

ASTHMA- C/F & Mx

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Definition of Asthma

- Chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. In susceptible individuals, this inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are associated with widespread but variable airflow obstruction that is reversible either spontaneously, or with treatment.

CLINICAL FEATURES AND DIAGNOSIS

- The characteristic symptoms of asthma are- wheezing, dyspnea, chest tightness and coughing.
- Symptoms may be worse at night, and patients typically awake in the early morning hours.
- There is increased mucus production in some patients, with typically tenacious mucus that is difficult to expectorate.
- Typical physical signs are inspiratory, and to a great extent expiratory rhonchi throughout the chest, and there may be hyperinflation.

SIGNS

- CYANOSIS
- TACHYPNEA
- TACHYCARDIA
- ACCESSORY MUSCLES OF RESPIRATION
- BILATERAL POLYPHONIC RHONCHI
- SILENT CHEST AND PULSUS PARADOXUS IN SEVERE CASES

DIAGNOSIS OF ASTHMA

- History and patterns of symptoms
- Physical examination
- Investigations

HISTORY

- Nature of symptoms
- H/O SOB / wheezing / chest tightness
- H/O cough, worse particularly at night, / on awakening?
- H/O cough after physical activity (eg. Playing)?
- H/O colds 'going to the chest' or take more than 10 days to resolve?
- H/O any medication (e.g. bronchodilator) when symptoms occur? Is there a response?

HISTORY

- Pattern of symptoms
- Perennial , seasonal , or cont. with seasonal flare.
- Continuous , paroxysmal / cont. with paroxysms.
- Frequency
- Diurnal variation
- Geographic variation.

- Family history

- Occupational history

HISTORY

- Precipitating / aggravating factors.
- Weather
- House dust exposure
- Mold exposure
- Animal exposure
- Pollen exposure
- Foods
- Irritants -strong odours, air pollutants ,cigarette smoke
- Exercise
- Resp. inf.
- Drugs – b –blockers , Aspirin



OTHERS

- **EYE** - Itching ,watering , redness ,burning ,dryness
- **URT**-Sneezing , headache, sorethroat
- **SKIN** – Eczema , itching
- **GIT** – Nausea , vomitting , heartburn.

CLINICAL FEATURES

- Acute –
- Inability to complete sentences , diaphoresis , tachycardia, tachypnoea, cyanosis , use of accessory muscles , pulsus paradoxus , hyperinflated chest , hyperresonant note , prolonged expir , insp. & expiratory rhonchi .

PHYSICAL EXAMINATION

- Examn should be focussed on both URT & chest.
(evidence of sinusitis & rhinitis should be sought)
- Chest findings depend upon activity of asthma and its chronicity.
- Absence of s/s at the time of examination does not exclude the diagnosis of asthma.

CONT...

In acutely ill, chest / neck pains suggest dissection of air through mediastinum with crunching sound on auscultation, crepitus felt in subcutaneous tissues.

- Chronic
- Hyperinflated thorax (with an incr. in A-P dia).
- Square configuration of chest
- Prominent harrison's groove
- Decreased breath sounds.

INVESTIGATIONS

- Eosinophilia (except those on corticosteroids)
 - >4% or 300 – 400 / mm³
- Sputum eosinophil count increased & have been shown to predict clinical outcomes
- **Sputum examn**
 - gross – scanty in acute cases
 - >=100 ml with expectn of “kite strings”/ millet seed bronchial casts in chronic cases
 - m/e - bronchial epithelial cells in clusters (creola bodies) , charcot –leyden crystals , curschmann spirals.

CONT..

- ALLERGY TESTS
- Skin tests – Pin prick test
- RAST
- SERUM IgE (>250 U / ml)
- ECG – sinus tachycardia
 - RAD & P pulmonale
(in acute severe asthma with RF)
- Exhaled Nitric oxide – non invasive marker of airway inflammation

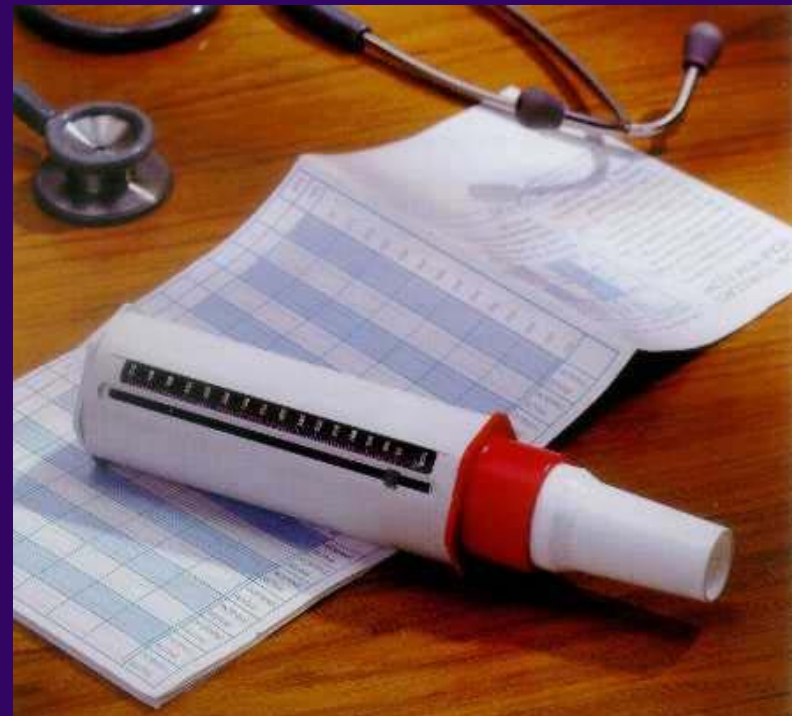
CONT...

- CXR –
- Normal in majority
- In the remainder hyperinflated lungs , increased retrosternal lucency & flattening of diaphragms
- In acute severe asthma greater likelihood of atelectasis, thickening of bronchial walls, mucoid impaction , pneumomediastenum / Pneumothorax .
- ABPA – central bronchiectasis

- X-Ray PNS

PULMONARY FUNCTION TESTS

- - To establish the diagnosis
- To quantify the severity
- To monitor the course & response to therapy.



