

2009 ACCP
Central American Scientific Program
Emphysema in 2009

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The case of MJ

- A 62yr old female presents with a chief complaint of persistent dyspnea and cough
 - Onset of symptoms: 4 years ago; worsening to date
 - Dyspnea is worse with exertion (2 blocks)
 - Cough is productive of clear mucous; estimates production of approximately $\frac{1}{2}$ cup per day
 - Denies fever or hemoptysis

MJ

- PMHX: Hypertension, controlled
- Allergies: Penicillin (hives)
- Medications: Primatene mist; Metoprolol for HTN
- SHX: Retired; current nonsmoker; past: 80 pack years; no significant ETOH; no HIV risks.
Hobbies: needlepoint, gardening

MJ

- FHX: Adult daughter with cough of unknown etiology
- ROS: Negative for hemoptysis, TB exposure; annual PPDs have been negative. Occasional, severe coughing spasms leading to emesis.

MJ

- Remarkable Physical Examination:
 - Vitals: BP 140/85 P 80 RR 20 T 98.3
 - Barrel chest
 - Occasional non-productive cough
 - Chest: hyperresonant, symmetrical expansion, midline trachea, slightly decreased fremitus bilaterally; soft expiratory wheezing; prolonged expiratory phase
 - CV: prominent P2; no S3 or S4
 - Absence of clubbing

Differential Diagnosis

- COPD
- Asthma
- Congestive heart failure
- Tuberculosis
- Obliterative bronchiolitis
- Interstitial pulmonary fibrosis
- Other

Factors suggestive of a diagnosis of COPD

- **Dyspnea:** progressive; worsened with exercise; similar on a daily basis; described as ‘increased effort’ to breathe; ‘air hunger;’ ‘gasping’
- **Chronic cough;** may be non-productive
- Chronic **sputum** production
- History of **risk factors:**
 - Tobacco abuse
 - Occupational exposure; home cooking with biofuels;
 - Alpha 1 antitrypsin deficiency in self/family

COPD:

- Gold Guideline: a Global Initiative for COPD: collaboration between the World Health Organization and recognized experts

www.goldcopd.org



MJ

Chest roentgenogram:
Hyperinflation

Actual	<u>% Predicted</u>	
FVC	2.50 L	68%
FEV1	1.25 L	53%
FEV1/FVC ratio	50%	

Is the diagnosis clear? Any further evaluation needed?

MJ

Bronchodilator challenge is indicated

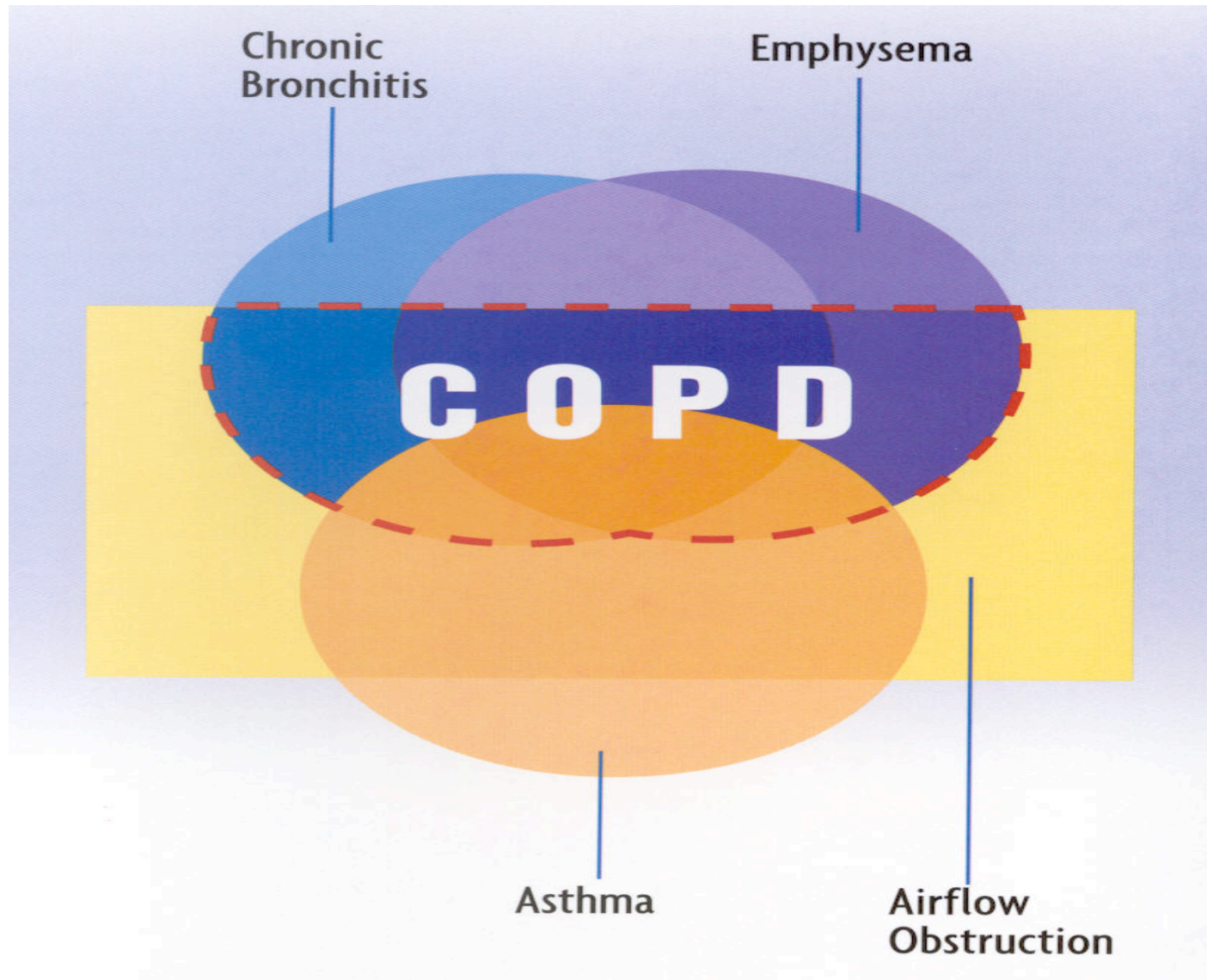
Postbronchodilator Results:

