# MANAGEMENT of COUGH

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# Three Categories of Cough

- Acute Cough = < 3 Weeks Duration
- Subacute Cough = 3 – 8 Weeks Duration
- Chronic Cough = > 8 Weeks Duration

# Acute Cough < 3 Weeks

# Differential Diagnosis
# Acute Cough

- Upper Respiratory Tract infections:

  -Viral syndromes, sinusitis viral / bacterial
- Allergies
- Exacerbation of Chronic Obstructive Pulmonary Disease (COPD)
- Left Ventricular Heart Failure
- Pneumonia
- Foreign Body Aspiration

# Common Cold/Viral Rhinosinusitis

- Presentation:

- **Symptoms –** Nasal Passages
  - Rhinorrhea, Sneezing, Nasal obstruction, Post nasal drip
- **Signs** - +/- Fever, +/- throat irritation, normal chest auscultation
- **Diagnostic – No** Laboratory or X-ray

# Common Cold/Viral Rhinosinusitis

- **Treatment**

- Antihistamine (H1) + Pseudoephedrine

OR

- Naproxen

# Treatment Failure

Viral Rhinosinusitis

VS

Bacterial Rhinosinusitis

# Viral vs. Bacterial Rhinosinusitis

- **Viral**
  - Most Common
  - Treat empirically
- **Bacterial**
  - Less Common
  - Treat in cases of treatment failure
  - Treat for set criteria

# Criteria Bacterial Rhinosinusitis

- Treatment failure

+

Two of the following signs or symptoms

1.Maxillary Tooth Ache

2. Purulent Nasal Discharge

3. Abnormal Sinus Trans-illumination

4. Discolored Nasal Discharge

# Treatment

- Antihistamine + Pseudoephedrine

+

Oxymetazoline (Afrin)

+

Antibiotics against Haemopholis influenza and Streptococcus pneumonia

(Bactrim TMP/Sulfa or Amoxacillin)

# Subacute Cough 3-8 Weeks

# Subacute Cough Differential Diagnosis

- Postinfectious
- Bacterial Sinusitis
- Asthma

# Post Infectious Cough

- A cough that begins with an acute respiratory tract infection and is not complicated* by pneumonia

*Not complicated = Normal lung exam normal chest X-ray

# Post Infectious Cough

- Post Infectious cough will resolve without treatment
- Cause = Postnasal drip or Tracheobronchitis

# Indications For Chest X-ray

- Abnormal auscultory lung exam

# Chest X-ray: Management

Treat Abnormality

- Infiltrate = Pneumonia = Antibiotics
- Cardiomegaly/Pulmonary Edema = Heart Failure
- Normal Chest X-ray Consider Empiric Therapy for Asthma

# Chronic Cough > 8 Weeks

# Chronic Cough
# Differential Diagnosis

- Post Nasal Drip (Nose and Sinus Conditions)
- Gastroesophogeal Reflux Disease
- Chronic Bronchitis from Tobacco
- Chronic Obstructive Pulmonary Disease
- Left Ventricular Heart Failure
- Lung Cancer
- Tuberculosis
- Asthma

# Patients Who Present With Chronic Cough Should Receive a Chest X-ray When Possible

# Chest X-ray and Differential Diagnosis

- **Normal X-ray**
  - **Post Nasal drip**
  - **Reflux Disease**
  - **Asthma**
  - **Chronic Bronchitis**
- **Abnormal X-ray**
  - **Tuberculosis**
  - **COPD**
  - **Heart Failure**
  - **Lung Cancer**

# Specific Causes of Cough Focus

- Asthma
- Chronic Obstructive Pulmonary Disease (COPD)

# Asthma

- Asthma is a Chronic Inflammatory Disorder of the Airway
- Activation of the Immune System = Airway Hyperresponsiveness + Airflow Limitation
- Airflow Limitation is Reversible