Diagnostic Testing

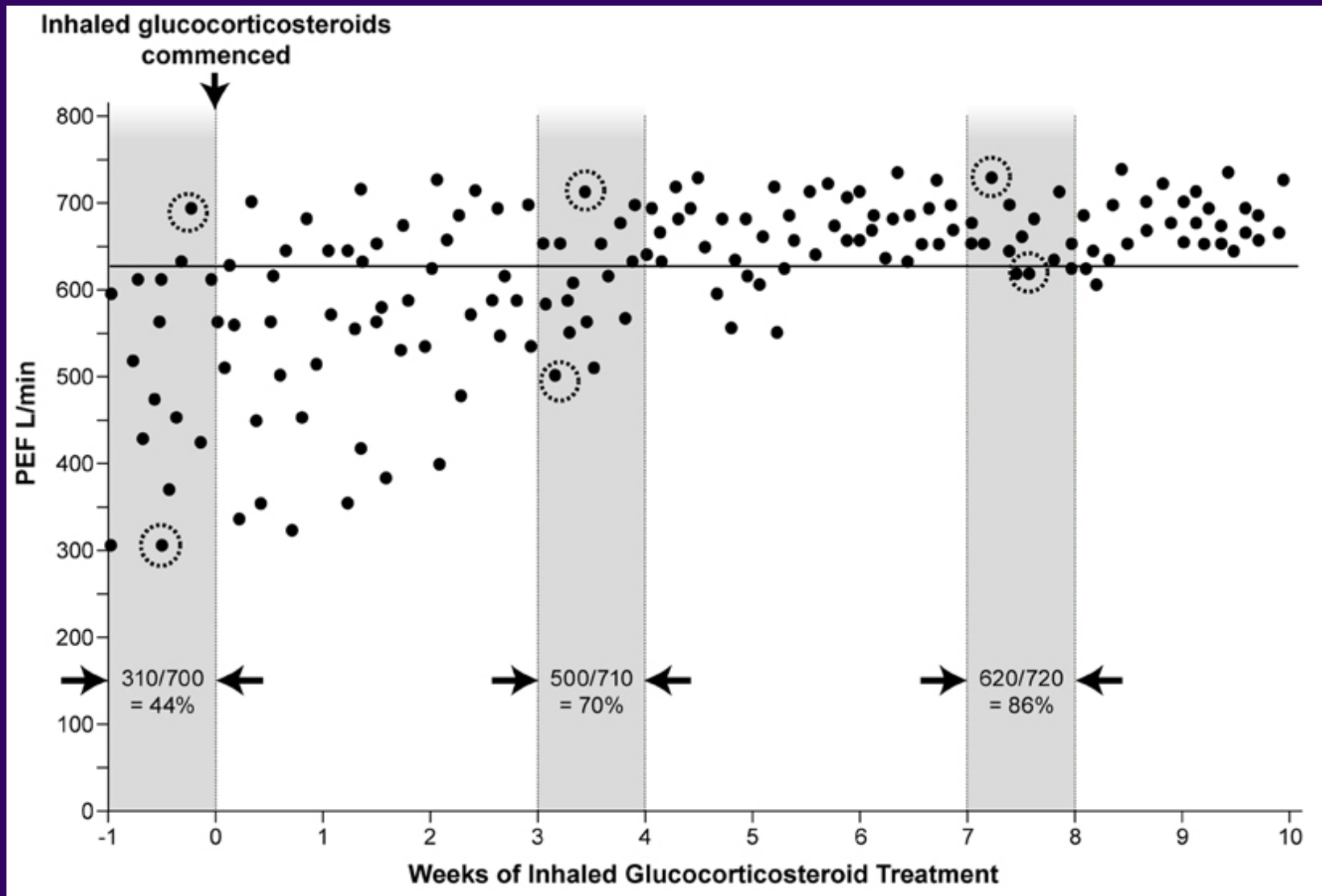
- Peak expiratory flow (PEF)
 - Inexpensive
 - Patients can use at home
 - May be helpful for patients with severe disease to monitor their change from baseline every day
 - Not recommended for all patients with mild or moderate disease to use every day at home
 - Effort and technique dependent

PEFR

- **GREEN** – Symptoms under control
 - PEF > 80% predicted
 - Continue to use steroid inhaler regularly in the same dose and bronchodilator as required
- **AMBER** – Symptoms not well controlled
 - PEF 50-80% predicted
 - Double the dose of steroid and use BD regularly
- **RED**
 - Distressing symptoms
 - PEF < 50% predicted
 - Obtain medical help immediately