	Actual	% Predicted	% change	
FVC		3.10 L	98%	3%
FEV1		1.90 L	76%	9%

Lung Volumes: RV= 169%

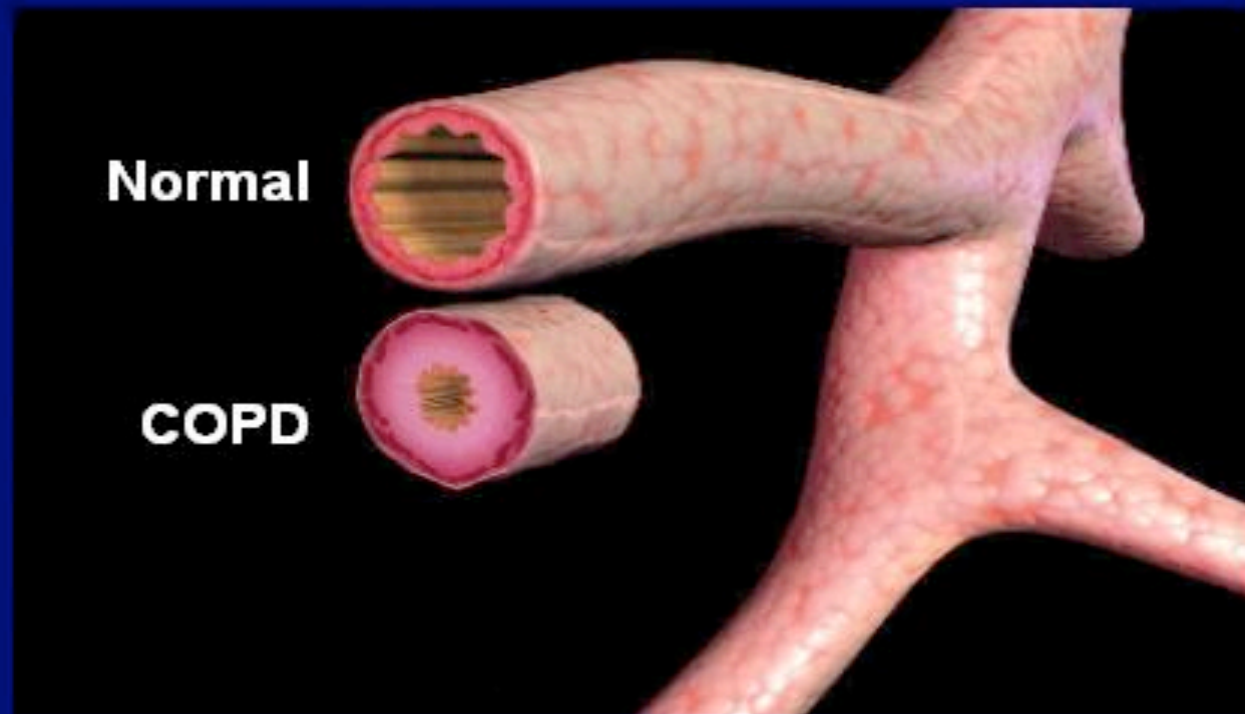
Oxygenation: 94% on room air at rest; saturation falls to 85% with ambulation.

"COPD Overlaps"



Definition of COPD

COPD is a progressive disease characterized by airflow limitation that is not fully reversible



Risk Factors for COPD Include Both Environmental Exposures and Genetic Factors

- Tobacco smoke is the major cause of COPD (80% to 90%)¹
- Other environmental factors include occupational dusts and chemicals (vapors, irritants, fumes) and indoor/outdoor air pollution²
- The best characterized genetic factor is alpha₁-antitrypsin deficiency³

1. US Surgeon General. *Summary of the Health Consequences of Smoking: Chronic Obstructive Lung Disease*. Publication DHHS. 84-50205.