# Asthma

- Asthma is Present in all Age Groups
- Asthma Affects Men and Women Equally

# Asthma
# Signs and Symptoms

- Signs and Symptoms Vary from Patient to Patient as well as being Dynamic over time

- Classic Symptoms:  Wheezing
  - Shortness of Breath
  - Cough
  - Chest Tightness

# Asthma Precipitants

- Many Nonspecific Precipitants Provoke Asthma Symptoms and the Need for Medication
  - Respiratory Infections
  - Exercise
  - GI Reflux
  - Stress
  - Weather Changes

# Asthma Treatment

- Based on Symptom Severity
  - "Step" Approach

"Step Up" Meds =Poor Symptom Control

"Step Down" Meds = Good Control

# Classification Asthma Severity

| | | |
|---|---|---|
| Mild Intermittent | Symptoms<2X Week<br>Exacerbations Brief Rare | Night Symptom<br><2 X Month |
| Mild Persistent | Symptoms>2X Week < 1X Day Exacerbations Rare+/- Limit Activity | Night Symptom<br>>2 X Month |
| Moderate Persistent | Symptoms Daily<br>Symptoms Limit Activity<br>Exacerbations >2 per Week | Night Symptom<br>> 1 X Week |
| Severe Persistent | Continuous Symptoms<br>Limited Exercise Tolerance<br>Frequent Exacerbations | Night Symptom<br>Frequent |

# Asthma: Stepwise Management

| | Long Term Control | Quick Relief |
|---|---|---|
| Step4<br>Severe Persistent | Inhaled Steroid (High Dose)<br>+<br>Long Acting Bronchodilator<br>**(B2 Agonist or Theophylline)**<br>+<br>Oral Steroids | Short Acting Bronchodilator<br>**Inhaled B2 Agonist** |
| Step 3<br>Moderate Persistent | Inhaled Steroid (Med Dose)<br>Or<br>Long Acting Bronchodilator<br>**(B2 Agonist or Theophylline)**<br>+<br>Inhaled Steroids | Short Acting Bronchodilator<br>**Inhaled B2 Agonist** |

# Asthma: Stepwise Management

| | Long Term Control | Rapid Relief |
|---|---|---|
| Step 2<br>Mild<br>Persistent | Low Dose Inhaled Steroids | Short Acting<br>Bronchodilator<br>B2 Agonist |
| Step 1<br>Mild<br>Intermittent | No Daily Medications | Short Acting<br>Bronchodilator<br>B2 Agonist |

# Asthma: Medications

The Dose of Medication that Reaches the Lung is Dependant On:

- Delivery Device
- Drug Dose
- Patient Technique

# Inhaled $B_2$ Agonist

- Most Effective Drug for the Treatment of Acute Bronchospasm and Prevention of Exercise Induced Asthma
- Example: Albuterol, Proventil, Ventolin

# $B_2$ Agonist

- Target:  Selective for Bronchodilation

- Toxicity:  Tachycardia, Palpitations, Tremor
  Extreme overuse May = Hypokalemia

# Inhaled Corticosteroids

- Target:  Suppress Inflammation, Minimize Airway Hyperresponsiveness
- Toxicity:  Rare  Stunt Growth in Children, Dermal Thinning

# Theophyline (Methylxanthine)

- Target:  Smooth Muscle Dilation of the Bronchial Tree, Anti-Inflammatory, Mucociliary Clearance

- Toxicity: Nausea, Nervousness, Headache, Insomnia, Vomiting, Tachycardia, Tremor, Seizures

# Oral Steroids

- Target:  Most Effective Therapy for Decreasing Inflammation and Airway Hyperresponsiveness
- Toxicity:  Glucose Intolerance, Weight Gain, Hypertension, Osteoperosis

# Asthma Diagnosis

# Asthma Diagnosis

- History
- Physical Exam
- Clinical Suspicion/Response Empiric Trial
- Pulmonary Function Testing