Measuring Variability of Peak Expiratory Flow

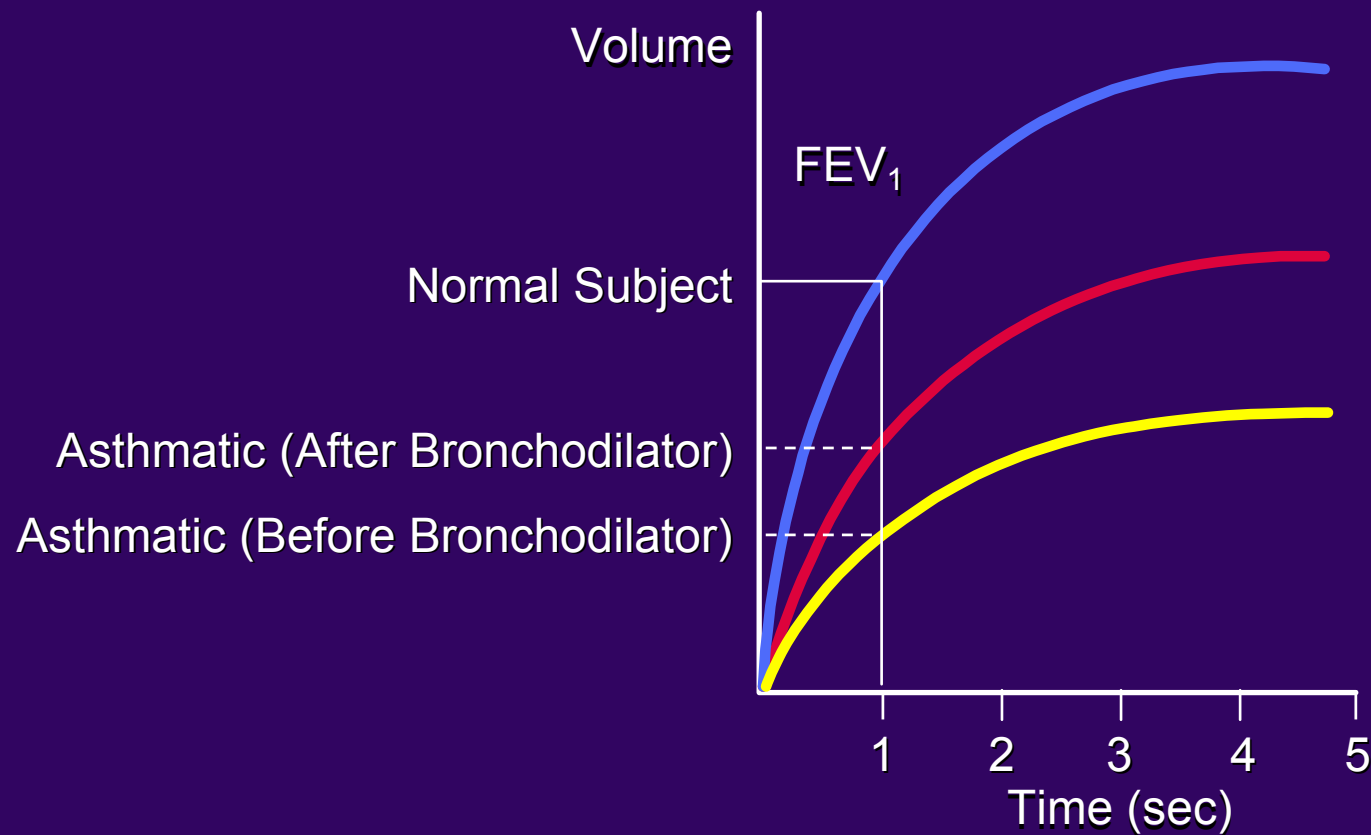


Diagnostic Testing

- Spirometry
 - Recommended to do spirometry pre- and post- use of an bronchodilator MDI to establish reversibility of airflow obstruction
 - $\geq 12\%$ reversibility or an increase in FEV1 of 200cc is considered significant
 - Obstructive pattern: reduced FEV1/FVC ratio
 - Restrictive pattern: reduced FVC with a normal FEV1/FVC ratio



Typical Spirometric (FEV_1) Tracings



Note: Each FEV_1 curve represents the highest of three repeat measurements

- If spirometry is normal,
Bronchoprovocation tests to show *inducible* obstruction (20 % fall in FEV1)
 - Methacholine (most standardized & available test)
 - Others = Exercise, Histamine, EVH, Cold Air, etc.

Diagnostic Testing

- Methacholine challenge
 - Patients breathe in increasing amounts of methacholine and perform spirometry after each dose
 - Increased airway hyperresponsiveness is established with a 20% or more decrease in FEV1 from baseline at a concentration < 8mg/dl

LUNG VOLUMES

- Useful for excluding restrictive lung disease
- Increased residual volume
- Ac. asthmatic episodes- FRC & TLC increased
- DLCO - normal

ABG

- Chronic stable asthma - normal
- Acute episode – hypoxemia
 - PCO₂ reduced (hypervent.)
- Severe obstruction – PCO₂ increased
 - Resp. acidosis

COMPLICATIONS

- FIXED OBSTRUCTIVE AIRWAY DISEASE
- RESPIRATORY FAILURE
- PNEUMOTHORAX
- LUNG COLLAPSE
- ABPA
- TREATMENT RELATED –STEROIDS

GOALS OF ASTHMA TREATMENT

- Min / no chronic day / night symptoms
- Min / no exacerbations
- Maintain(near) norm pulm. func.(elders/children > 5 yrs
- No limitation of activities: no school / work missed
- Min. use of SABA
- Min. / no adverse effects from medications

- **TREATMENT** manly divided into –
- A) Non pharmacological treatment
 - ✓ *Patient education*
 - ✓ *Environmental Control*
 - ✓ *Vaccination*
 - ✓ *Immunotherapy*
 - ✓ DIET – Rely on natural foods.
- B) Pharmacological treatment
 - ✓ Long-term control medications or “controllers”
 - ✓ Quick-relief medications or “relievers”

➤ Non pharmacological treatment

- *Education:-*

- ✓ The goal of asthma education is to improve patient understanding of the disease and its management and, consequently, to improve adherence to treatment recommendations.

- *Environmental Control and other comorbid conditions:-*

- ✓ For those with severe asthma who remain symptomatic despite intensive drug therapy.

- ✓ Avoidance can prevent exacerbations, reduce the need for drug treatment, and decrease utilization of emergency facilities.

Identify Precipitating Factors and Comorbid Conditions

Precipitating Factors

- Allergens
- Irritants (eg, environmental, tobacco smoke)
- Respiratory viruses
- Medications

Comorbid Conditions

- GERD
- Rhinosinusitis
- Rhinitis
- OSA
- Obesity
- ABPA

GERD=gastroesophageal reflux disease.

OSA=obstructive sleep apnea.

ABPA=allergic bronchopulmonary aspergillosis.

- *Vaccination:-*

- ✓ Inactivated influenza vaccine may be safely administered to patients with asthma. It seems likely that influenza vaccination would decrease the incidence of exacerbations of asthma

- *Immunotherapy :-*

- ✓ Allergen immunotherapy also appears to be of benefit in highly selected patients with defined allergic triggers.
- ✓ who have mild- or moderate- persistent asthma not adequately controlled with inhaled medications may be considered for immunotherapy.