2. Pauwels RA, et al. *Am J Respir Crit Care Med*. 2001;163:1256-1276.

3. Mahadeva R, Lomas DA. *Thorax*. 1998;53:501-505.

COPD Is a Leading Cause of Death and Disability

- US COPD prevalence: 5.9% (~10 million adults diagnosed, ~14 million undiagnosed)¹
- Fourth-leading cause of death in the United States²
 - Almost 120,000 deaths in 2000¹
 - As of 2000, mortality of women has surpassed men¹
- Second-leading cause of disability (after heart disease)³
- Approximately 70% of patients with COPD are younger than the age of 65⁴

1. Mannino et al. *MMWR*. 2002;51(SS06):1-16.

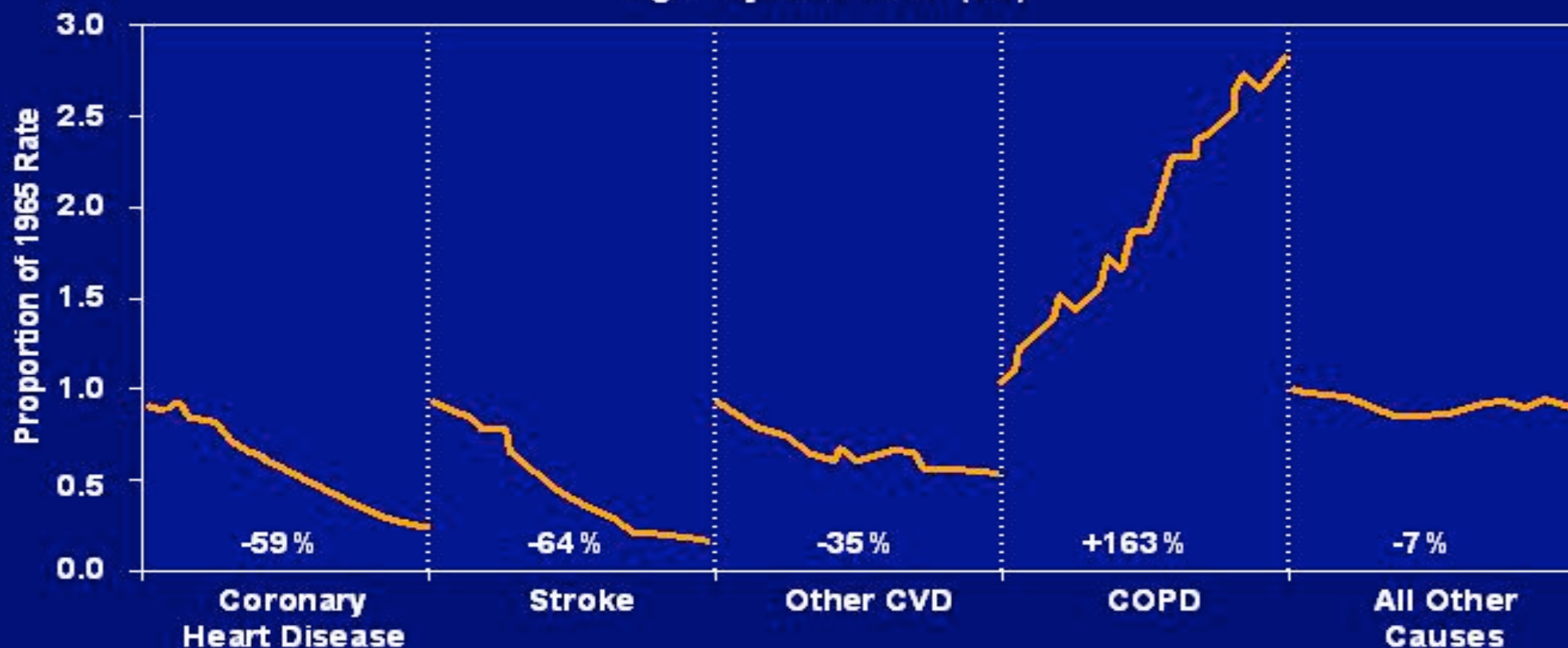
2. Mannino et al. *Arch Intern Med*. 2000;160:1683-1689.