# Pulmonary Function Testing

Lung Volume

Airflow Rates

Ability to Transfer Gas Across the Alveolar Capillary Membrane

# Flow Rates Define Asthma

- Forced Vital Capacity (FVC) = Volume of Gas that can be expelled from the lungs After Maximal Inspiration

- Forced Expiratory Volume in 1 Sec ($FEV_1$)= Volume of Gas Expelled in the First Second of the FVC Maneuver

# Flow Rate Compromise

- $FEV_1$/FVC 75% Mild Obstruction
- $FEV_1$/FVC 50-75% Moderate Obstruction
- FEV1/FVC <50% Severe Obstruction
    - REVERSIBILITY
- Increase 12% and 200 cc in $FEV_1$ OR
- Increase 15% and 200 cc in FVC

# Provocative Testing: Methacholine Challenge

- Positive Test =Decrease in FEV1 of at Least 20% at a dose of 16mg/ml or less
- A negative Test has a Negative Predictive Value For Asthma of 95%

# Chronic Obstructive Pulmonary Disease (COPD)

# COPD: Definition

- Airflow Obstruction From Chronic Bronchitis or Emphysema; Airflow obstruction is Progressive, may be accompanied by Airway Hyperreactivity and May be Partially Reversible

# COPD: Terms

- Chronic Bronchitis= Cough for Three Months in any 2 Successive Years without other Cause

- Emphysema = Pathologic Diagnosis Describing Airspace Destruction

# COPD: Risk Factors

- **SMOKING/TOBACCO**
- Genetic Alpha1 Antitrypsin Deficiency (Less Than 3% of Cases)
- Environmental/Occupational Exposure

# Natural History of COPD

- CHART HERE

# COPD: Diagnosis

- History
- Physical Examination
- Laboratory and Spirometry

# COPD: Patterns of Advanced Disease

## Pink Puffer (Emphysema)

- Dyspenea
- Age > 50
- Rare Cough
- Thin/Weight Loss
- Quit Auscultory Exam
- No Peripheral edema

## Blue Bloater (Bronchitis)

- Chronic Cough/Productive
- Age > 40
- Dyspnea Mild
- Over Weight
- Cyonotic
- Chest + Rhonchi/Wheezes

# COPD: Patterns of Advanced Disease

Pink Puffer (Emphysema)

- Normal Hematocrit
- $PaO_2$ Reduced
- $PaCO_2$ Normal/Reduced
- X-Ray = Hyperinflation

Blue Bloater ( Bronchitis)

- Hematocrit Elevated
- $PaCO_2$ Elevated
- X-Ray Increased Markings (Dirty X-Ray)

# COPD: History

- Smoking 20 Cigarettes/Day > 20 Years
- >40 Years Old
- Dyspnea > 50 years Old
- Cough

# COPD: Physical Exam

- Prolonged Expiration
- Expiratory Wheezing

Severe COPD

- Over distention of Lungs/ Increased A-P Diameter
- Decreased Heart Sounds
- Decreased Breath Sounds
- Pursed Lip Breathing
- Use of Accessory Muscles in Breathing

# COPD: Chest X-ray

- Lung Distention = Long Narrow Heart Shadow
  Flat Diaphragm

- Bullae = Radiolucent Areas > 1 cm in Diameter

(Caution Bullae can be Confused with Pneumothorax)

# COPD: Pulmonary Function Test

- Stage I = $FEV_1$ > 50% Predicted
- Stage II = $FEV_1$ 35-49% Predicted
- Stage III = $FEV_1$ < 35% Predicted

- $FEV_1$ < .75 L 1 Year Mortality = 30%
  10 Year Mortality = 95%

# COPD: Treatment

- **Stop Smoking**

- Smoking Cessation is Challenging:

  Without Intervention 5% Success

  With Intensive Intervention 22% Success at 5 Years

  (US Lung Health Study)