IMMUNOTHERAPY

- Gradual adm. of increasing doses of allergen extract to decrease sensitivity to allergens.
- **MOA** – Induce blocking antibody , dec. in IgE , modulation of mast cells & basophils.
- Considered for pts. with hay fever & asthma , rhinitis & asthma sensitive to specific allergen
- **CI** – Immunodef. diseases , malignancy , severe uncontrolled asthma , tt with B – blockers

PHARMACOLOGICAL THERAPY

- RELIEVERS

- Rescue medications
- Bronchodilators
- Quick relief of symptoms (2-3 min)
- Used during acute attacks
- Action lasts 4-6 hrs

• PREVENTERS

- Prevent future attacks
- Long term control
- Prevent airway remodelling
- Regular use
- Act within 1-3 hrs
- Action lasts 12-24 hrs.

TREATMENT

- RELIEVERS
- SHORT ACTING BETA 2 AGONISTS
- ANTICHOLINERGICS
- SYSTEMIC GLUCOCORTICOSTEROIDS
- METHYL XANTHINES

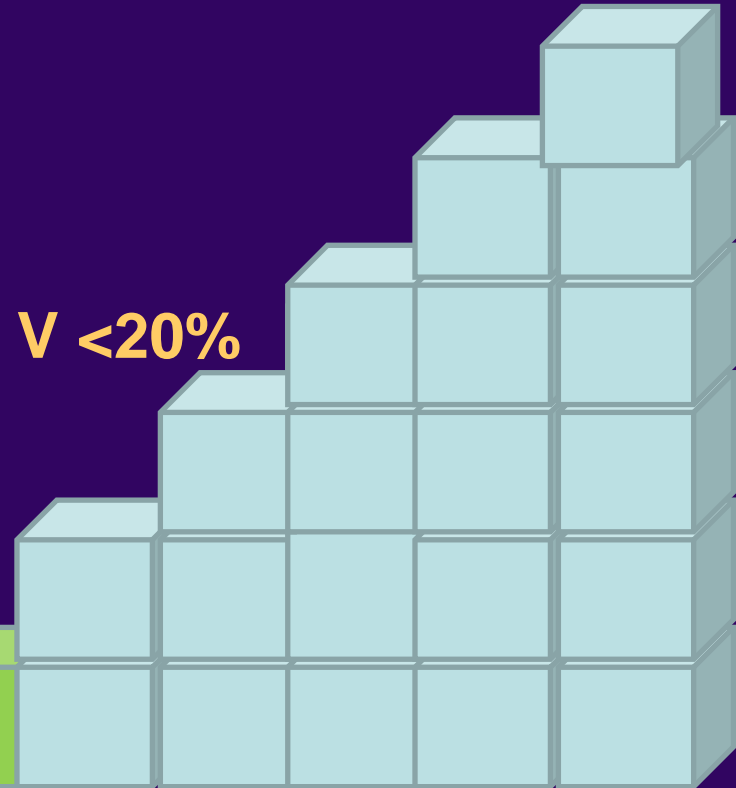
- PREVENTORS
- INHALATIONAL /SYSTEMIC STEROIDS
- LONG ACTING BETA 2 AGONIST
- MAST CELL STABILIZER
- LEUKOTRIENE MODIFIERS
- ANTI HISTAMINIC
- ANTI IgE
- ALLERGEN SPECIFIC IMMUNOTHERAPY
- METHOTREXATE/GOLD/CYCLOSPORIN E

Intermittent

Severity

Impairment	Symptoms	≤ 2 days/week
	Nighttime awakenings	$\leq 2x$ /month
	relief medication	≤ 2 days/week
	Activity interference	None
	Lung function	Normal between exacerbations; $FEV1 > 80\%$ and $FEV1/FVC > 85\%$
Risk	Exacerbations requiring steroids	0-1/year

STEP 1*
Preferred:
Short-acting beta-agonist (SABA) as needed



* Patients ≥ 12 yrs of age



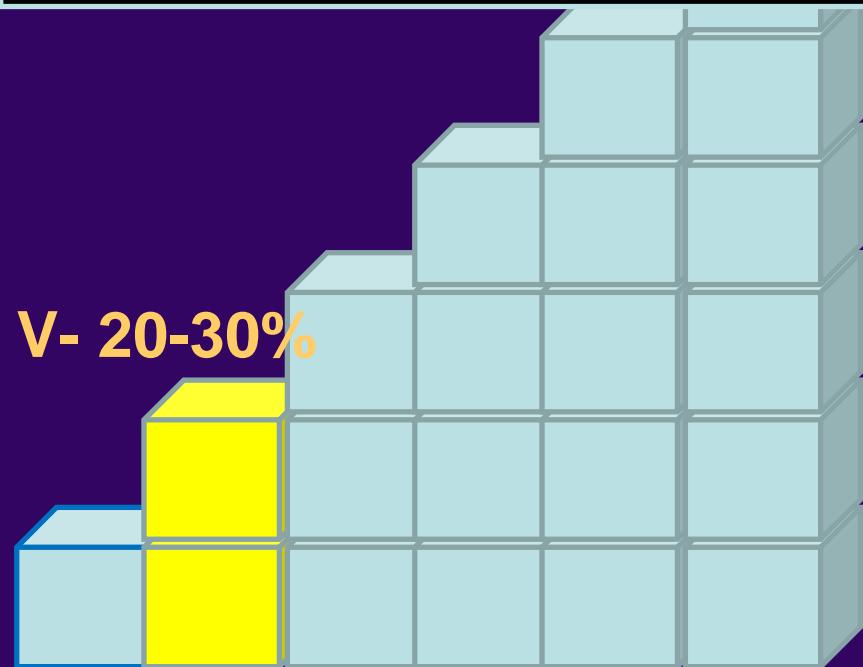
Treating to Achieve Asthma Control

Step 1 – As-needed reliever medication

- Patients with occasional daytime symptoms of short duration
- A rapid-acting inhaled β_2 -agonist is the recommended reliever treatment
- When symptoms are more frequent, and/or worsen periodically, patients require regular controller treatment (*step 2* or higher)

Severity		Mild Persistent
Impairment	Symptoms	> 2 days/wk but not daily
	Nighttime awakenings	3-4x/month
	relief medication	>2 days/wk but not daily
	Activity interference	Minor limitation
	Lung function	FEV1=>80% FEV1/FVC >80%
Risk	Exacerbations requiring steroids	>-2/year