3. AHRQ publication 02-M016.

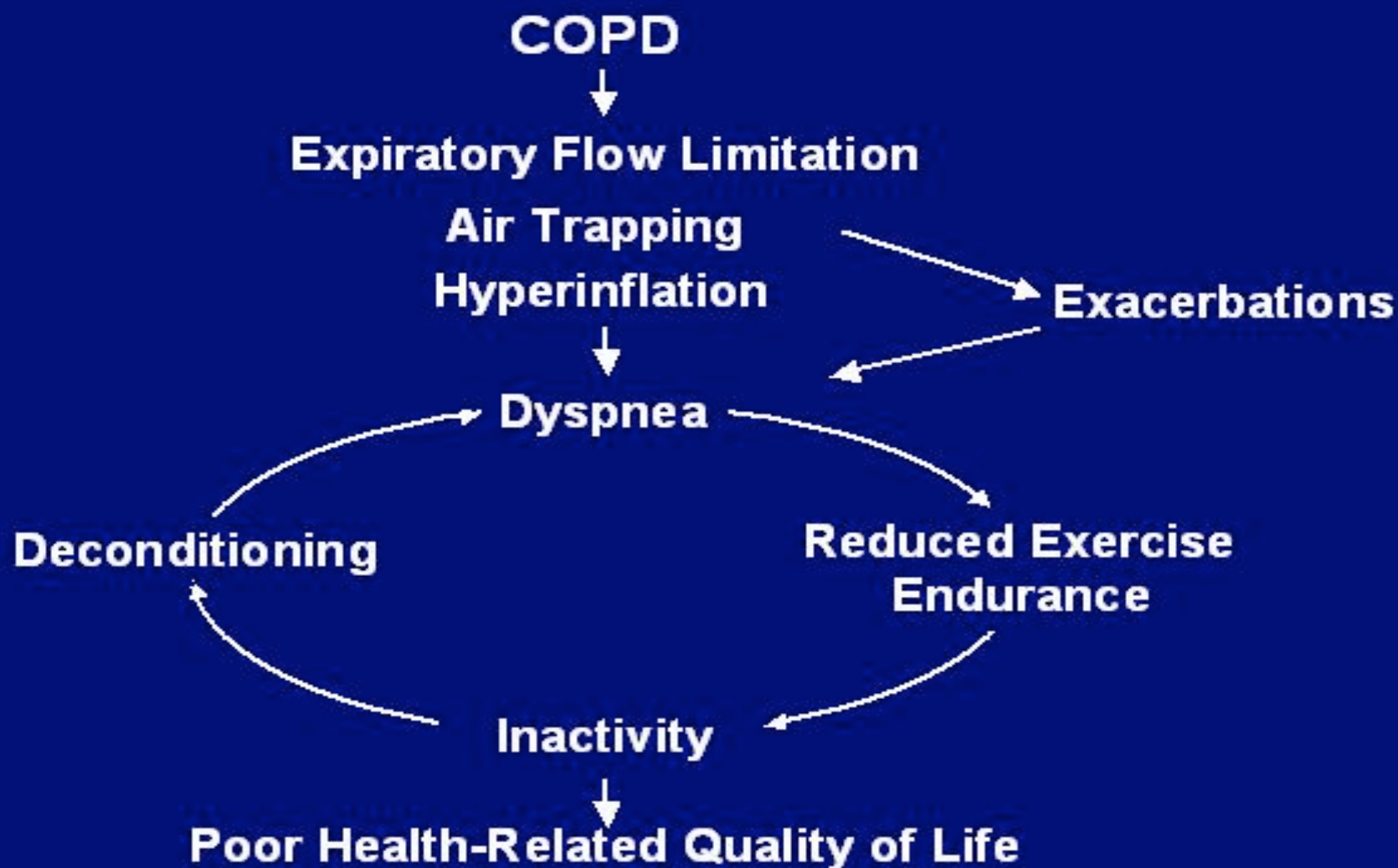
4. Sin et al. *Am J Respir Crit Care Med*. 2002;165:704-707.

COPD Projected to Be the Third-Leading Cause of Death by 2020

Proportion of 1965-1998 Rate, Percentage Change in Age-Adjusted Death (US)



Cycle of Airflow Limitation, Dyspnea, Reduced Exercise Endurance, and Poor Health-Related Quality of Life



Diagnosing COPD

- Diagnosis of COPD should be considered in any patient who has¹:
 - Smoking history of at least 10-20 pack-years and/or a history of exposure to other risk factors
 - Dyspnea
 - Chronic cough with or without sputum production
 - Onset of respiratory symptoms in the 40s
 - Respiratory infection that persists or recurs
- Diagnosis is confirmed by spirometry²
 - Expiratory airflow limitation is the hallmark physiologic change of COPD
 - FEV₁ and FEV₁/FVC are reduced

1. ATS Statement. *Am J Respir Crit Care Med.* 1995;152(suppl 5):S77-S120.

2. Pauwels RA, et al. *Am J Respir Crit Care Med.* 2001; 163:1256-1276.

Differentiating COPD From Asthma

Diagnosis	Asthma	COPD
Onset	Anytime (often childhood/early adulthood) ¹	Later in life (midlife) ¹
Usual etiology	Immunologic stimuli, family history of asthma ¹	Cigarette smoking, exposure to other risk factors ¹
Course	Usually intermittent ¹	Chronic, progressive ¹
Airflow limitation	Largely reversible ¹	Partially reversible ¹
Clinical features	Wheeze, chest tightness, cough, episodic dyspnea ²	Persistent or worsening dyspnea, chronic cough/sputum ¹
Inflammatory cell	Eosinophils, macrophages ³	Neutrophils, macrophages ^{3,4}
Response to steroids	Inhibits inflammation ⁵	Little or no effect on inflammation ⁴

