Diagnosis and Management of Asthma

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Definition

- Chronic inflammatory disorder of the airways
- Causes recurrent wheezing, breathlessness, tightness and coughing usually at night or early morning
- Widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment
- Bronchial hyperresponsiveness to a variety of stimuli
Background

- 34.1 million asthmatics in the US
  - 88%
  - % of which are estimated to have an allergic component

- In 2000 asthmatics had:
  - 10.4 million outpatient visits to physicians
  - 2 million emergency room visits
  - 500,000 hospitalizations

- Mortality of asthma increased 50% from 1980 to mid-1990’s
Health Care Costs

- Every year an estimated $19.7 billion direct and indirect costs
  - $14.7 billion direct costs. Prescription drug costs were the largest single direct medical expenditure contributing $6 billion
  - $5 billion indirect costs. Largest contributor: 13 million+ days of school lost ($1.5 billion) and 10 million lost work days
Adult Asthma Facts

- 14.5 million workdays lost due to asthma, a 2.3 fold increase from the early 80’s to mid 90’s
- Adults accounted for over 1.3 million ED visits and 288,000 hospitalizations
- One third of asthma related deaths occur in patient 35-44 yrs. Old
- Over 50% of asthma related deaths occur in patients age 65 and over
Children with Asthma

- Asthma rates in children under five increased 160% in the 1990’s
- 9 million children under 18 have been diagnosed with asthma in their lifetime
- 29% of children with food allergy have asthma
- Third ranking cause of hospitalization among children under 15
- 1 of 10 school age children have asthma
Pathology

- Mast cells, eosinophils, epithelial cells, macrophages, and activated T cells are key features in the inflammatory process of asthma.
- All may be important factors in initiating and maintaining the level of airway inflammation.
- This process is multicellular, redundant, and self-amplifying.
Pathology

- Cell derived mediators can influence airway smooth muscle tone, modulate vascular permeability, activate neurons, stimulate mucous secretions, and produce characteristic structural changes in the airway.

- The inflammatory process is redundant in its ability to alter airway physiology and architecture.
Airway Inflammation

- Exaggerated bronchoconstrictor response to stimuli
- Leads to wheezing and dyspnea
- Tested with methacholine
Airflow Obstruction

- Acute Bronchoconstriction
- Airway edema
- Chronic mucous plug formation
- Airway remodeling
History

- Episodic symptoms of airflow obstruction
- Airflow obstruction is at least partially reversible
- Alternative diagnoses are excluded
Symptoms

- Recurrent episode of:
  - Shortness of Breath
  - Wheezing
  - Chest Tightness
  - Cough, particularly at night and early in the morning
Pattern of Symptoms

- Perennial, seasonal or both
- Continual, episodic or both
- Diurnal variations, especially nocturnal and on awakening early in the morning
Precipitating and/or Aggravating Factors

- Viral respiratory infections
- Environmental allergens
- Exercise
- Occupational chemicals or allergens
- Irritants
- Changes in weather
- Endocrine factors
- Strong emotional expression
Differential Diagnosis

- COPD
- Sinusitis/Allergic Rhinitis
- GERD
- Vocal cord/laryngeal dysfunction
- Congestive Heart Failure
- Cough due to ACE Inhibitor
- Wheeze due to beta blocker
- Pulmonary Embolus
- Pulmonary Fibrosis
- Bronchiectasis
GERD and Asthma

- Approximately 80% of asthmatics have GERD, about 50% have unrecognized symptoms and remain untreated.
- GERD may be the trigger or may be the cause of the wheeze and cough without asthma.
Allergic Rhinitis and Asthma

- Allergic Rhinitis increased the risk of asthma three-fold
- 80% of asthmatics have allergic rhinitis
Classification of Severity

- Step 1  Intermittent
- Step 2  Mild Persistent
- Step 3  Moderate Persistent
- Step 4  Severe Persistent
Step 1 Intermittent

- Symptoms ≤ 2 times a week
- Asymptomatic and normal PEF between exacerbations
- Exacerbations brief and intensity varies
- Nighttime symptoms ≤ 2 times per month
- FEV1 ≥ 80% pred
- PEF ≤ 20% variability
Step 2  Mild Persistent

