

# CHRONIC DISEASE CO-MORBIDITIES:

In the COPD Lung Transplant Population

Cassandra Short, SPT  
UNC DPT 2013

# Educational Objectives

1. Identify heart failure, diabetes, and osteoporosis as separate chronic diseases
2. Identify criteria in COPD that leads to lung transplantation
3. Understand the impact of heart failure, diabetes, and osteoporosis on the COPD population
4. Be aware of intervention strategies that can be used in the management of COPD and these comorbidities
5. Understand ways to educate patients about their comorbidities

# Heart Failure<sup>1</sup>

- ⦿ A progressive condition in which the heart cannot maintain normal cardiac output (CO) to meet body's demands
- ⦿ “congestive”- back up of blood into liver, abdomen, lower extremities, and lungs
- ⦿ Develops secondary to other conditions:
  - CAD, HTN, DM, MI, abnormal heart valves, and cardiomyopathy

# Heart Failure<sup>1</sup>



- ⦿ Symptoms:
  - SOB, fatigue, weakness, swelling in legs and abdomen, rapid or irregular HR with S3 or S4 heart sounds, persistent cough/ wheezing, weight gain from fluid retention
- ⦿ Managed by surgery, devices, medications, and lifestyle changes

# Diabetes Mellitus<sup>1</sup>



- Type I- “insulin-dependent”
  - Pancreas fails to produce enough or any insulin
  - Unknown etiology, dx in childhood
  - Symptoms:
    - Polyphagia, weight loss, ketoacidosis, polyuria, polydipsia, blurred vision, dehydration, fatigue
  - Exogenous insulin injections, nutritional management

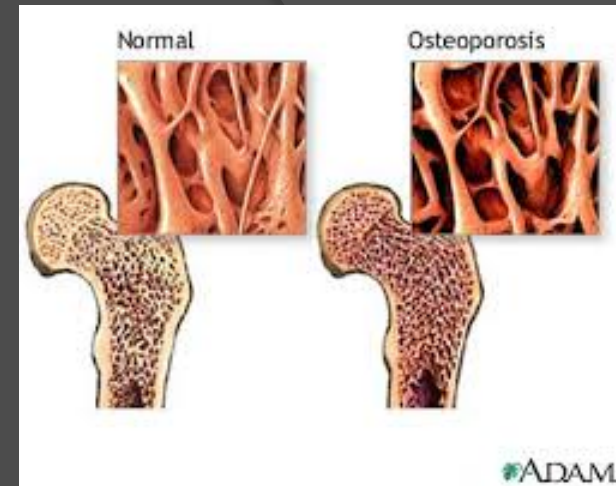
# Diabetes Mellitus<sup>1</sup>

## ◎ Type II

- Resistance to the pancreas' ability to produce insulin
- Hyperglycemia; dx adults >40, \*children
- Symptoms:
  - Same as Type I (except ketoacidosis)
- Blood glucose control through diet, exercise, oral medications, or insulin injections

# Osteoporosis<sup>1,2</sup>

- ⦿ “porous bone”; significant loss of bone density, weakening infrastructure, making bone susceptible to fracture
- ⦿ Idiopathic; post-menopausal or involutional; result of another condition or medications\*
- ⦿ Symptoms:
  - >1 inch loss of height, protruding abdomen, increasing kyphotic posture, receding gums or loss of teeth, sudden back pain, weak and brittle fingernails, dowager’s hump



# Osteoporosis<sup>1,2</sup>

- Often called a “silent disease”
  - Typically not diagnosed until a fracture
- Fractures are typically seen in the hip, spine, or wrist
- Dual-energy X-ray Absorptiometry (DXA) used to evaluate bone mineral density (BMD)
- Vitamin and pharmacological intervention, nutrition, adaptive device, patient education, or surgery



# Chronic Obstructive Pulmonary Disease (COPD)<sup>1</sup>

- ⊙ Lung diseases that block airflow:
  - Emphysema
  - Chronic Bronchitis
- ⊙ Alveolar destruction and air trapping:
  - ↑ Total lung capacity (TLC), ↑ residual volume (RV)
- ⊙ **SMOKING** primary risk factor
- ⊙ Symptoms:
  - Excessive mucous production, chronic productive cough, wheezing, SOB, fatigue, and reduced exercise capacity
- ⊙ Medical management

# COPD and Lung Transplant<sup>4,5,6</sup>

- Single or double
- 1-year survival 70-80%
- $PCO_2$ , pH,  $FEV_1$  (<30%),  $FEV_1/FVC$  (<70%)
- Qualifications:
  - End-stage COPD
  - < 65 years
  - Stopped smoking, no current drug/alcohol abuse
  - Familial support, financial support
  - Control of co-morbidities
- Risks: rejection, infection



# COPD and Heart Failure<sup>1,7</sup>

- Leading cause of hospitalization
- Contributes to SOB, fatigue, weakness, cough/wheezing
- Smoking common risk factor
- Medications
  - beta-blockers → impair lung function
  - Bronchodilators → heart rhythm

# COPD and Diabetes<sup>7,9</sup>

- ⦿ Increased risk of infection
- ⦿ Mild abnormal pulmonary function tests
  - FEV<sub>1</sub>, FVC
- ⦿ Chronic systemic inflammation
- ⦿ High blood sugar can effect outcomes in hospitalizations due to COPD exacerbation
- ⦿ Smoking

# COPD and Osteoporosis<sup>7,8</sup>

- 22-24% of patients with COPD
- Female sex, corticosteroid use, smoking, deconditioning, vitamin D deficiency, chronic systemic inflammation
- Vertebral fractures can impact lung function, hip fractures decrease mobility
- Smoking

# Rehabilitation Goals<sup>10</sup>

- ⦿ Interdisciplinary approach
- ⦿ Increase, decrease, or maintain individual's max level of independence and functioning
- ⦿ Prepare patients for lung transplant
- ⦿ Reduce post-op complications and maximize advantages derived from transplant

# Useful Measures for COPD<sup>11</sup>

- Exercise capacity
- Pulmonary Function Tests (PFT)
- Quality of life
- Rate of Perceived Exertion
- Body Mass Index (BMI)
- Vital signs (BP, HR, RR, SaO<sub>2</sub>)
- Pain
- Etc....