1. Pauwels RA, et al. *Am J Respir Crit Care Med.* 2001; 163:1256-1276.

2. NLHEP Executive Committee. *Chest.*1998;113(suppl 2):123S-163S.

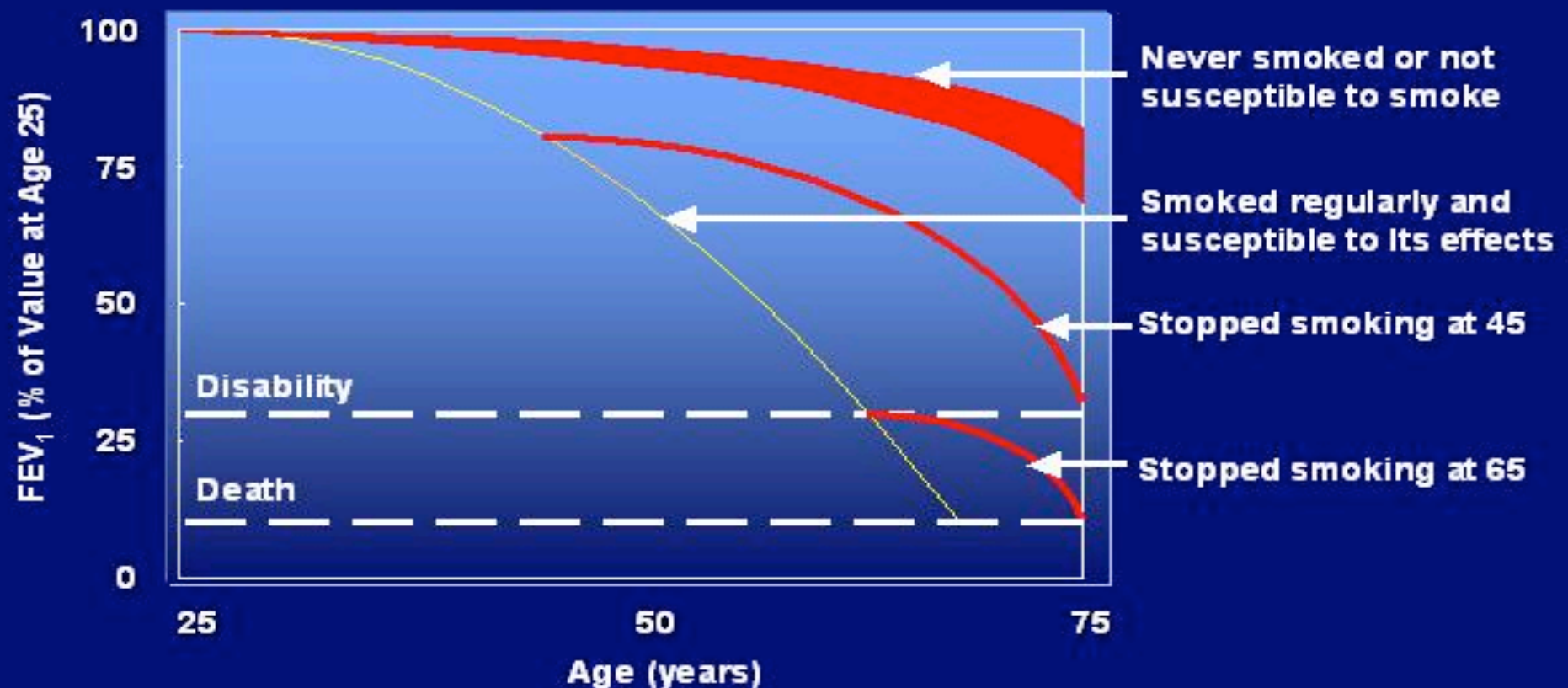
3. Global Initiative for Chronic Obstructive Lung Disease teaching slide kit. Available at: <http://www.goldcopd.com/slides/download.ppt>.

4. Barnes PJ. *N Engl J Med.* 2000;343:269-280.

5. Wenzel S. Inflammation in asthma. National Jewish Medical and Research Web site. Available at: <http://asthma.nationaljewish.org/about/what/inflammation.php>. Accessed March 29, 2004.

Smoking Cessation Is the Single Most Important Way to Prevent the Onset and Progression of COPD

If exposure to noxious agents stops, disease progression slows



Global Initiative for Chronic
Obstructive
Lung
Disease





GOLD Website Address

www.goldcopd.org

Pocket guide: February 2009 version

Stage 1: Mild COPD

- MILD airflow limitation:
 - FEV1 / FVC: less than 70%
 - FEV1 > 80% predicted
- MAY or MAY NOT have chronic sputum production
- Patient may have no awareness of any problems with breathing

Stage 2: Moderate COPD

- Moderate airflow limitation:
 - (FEV1 / FVC: less than 70%)
 - FEV1 > 50% but less than 80% predicted
- Shortness of breath, typically on exertion
- Typically the stage at the time of diagnosis because of chronic symptoms OR an exacerbation