STEP 2*
Preferred:
 Low-dose inhaled corticosteroid
Alternatives:
 Cromolyn
 Leukotriene antagonist (LTRA)
 Nedocromil
 Theophylline



* Patients >= 12 yrs of age



Treating to Achieve Asthma Control

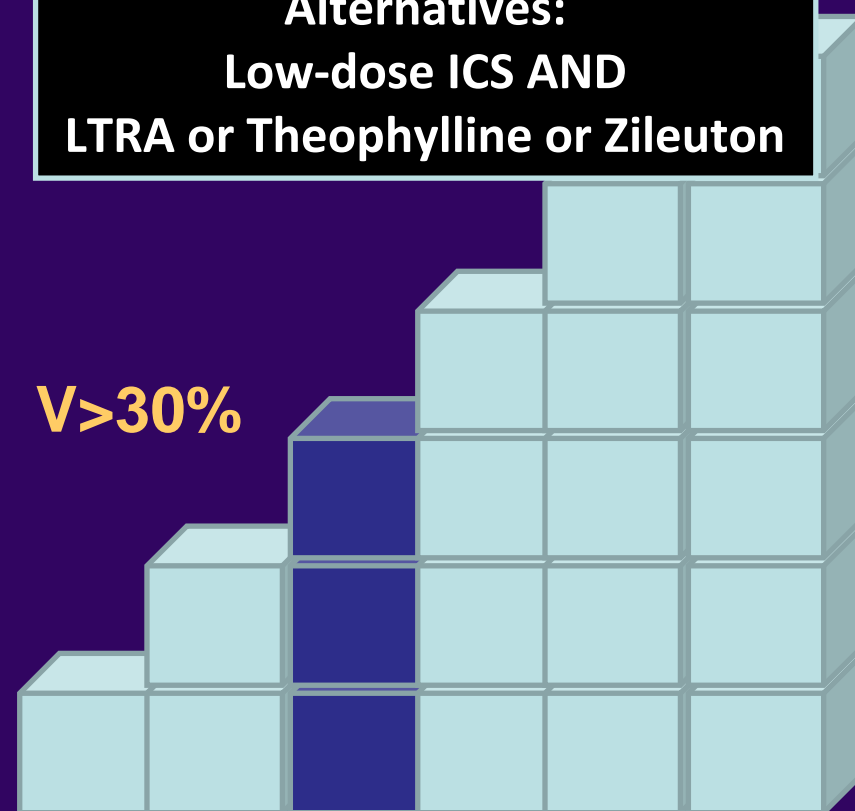
Step 2 – Reliever medication plus a single controller

- A low-dose inhaled glucocorticosteroid is recommended as the initial controller treatment for patients of all ages
- Alternative controller medications include leukotriene modifiers appropriate for patients unable/unwilling to use inhaled glucocorticosteroids

Moderate Persistent

Severity		
Impairment	Symptoms	Daily
	Nighttime awakenings	>1x/wk but not nightly
	relief medication	Daily
	Activity interference	Some limitation
	Lung function	FEV1=60-80% FEV1/FVC=75-80%
Risk	Exacerbations requiring steroids	>-2/year

STEP 3*
 Preferred:
 Low-dose ICS & (LABA)
 OR
 Medium-dose ICS
 Alternatives:
 Low-dose ICS AND
 LTRA or Theophylline or Zileuton



* Patients >= 12 yrs of age



Treating to Achieve Asthma Control

Step 3 – Reliever medication plus one or two controllers

- For adults and adolescents, combine a low-dose inhaled glucocorticosteroid with an inhaled long-acting β_2 -agonist either in a combination inhaler device or as separate components
- Inhaled long-acting β_2 -agonist must not be used as monotherapy
- For children, increase to a medium-dose inhaled glucocorticosteroid



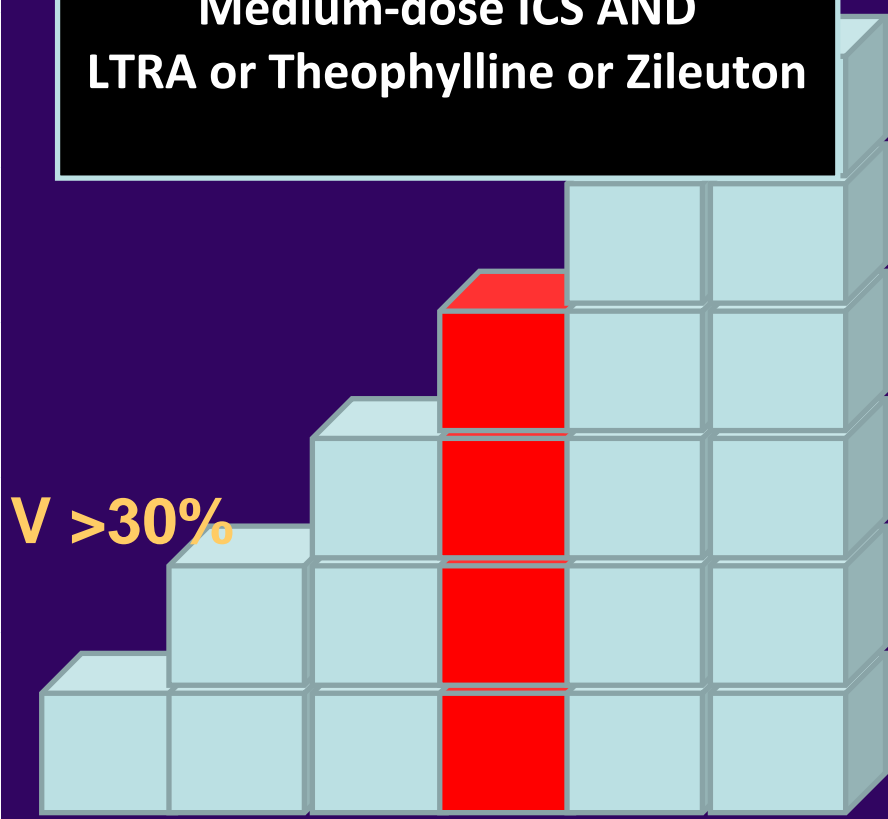
Treating to Achieve Asthma Control

Additional Step 3 Options for Adolescents and Adults

- Increase to medium-dose inhaled glucocorticosteroid
- Low-dose inhaled glucocorticosteroid combined with leukotriene modifiers
- Low-dose sustained-release theophylline

