**  
→ *Efficacy of patient education and parental awareness has also been shown to be effective in individual studies from India*  
(Singh et al. 2002; Gupta et al. 1998; Ghosh et al. 1998; Lal et al. 1995).
- **Lifestyle Modifications:** Regular balanced diet and avoidance of obesity.  
→ *Short acting beta-2 agonists should be used prior to anticipated exercise, in a patient with exercise-induced Asthma, to alleviate symptoms*  
(Consensus on Guidelines of Management of Clinical Asthma 2005).
- **Alternative System of Medicine:**  
→ *Yogic breathing exercise technique, Pranayama, was been shown to reduce in histamine reactivity*  
(Singh et al. 1990).

# Prevention: Secondary

- ☐ Avoidance of precipitating factors
- ☐ Avoid dusting when subject is around
- ☐ Avoid using carpets, stuffed toys, open bookshelves, smoking, chemical sprays in house. Prefer mosquito nets to repellants
- ☐ Food containing allergen to be avoided
- ☐ Maintain record of daily symptoms

*\*Involves avoidance of allergens and nonspecific triggers when Asthma is established.*

*(Custovic et al. 1998; Strachan and Cook 1998; Chalmers et al. 2002; Jindal et al. 2007)*

# References

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- Global Initiative for Asthma, National Institute of Health, Bethesda, 1995 Publication, Updated Oct. 2005– National Heart Lung and Blood Institute and WHO.
- Oxford Handbook of Clinical Medicine 8<sup>th</sup> EDN
- Oxford Handbook of Critical Care 3<sup>rd</sup> END



# Can it really cure asthma?



Thank you