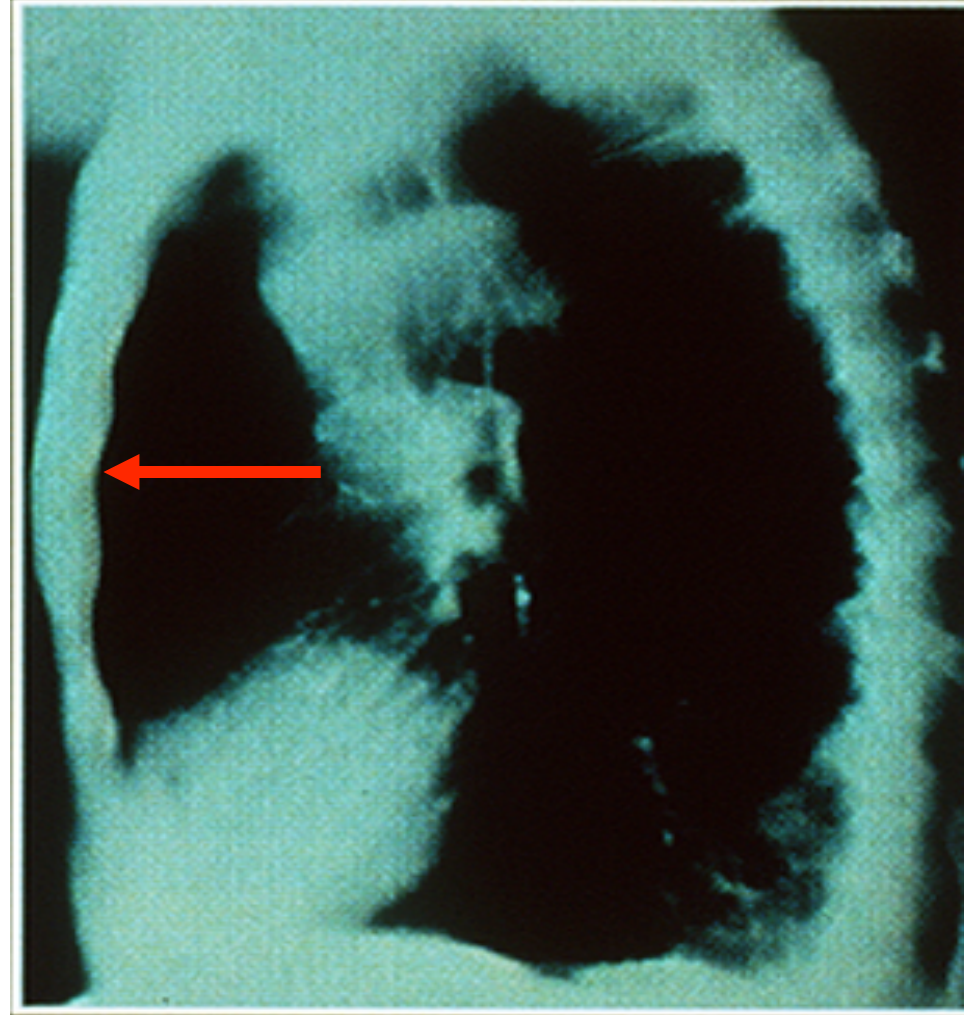
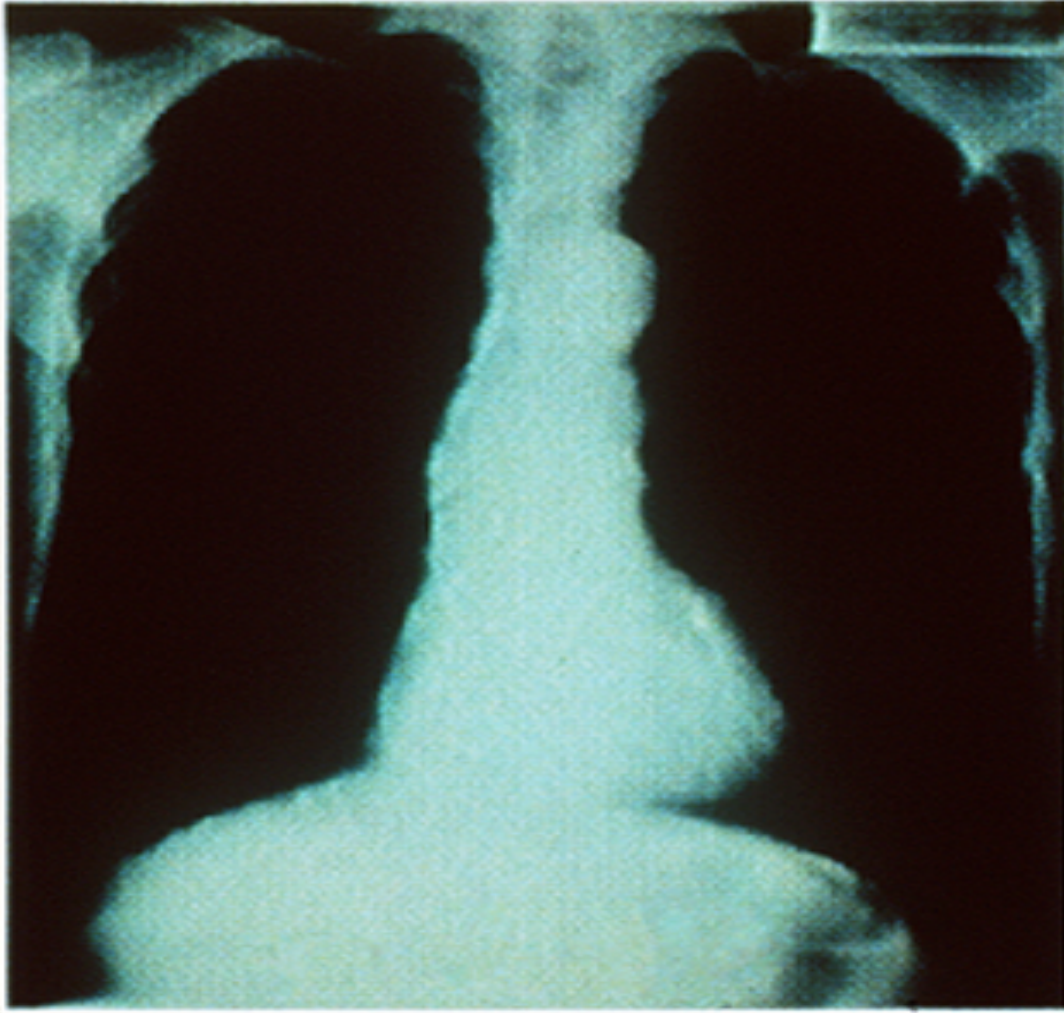
Stage 3: Severe COPD

- SEVERE airflow limitation:
 - (FEV1 / FVC: less than 70%)
 - FEV1 > 30% but less than 50% predicted
- Greater shortness of breath, worsened by exertion
- Repeated exacerbations; negative impact on activities of daily life

Stage 4: VERY Severe COPD

- VERY SEVERE airflow limitation:
 - (FEV1 / FVC: less than 70%)
 - FEV1 < 30% OR > 50% with chronic respiratory failure
- Greater shortness of breath, worsened by exertion
- Quality of life is greatly impaired; exacerbations may be life-threatening