Severity		Severe Persistent
Impairment	Symptoms	Throughout the day
	Nighttime awakenings	Often 7x/wk
	relief medication	Several times per day
	Activity interference	Extremely limited
	Lung function	FEV1 < 60% FEV1/FVC < 75%
Risk	Exacerbations requiring steroids	> -2/year

STEP 4*
 Preferred:
 Medium-dose ICS & Long-acting beta-agonist
 Alternatives:
 Medium-dose ICS AND LTRA or Theophylline or Zileuton



* Patients >= 12 yrs of age



Treating to Achieve Asthma Control

Step 4 – Reliever medication plus two or more controllers

- Selection of treatment at *Step 4* depends on prior selections at *Steps 2 and 3*
- Where possible, patients not controlled on *Step 3* treatments should be referred to a health professional with expertise in the management of asthma



Treating to Achieve Asthma Control

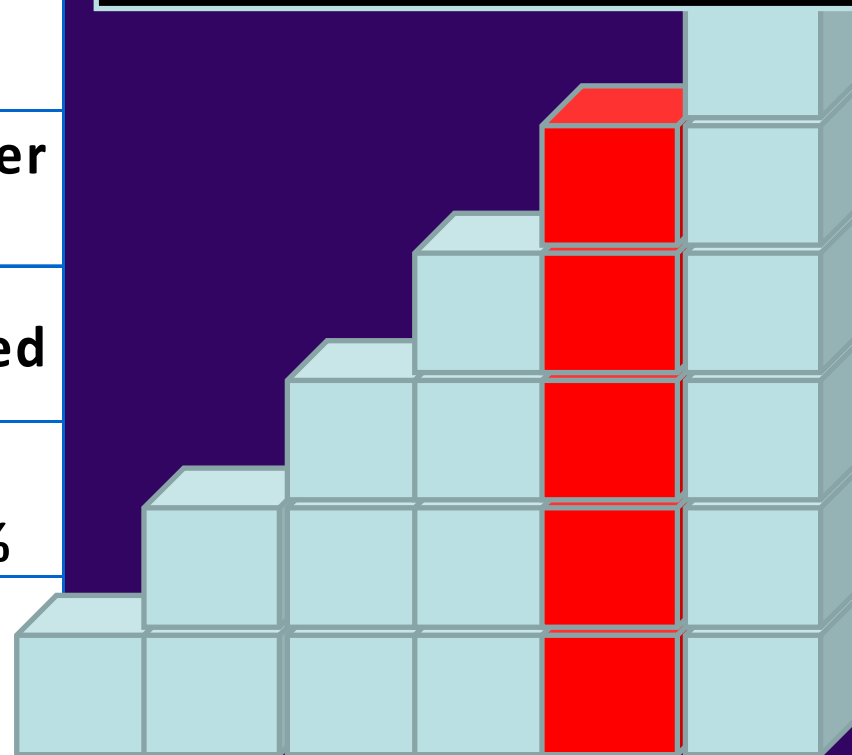
Step 4 – Reliever medication plus two or more controllers

- Medium- or high-dose inhaled glucocorticosteroid combined with a long-acting inhaled β_2 -agonist
- Medium- or high-dose inhaled glucocorticosteroid combined with leukotriene modifiers
- Low-dose sustained-release theophylline added to medium- or high-dose inhaled glucocorticosteroid combined with a long-acting inhaled β_2 -agonist

Severe Persistent

Severity		
Impairment	Symptoms	Throughout the day
	Nighttime awakenings	Often 7x/wk
	relief medication	Several times per day
	Activity interference	Extremely limited
	Lung function	FEV1 < 60% FEV1/FVC < 75%
Risk	Exacerbations requiring steroids	> -2/year

STEP 5*
High-dose ICS &
Long-acting beta-agonist
AND
Oral steroids +
Omalizumab (anti-IgE) for pts
with allergies





Treating to Achieve Asthma Control

Step 5 – Reliever medication plus additional controller options

- Addition of oral glucocorticosteroids to other controller medications may be effective but is associated with severe side effects
- Addition of anti-IgE treatment to other controller medications improves control of allergic asthma when control has not been achieved on other medications

RELIEVERS

- SHORT ACTING β AGONISTS
- MOA – BD , inc. mucus production , inhibition of mediator release from inflamm. cells.
- SE – Tachycardia , tremors , headache ,hypokalemia hyperglycemia.
- Onset of action – 5 min , dur. of action – 3 – 6 hrs
- **Salbutamol** – 2,4 mg oral ; 0.25-0.5 mg i.m /s.c ;
100- 200 μ g by inhalation 4- 6 hrly
0.15 – 0.2 mg / kg / dose nebulisation
- **Terbutaline** – 5 mg oral QID , 0.25 mg s.c , may rpt after 30 min ,max 0.5 mg in 4 h, 250 μ g inh. 4-6 hr

RELIEVERS

- ANTICHOLINERGICS
- MOA – BD ; acts on receptors located on larger central airways.
- Gradual onset & late peak at 60 – 90 min.
- Axn lasts 4 – 6 hrs .
- SE - dry mouth , cough , bad taste , systemic sym. rare due to poor abs. from lungs & GIT
- Ipratropium bromide - 40 – 80 μg by inh
- 2 puffs 4-6 hrly

PREVENTERS

- CORTICOSTEROIDS
- MOA – Reduce br. hyperreactivity , mucosal edema , suppress inflamm. response to AG – AB rnc.
- SE - hoarseness of voice , dysphonia, sorethroat , oral thrush (min. by use of spacer / gargling after every dose)
- Mild persistant - severe persistant asthma
- Beclomethasone -200 -800 μ g twice daily
- Budesonide – 200 – 800 μ g twice daily
- Fluticasone – 100 – 250 (max 1000) μ g twice daily