- Symptoms > 2 times per week but < 1 per day
- Use of SABA > 2 weekly not > 1/day
- Exacerbations may have minor affect activity
- Nighttime symptoms > 2 times a month
- FEV1 or PEF ≥ 80% predicted
- PEF variability 20-30%
Step 3  Moderate Persistent

- Daily symptoms
- Daily use of inhaled b2-agonist
- Exacerbations have some affect activity
- Exacerbations > W times a week
- Nighttime symptoms > 1 time a week
- FEV1 or PEF > 60 or < 80% predicted
- PEF variability > 30%
Step 4 Severe Persistent

- Daily symptoms throughout the day
- Limited physical activity
- Use of SABA several times per day
- Frequent exacerbations
- Nighttime symptoms frequent
- FEV1 or PEF ≤ 60% predicted
- PEF variability > 30%
Goals of Therapy

- Minimal or no chronic symptoms day or night
- Minimal or no exacerbations
- No limitations on activities; no school/work loss
- Maintain normal pulmonary functions
- Minimal use of rescue b2 agonists
- Minimal or no adverse effects of medications
Pharmacologic Therapy

- Inhaled corticosteroids
- Combination LABA/steroids
- Use of SABA
- Leukotriene Modifiers
- Anticholiergic Inhalers
- Low dose Theophylline
- PPI and H2 agonist
- Nasal Steroids
Asthma and IgE

- IgE can play an important role in asthma
- IgE levels from 30-700 IU/ml indicate an allergic role in the patient’s asthma exacerbations
- RAST will indicate allergens that the patient will react to causing asthma exacerbation
- IgE binding will start the whole allergic cascade that eventually starts an exacerbation
IgE release of Inflammatory Mediators

- **Immediate Release**
  - Histamine, TNF, Protease, Heparin
  - Sneezing, congestion, itchy and watery eyes

- **Over minutes**
  - Lipid mediators, Prostaglandins, Leukotrienes
  - Wheezing, Bronchoconstriction

- **Over hours**
  - Cytokine production: IL-4, IL-3
  - Mucous production, Eosinophil recruitment
Treatment of IgE Mediated Asthma

- First identify allergens
- Inhaled therapy
- Diary of symptoms
- Use of Omalizumab for treatment
Control Medications

- ICS/LABA combinations
- ICS alone
- Methylxanthines
- Leukotriene Modifiers
- Monoclonal Antibody therapy
Rescue Medications

- Inhaled b2 agonists
- Anticholinergics
- Systemic Corticosteroids
Aerosol Delivery Devices

- MDI – Meter dose inhaler
- HFA – new CFC absent inhaler
- DPI - Dry powder inhaler
- Nebulizer
Stepwise Approach to Therapy

- Intermittent – SABA usually sufficient
- Persistent – Control medication is recommended
- Review of Stepwise Approach
Management of Exacerbations

- Oxygen is recommended for most patients
- Inhaled b2 agonists
- Anticholinergics may be considered
- Systemic Corticosteroids are recommended for most patients
- Antibiotics are not recommended for asthma but are necessary for comorbid conditions
- Chest PT, Mucolytics, Sedation, Hydration not recommended
Decision to Admit

- Based on severity of symptoms, duration, severity of airflow obstruction, course and severity of prior exacerbations, adequacy of support and home conditions

- Does the patient require frequent monitoring, is there impending respiratory failure, is there a likelihood of increasing severity of exacerbation?
Decision to Discharge

- Oxygen requirements at baseline
- Inhaled regimen established
- Oral medications established
- Follow up appointments
- Recognition of trigger and avoidance discussed
Children Treatment

- Key to treatment is control of symptoms
- Children are recommended to remain on the lowest dose of inhaled therapy and remain as active as possible
- Again use of prednisone should be limited to only when necessary
Case Study

- MM 34yo female middle school teacher
- Lives in farm country among trees
- Has been treated for three years from Oct. to April for bronchitis/laryngitis
- Presents whispering, coughing, SOB with exercise as minimal as walking into school
- New diagnosis of asthma
Diagnosis

- PFT’s
- RAST
- IgE
- GI workup
 Treatment

- Start with high dose Advair
- Albuterol rescue
- Asthma action plan
- Protonix
- Sleep study
- Xolair
The End

- Please ask questions now.

- Thanks