Chest X-ray of Patient with Severe COPD



Stable COPD: Overall Management approach

- **ALL Stages of Disease**
 - AVOIDANCE of indoor and outdoor occupational exposures
 - Vaccinations:
 - **Influenza vaccine** annually reduces serious illness and death by 50%
 - **Pneumovax** is recommended for COPD patients who are > 65 years; also shown to reduce CAP in those <65 years whose FEV1 <40%

Stable COPD: Overall Management approach

- **ALL Stages of Disease**

- Smoking cessation:

- **ASK** at every visit;
- **ADVISE** all smokers of the need to stop smoking tobacco
- **ASSESS** readiness to quit
- **ASSIST:** counseling; contracts; group support programs; pharmacologic therapy
- **ARRANGE** for follow-up to monitor success with treatment; evaluate for side effects of medications

Smoking Cessation Pharmacotherapy

- Used ONLY when counseling alone is not effective
- Has been shown to be additive to behavioral modification programs, which should be utilized by all patients
- Special consideration should be given to:
 - Using pharmacotherapy in patients smoking <10 cigarettes/d
 - Pregnant women; adolescents
 - Medical complications (unstable CAD; recent stroke or MI; untreated gastric peptic disease; history of seizures (bupropion))

Stable COPD

- **ALL Stages of Disease**

- **Assess stage of COPD**

- Spirometry
- Assess symptoms
- Perform additional studies as necessary:
 - Bronchodilator reactivity
 - Chest X-Ray: rule out CHF; lung cancer; interstitial fibrosis;
 - ABG: if FEV1 is $<50\%$ or patient has cyanosis
 - Ambulatory oximetry: assess for desaturation with exercise
- Choose treatment based upon stage of disease, patient preference, cultural factors

Alpha1-Antitrypsin level

- Caucasians with onset of COPD <45 years; or positive family history

Stable COPD: Overall Management approach

- **Bronchodilators** are administered as needed for intermittent or worsening symptoms; AND, on a regular basis to prevent or reduce symptoms.
(long-acting medications provide convenience)
- **Inhaled therapy** is preferred
- Long acting bronchodilators are more convenient
- Combining classes of bronchodilators should be considered

Therapeutic classes

Glucocorticoids

- Stable COPD:
 - Long-term treatment with systemic therapy is not recommended
 - **Inhaled corticosteroids** do not alter deterioration of FEV1 but are indicated for individuals who have an FEV1 <50% AND recurrent exacerbations
 - Increases likelihood of developing pneumonia
 - Does not reduce mortality
 - Use of an inhaled corticosteroid combined with a long-acting beta agonist is more effective in reducing exacerbations and improving lung health

Miscellaneous Therapies

- **Mucolytics:**

- Patients with viscous sputum may benefit from the use of mucolytic; benefit is small; not recommended for all patients with COPD

- **Antitussives**

- Regular use is CONTRAINDICATED in COPD

- **Antibiotics**

- Not recommended except for treatment of bacterial or other infections

Pulmonary rehabilitation

- Minimum program duration: 6 weeks
- Exercise training; ensure adequate oxygenation during exercise
- Goals:
 - Reduce symptoms
 - Improved quality of life
 - Increase participation in daily activities

Non-pharmacologic therapies

- **Antitussives**

- Regular use is CONTRAINDICATED in COPD

- **Surgery**

- Consider in cases of Very Severe COPD

- **Nutrition; Education** regarding disease progression, need for medication adherence

- **Oxygen**

- Indicated for hypoxemia at rest; hypoxemia with exercise; hypoxemia during sleep; chronic respiratory failure (keep saturation at ~90%)

Non-pharmacologic therapies

● Oxygen

- **Long-term oxygen therapy, for patients with chronic respiratory failure, consisting of >15 hours per day has been shown to:**
 - Increase survival
 - Improve pulmonary hemodynamics
 - Reduce polycythemia
 - Improve pulmonary mechanics
 - Improve exercise capacity
 - Improve mental state/well-being

Non-pharmacologic therapies

● Oxygen

- PaO₂ is <55 or SaO₂ is <88% with or without hypercapnia OR
- PaO₂ is between 55 and 60 or saturation is <88%
IF
 - Peripheral edema is present suggestive of congestive heart failure
 - Pulmonary hypertension
 - Polycythemia (Hct >55%)