ESTIMATED EQUIPOTENT DOSES OF INHALED GLUCOCORTICOSTEROIDS

DRUG	LOW(μg)	MOD (μg)	HIGH(μg)
Beclomethasone	200-500	500-1000	1000-2000
Budesonide	200-400	400-800	800-1600
Ciclesonide	80-160	160-320	320-1280
Flunisolide	500-1000	1000-2000	>2000
Fluticasone	100-250	250-500	500-1000
Mometasone	200-400	400-800	800-1200
Triamcinolone	400-1000	1000-2000	>2000

PREVENTERS

- LABA
- Moderate – severe persistent asthma
- Salmeterol 50 µg/ puff 1- 2 puff 12 – 24 hrly
- Formeterol 12 µg/ puff 1- 2 puff 12 – 24 hrly

- Ideal combination
- Formoterol (fast & sustained relief) + Budesonide (1 – 2 times daily use) Dose: 1- 4 puffs (OD/BD)

- Another comb. : Salmeterol + Fluticasone

PREVENTERS

- SYSTEMIC CORTICOSTEROIDS
- Severe persistent asthma / asthma exacerbations
- Methylprednisolone iv 60 – 500 daily in divided doses
Oral prednisolone 5 – 60 mg daily / every alt day
- SE – Skin thinning , bruising , adrenal suppression ,
cataracts , osteoporosis , oral candidiasis ,
psychosis , hyperglycemia, fluid retention

PREVENTERS

- METHYLXANTHINES
- MOA – Blockade of adenosine receptors which contract smooth muscles
 - inhibit phosphodiesterase which degrade cAMP that causes BD
- Narrow margin of safety – GIT ,CNS ,CVS
- Theophylline anhydrous – 100-300 mg TDS (15 mg/kg/d)
- Hydroxyethyl theophylline (etophylline , theo 80%)
 - 250 mg oral / iv / im

PREVENTERS

- MAST CELL STABILISERS

- Inhibit degranulation of mast cells
- SE – Throat irritation , cough , arthralgia , rashes
- Sod. cromoglycate– 1 mg /dose: 2puffs QID
- Nedocromil sod. – 4 mg (2 puffs) BD

- HISTAMINE RECEPTOR ANTAGONISTS

- Useful in pts. suffering from both seasonal allergic rhinitis & asthma , in EIA
- Loratidine, azelastine (red. Need for ICS-Bues et al

PREVENTERS

- LEUKOTRIENE RECEPTOR ANTAGONISTS

- Montelukast 5, 10 mg – headache , gastritis , CSS
- Zafirlukast 10 ,20 , 40 mg

- LEUKOTRIENE SYN. INHIBITORS

- Zileuton 1.6 / 2.4 g (600 mg 1 QID) – hepatitis
- Allergen- induced asthma , EIA , AIA

PREVENTORS

- Omalizumab, a monoclonal anti-IgE antibody, is currently the only approved anti-IgE therapy used for
- the prophylaxis of asthma exacerbations and control of symptoms in moderate to severe allergic asthma in patients ≥ 12 years of age
- Given as an add-on therapy to ICS in moderate to severe allergic asthma, it significantly reduces asthma exacerbations **and** allows doses of ICS to be reduced

PREVENTERS

- ANTI – IgE ANTIBODY – OMALIZUMAB
- MOA – Inh. of IgE mediated mast cell degranulation
- Dose – 0.016 mg x kg x serum IgE in IU / ml SC every 2-4 wks
- Advantages –
 - useful in con. with concomitant asthma & allergic rhinitis
- SE – Urticaria , fatigue , paresthesia

BRONCHIAL HYGIENE

- Asthmatics with ass. bronchitis / bronchiectasis gain benefit from postural drainage / percussion.
- In chronic asthmatics bronchoscopy can be done to remove large tenacious mucus plugs

OTHERS

- CYCLOSPORINE – Inhibits mediator release from mast cells & basophils & inh. syn. of lymphokines
- SE – HTN , Hypertrichosis ,neuro. dist., nephrotoxicity
- GOLD – Recent 8 month controlled trial of 227 steroid- dep. asthmatics (prednisone \geq 10 mg/d) randomised pts. to oral gold (auranofin 4 mg bd) or placebo. Significant decrease in oral steroid (\geq 50%) was with gold (60%), placebo (32%)
- TROLEANDOMYCIN – Macrolide antibiotic - prolong $t_{1/2}$ of CS , ass. with SE
- Methotrexate ,Inhaled furosemide , neb. lidocaine etc

All Asthma Drugs Should Ideally Be Taken Through The Inhaled Route

- Oral
- Slow onset of action
- Large dosage used
- Greater side effects
- Not useful in ac. sym.
- Inhaled route
- Rapid onset of action
- Less amount of drug used
- Better tolerated
- TOC in acute symptoms