# COPD: Therapy Goals

- Induce Bronchodillitation
- Decrease Inflammatory Response

# COPD: Medication

- Bronchodilators = Beta$_2$-Agonists = Albuterol
- Anticholinergic Agents = Ipratropium (Atrovent)
- Theophylline
- Anti-Inflammatory Therapy = Corticosteroides

# COPD: Management

- Mild Variable Symptoms

  $B_2$-Agonist 1-2 Puffs Every 2-6 Hours

- Mild – Moderate Continued Symptoms

  Ipratropium 2-6 Puffs Every 6 Hours

  +

  B2-Agonist

# COPD: Management

- Inadequate Response to Ipratrpium + $B_2$ Agonist
- Add Sustained Release Theophylline 200-400mg 2x/day
- Nocturnal Symptoms Theophylline 400-800mg

# COPD: Management

- If Continued Poor Control

  Corticosteroids – Prednisone 40mg 1x/day
  For 10-14 Days*

If No Improvement Stop Abruptly

If Improvement Considered Inhaled Steroides

# COPD: Management

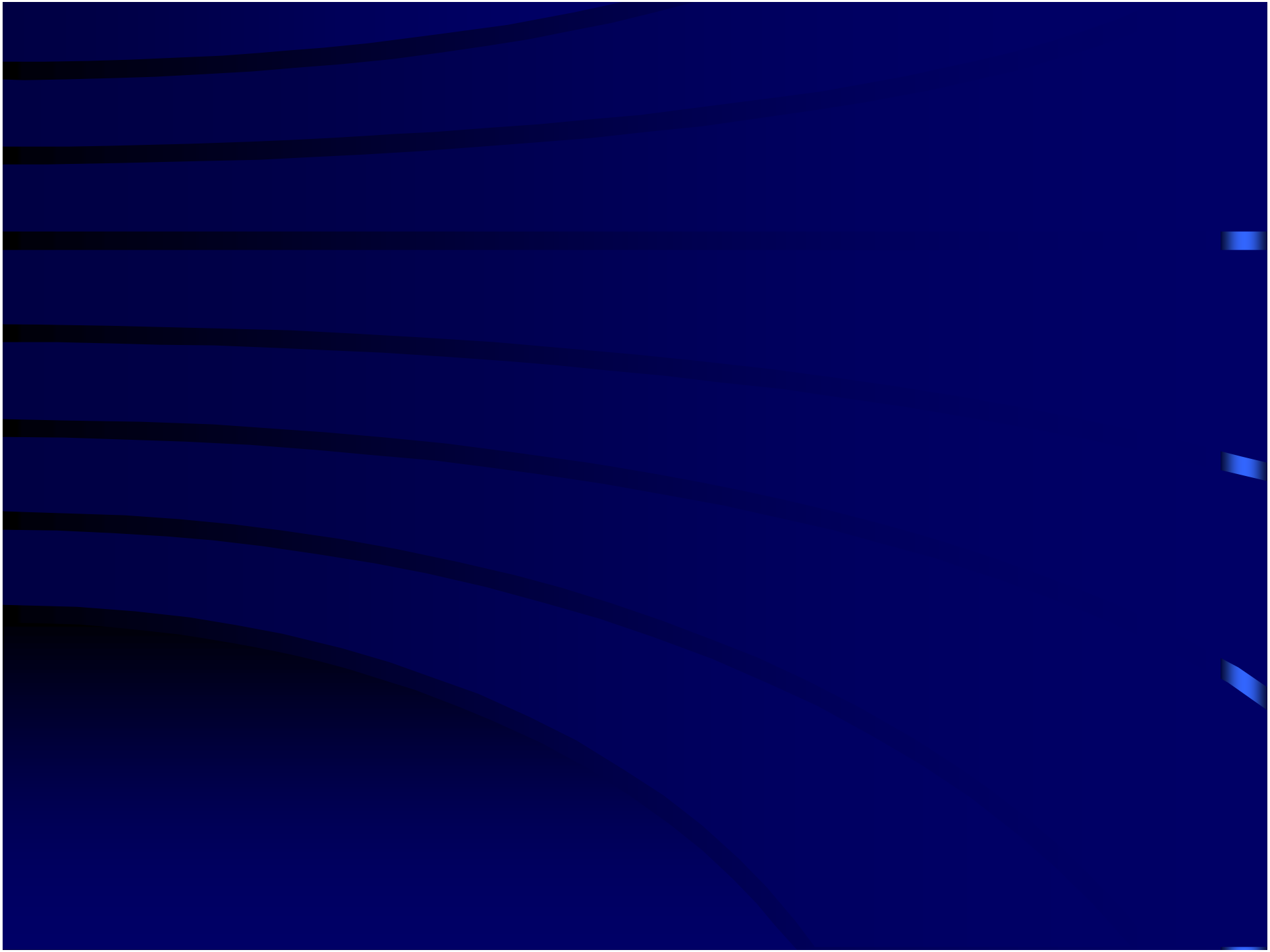
- COPD Therapy Holds Many Similarities to Asthma