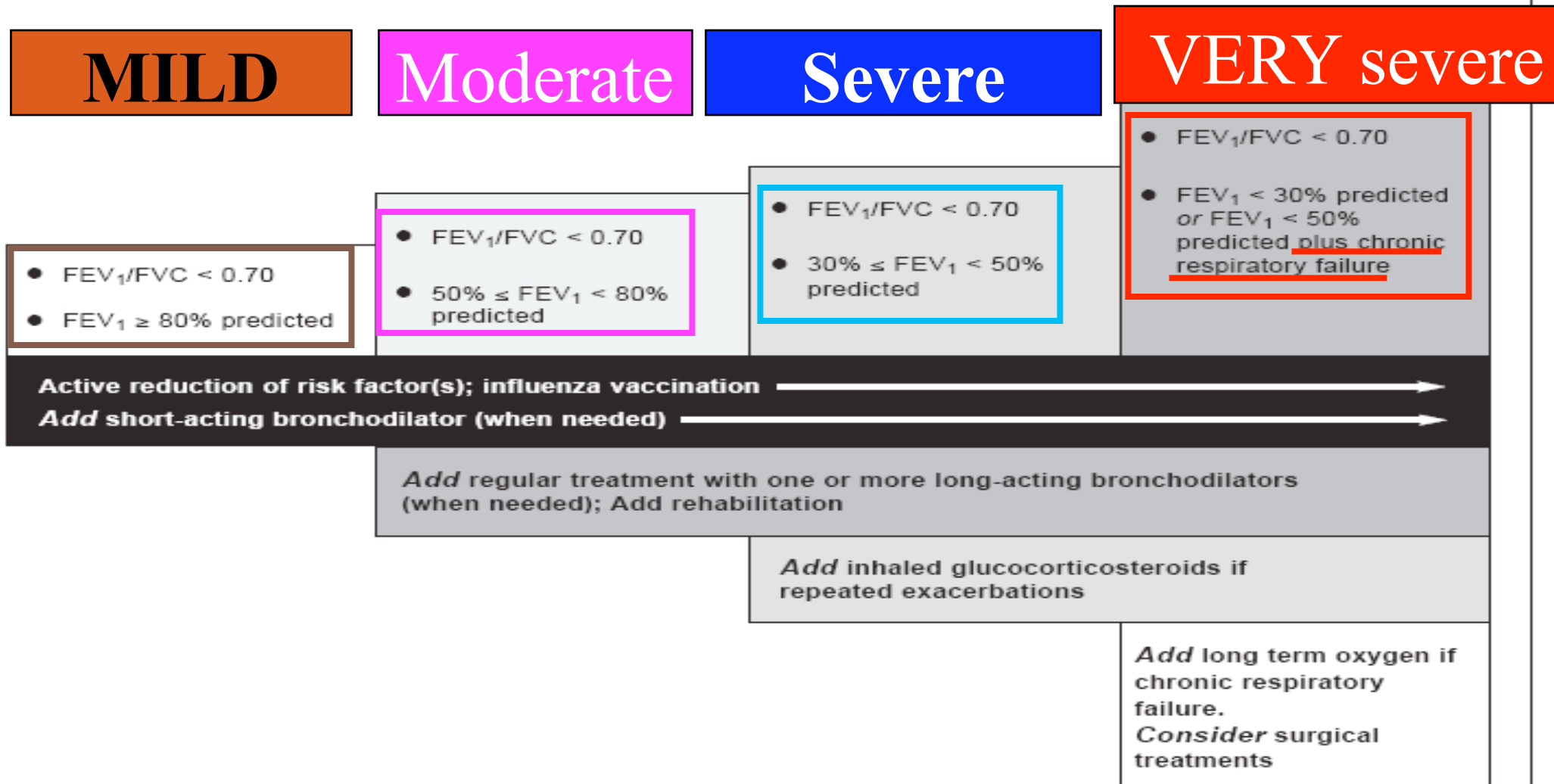
Non-pharmacologic therapies

- **Surgical treatment:**

- Bullectomy and lung transplantation may be considered in carefully selected patients with **VERY SEVERE COPD**
- **No EVIDENCE** to suggest widespread use of Lung Volume Reduction Surgery

GLOBAL STRATEGY FOR THE DIAGNOSIS, MANAGEMENT, AND PREVENTION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (2006)

Figure 5.3-7. Therapy at Each Stage of COPD*



*Postbronchodilator FEV₁ is recommended for the diagnosis and assessment of severity of COPD.

Exacerbations of COPD

- Most common causes of exacerbation: infection, air pollution; in 1 / 3 of cases, no cause is identified.
- Assess severity and cause:
 - ECG; CXR; Sputum culture ONLY if patient does not respond to initial antibiotic therapy
 - CBC: identify polycythemia (from low paO_2) or bleeding; electrolytes; glucose;
 - Determine whether or not hospitalization is necessary
 - Hypoxemia
 - Acidosis (metabolic and/or respiratory)

Exacerbations of COPD

- Home treatment:
 - Increase beta agonists (short-acting)
 - Add inhaled ipratropium bromide, if not already using
 - If baseline FEV1 is $<50\%$, add prednisone 1 mg/kg/day for 7-10 days (no taper needed)
 - Nebulized budesonide can be used as an alternative to prednisone if the patient is not acidotic
 - If on chronic steroids, increase dosing with slow taper

Exacerbations of COPD

- Indications for hospitalization:
 - Marked, sudden increase in dyspnea
 - Severe baseline COPD
 - Onset of new physical signs: pneumonia; cyanosis; edema
 - Failure to respond to initial treatment
 - Frequent exacerbations
 - New cardiac dysrhythmias; significant co-morbidities
 - Older age; insufficient home support

Exacerbations of COPD

- Indications for antibiotics:
 - If the patient has all of the following three CARDINAL symptoms:
 - Increased dyspnea; sputum; sputum purulence
- Any patient requiring mechanical ventilation

Additional Therapies in COPD

- Antioxidants/Vitamins
 - Antioxidants have been shown in *retrospective* human and animal studies to be beneficial in COPD
 - **B** carotene and Vitamin C, Vitamin E-not efficacious
- Alpha₁-antitrypsin
 - Effective **ONLY** in patients proven deficient (AAT < 11)
- Nutritional supplementation
- Anti-anxiety agents/Antidepressants
 - Depression is frequently unrecognized; (SSRIs)
 - Panic attacks occur in 25%



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