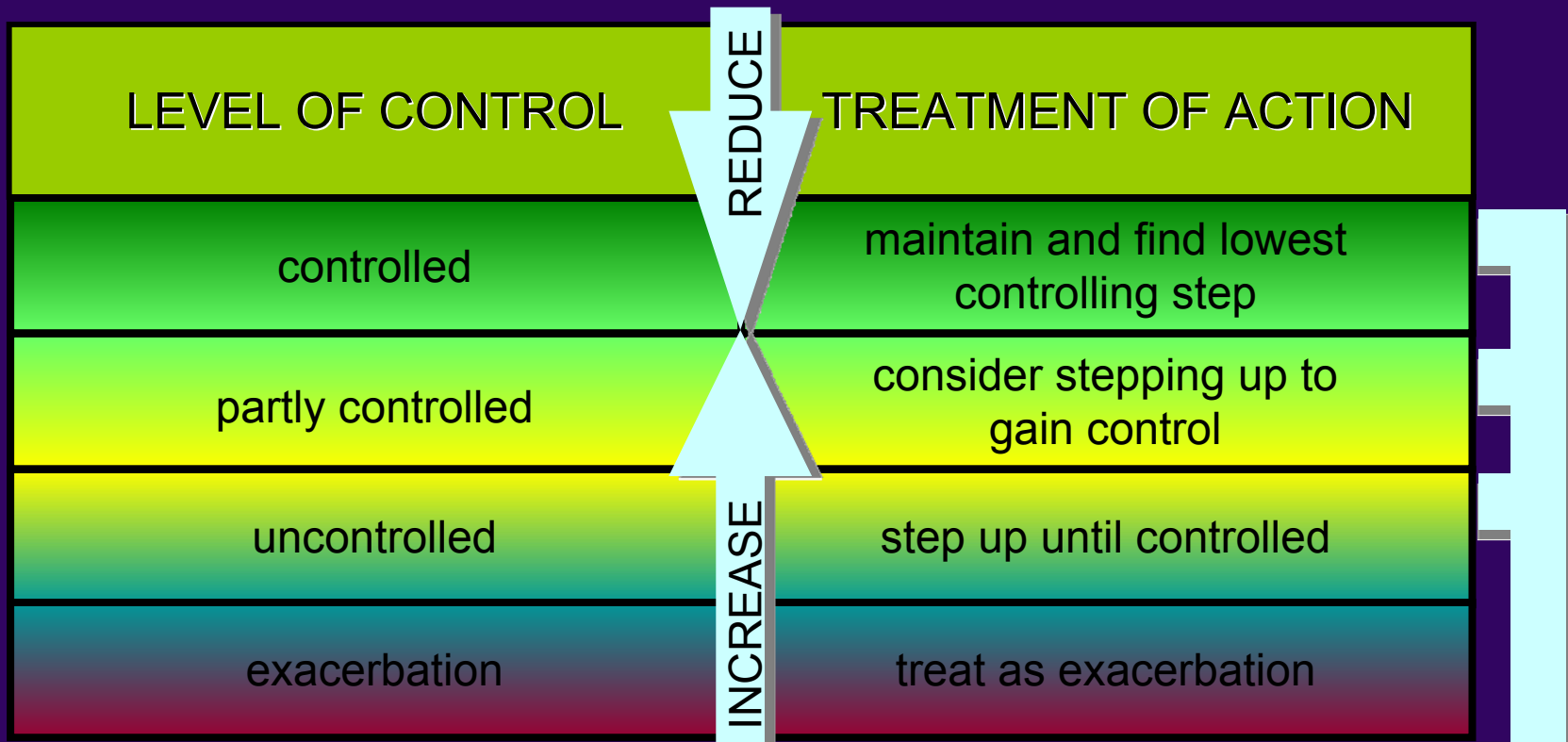


Levels of Asthma Control

(Assess patient impairment)

Characteristic	Controlled (All of the following)	Partly controlled (Any present in any week)	Uncontrolled
Daytime symptoms	Twice or less per week	More than twice per week	3 or more features of partly controlled asthma present in any week
Limitations of activities	None	Any	
Nocturnal symptoms / awakening	None	Any	
Need for rescue / "reliever" treatment	Twice or less per week	More than twice per week	
Lung function (PEF or FEV ₁)	Normal	< 80% predicted or personal best (if known) on any day	

Assessment of Future Risk (risk of exacerbations, instability, rapid decline in lung function, side effects)



REDUCE

INCREASE





Treating to Maintain Asthma Control

- When control has been achieved, ongoing monitoring is essential to:
 - maintain control
 - establish lowest step/dose treatment
- Asthma control should be monitored by the health care professional and by the patient



Treating to Maintain Asthma Control

Stepping down treatment when asthma is controlled

- When controlled on medium- to high-dose inhaled glucocorticosteroids: 50% dose reduction at 3 month intervals
- When controlled on low-dose inhaled glucocorticosteroids: switch to once-daily dosing



Treating to Maintain Asthma Control

Stepping down treatment when asthma is controlled

- When controlled on combination inhaled glucocorticosteroids and long-acting inhaled β_2 -agonist, reduce dose of inhaled glucocorticosteroid by 50% while continuing the long-acting β_2 -agonist
- If control is maintained, reduce to low-dose inhaled glucocorticosteroids and stop long-acting β_2 -agonist



Treating to Maintain Asthma Control

Stepping up treatment in response to loss of control

- Rapid-onset, short-acting or long-acting inhaled β 2-agonist bronchodilators provide temporary relief.
- Need for repeated dosing over more than one/two days signals need for possible increase in controller therapy



Treating to Maintain Asthma Control

Stepping up treatment in response to loss of control

- Use of a combination rapid and long-acting inhaled β_2 -agonist (e.g., formoterol) and an inhaled glucocorticosteroid (e.g., budesonide) in a single inhaler both as a controller and reliever is effective in maintaining a high level of asthma control and reduces exacerbations .
- Doubling the dose of inhaled glucocorticosteroids is not effective, and is not recommended



Asthma Management and Prevention Program

Component 4: Manage Asthma Exacerbations

- Exacerbations of asthma are episodes of progressive increase in shortness of breath, cough, wheezing, or chest tightness
- Exacerbations are characterized by decreases in expiratory airflow that can be quantified and monitored by measurement of lung function (FEV₁ or PEF)
- Severe exacerbations are potentially life-threatening and treatment requires close supervision



Assessment of Future Risk

Risk of decline

Any exacerbation should prompt review of maintenance treatment

- Frequent
- Ever
- Low FEV₁, exposure to cigarette smoke, high dose medication



Asthma Management and Prevention Program

Component 4: Manage Asthma Exacerbations

Primary therapies for exacerbations:

- Repetitive administration of rapid-acting inhaled β_2 -agonist
- Early introduction of systemic glucocorticosteroids
- Oxygen supplementation
- Assess regularly ;If all these fail consider mechanical ventilation.

INDICATIONS FOR NONINVASIVE & MECHANICAL VENTILATION

• NONINVASIVE

- Alert & cooperative
- Hemodyn. stable
- No need for intub. to protect their airway / to remove excessive secretions.

MECH. VENT.

PaCO₂ >6.6KPa(50mmhg)
PaO₂ <6.6KPa(50 mmhg)
Ph ≤ 7.3 & falling
Resp. distress & exhaustn
Resp. arrest.

KEY MESSAGES

- Asthma can be effectively controlled, which improves the quality of life.
- A stepwise approach to pharmacologic therapy is recommended. The aim is to accomplish the goals of therapy with the least possible medication.

THANK U