Important to Note Response to Treatment in COPD Considerably Less than Response in Asthma

- Patient Population older less Tolerant and More Sensitive to Drug Side Effects

# Cough Summary

- Diverse Differential Diagnosis Involving Multiple Organ Systems
- Therapeutic Approach Requires Knowledge of Epidemiology and Symptom Complex
- Patient Care Requires Therapeutic Trial Which May Require Re-evaluation if Inadequate



# CASE I

- 33 Year Old Male Presents For Care Complaining of 10 Days of Nonproductive Cough. Patient states Cough Syndrome was Preceded by Sinus Congestion, Muscle Aches and Fatigue.
- Patient has No Past Medical History
- Patient Lives With His Wife and 6 Year old Boy. The Child has been Irritable with Rhinorea

# CASE I

- Physical Exam

HR 87  BP 140/70 RR 14 T 37.6

Sclera are Injected Bilaterally

Left Nares limited Air Flow

Sinuses Nontender with Good Transillumination

Lungs Clear to Auscultation

Cardiac Regular Without Murmur

# CASE 1

- What is The Differential Diagnosis
- What Studies do You Need For Diagnosis
- What is Your Treatment Plan

# CASE 2

- A 65 year Old Male Presents For Care, He is Complaining of Cough Worse in The Morning, Shortness of Breath and Increasing Dyspnea on Exertion.  The Cough is Minimally Productive of Sputum
- No Past Medical History
- Patient Lives With His Wife He Smokes 1 Pack of Cigarettes/day for 40 Years

# CASE 2

- Physical Exam
- BP 165/88 HR 75 RR 18 T 37.6
- Sinuses Non Tender No Rhinorea
- Lungs Crackles at Bases
- Chest Increased AP Diameter
- Cardiac Distant Heart Sounds

# Case 2

- What is The Differential Diagnosis
- What Studies are Necessary For Diagnosis
- What is The Treatment Plan

# CASE 3

- A 23 Year Old Female Present for Care Complaining of > 1 month of Cough The Cough is Not Productive of Sputum. The Cough is Worse When She Exercises or is Exposed to Cold Air. The Cough is Associated with Shortness of Breath
- The Patient Has No Past medical problems
- The Patient Is a University Student she Lives alone in a Dormitory She Does Not Smoke

# CASE 3

- Physical Exam

HR 70  BP 140/60 RR 12 T 37.6

Sinuses Non Tender No Rhinorea

Lungs Diffuse Musical Wheezes With a Prolonged Expiratory Phase

Cardiac Regular Without Murmur

# Case 3

- What is The Differential Diagnosis
- What Studies Do You Need for diagnosis
- What is Your Treatment Plan