# Benefits & Outcomes<sup>10</sup>

- Prepare for transplant
- Education
- Increase exercise adherence
- Increase ability to clear secretions
- Decrease work of breathing
- Increase strength
- Improve quality of life





# Rehab Focus for Comorbidities<sup>11</sup>

## ⦿ Heart Failure:

- Resistance training, progressive ambulation, strength training, postural re-education, assistive device training, energy conservation, lifestyle changes

## ⦿ Diabetes:

- *NO EXERCISE if blood glucose >250mg/dL or <100 mg/dL*
- Weight loss, resistance training, wound care, walking, orthotic adaptations, modalities, assistive device training

## ⦿ Osteoporosis:

- Resistance/strength training, trunk stability, agility training, walking, balance, posture, tai chi/dancing, weight-bearing exercise, assistive device training

# Rehab Focus for Comorbidities<sup>1</sup>

- Monitor vital signs
- Hydration
- Intensity, frequency, duration, mode
- Nutrition
- Medications
- Patient goals!



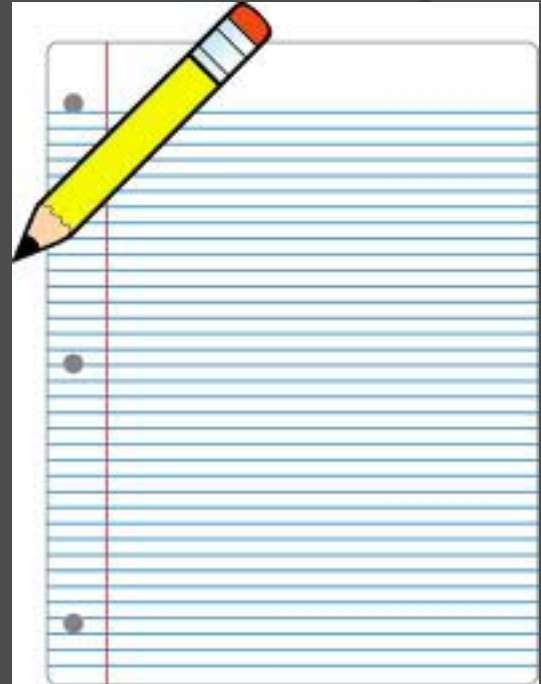
# Educating Your Patients<sup>12</sup>

- Important for use of interventions
- Understanding their conditions
- Health literacy
- Medication management
- Communication barriers
- Decrease costs and complications



# Patient Education

- ⦿ Forms:
  - Written
  - Verbal
  - Demonstration
  - Pictures
- ⦿ Identifying learning styles
- ⦿ Simplicity



# Patient Education

- ◎ Understanding management of co-morbidities
  - Patient preparation and recovery for lung transplant
    - Activity, medications, nutrition, risks, side-effects, safety, contact information, restrictions, etc.

# In Summary

1. Identified heart failure, diabetes, and osteoporosis as separate chronic diseases
2. Identified criteria in COPD that leads to lung transplantation
3. Investigated the impact of heart failure, diabetes, and osteoporosis on the COPD population
4. Became aware of intervention strategies that can be used in the management of COPD and these comorbidities
5. Learned ways to educate patients about their comorbidities

# Questions



## References:

1. Giles, Scott M. Scorebuilders PT Exam: The complete study guide. Chapter 6: Cardiovascular/Pulmonary and Lymphatic Systems. 2013. Pages 234-310.
2. National Osteoporosis Foundation. Clinician's guide to prevention and treatment of osteoporosis. Washington, DC: National Osteoporosis Foundation; 2010.
3. Leader D. About.com: Pulmonary Function Tests. 2012. Available at: <http://copd.about.com/od/copd/a/pfts.htm>
4. Berry MJ, Rejeski WJ, Adair NE, Ettinger WH, Zaccaro DJ, Sevick MA. A randomized, controlled trial comparing long-term and short-term exercise in patients with chronic obstructive pulmonary disease. *Journal of Cardiopulmonary Rehabilitation*. 2003; 23: 60-68.
5. Lahzami S, Bridevaux PO, Soccia PM, et al. Survival impact of lung transplantation for COPD. *Eur Respir J*. 2010; 36: 74-80.
6. Rebecca H. Crouch. Lecture: Obstructive Lung Disease. PHYT 710 – Cardiopulmonary Interventions.



## References:

7. Chatila WM, Thomashow BM, Manai OA, Criner GJ, Make BJ. Comorbidities in chronic obstructive pulmonary disease. *Proc Am Thorac Soc*. 2008; 5: 549-55.
8. Duckers JM, Evans BA, Fraser WD, Stone MD, Bolton CE, Shale DJ. Low bone mineral density in men with chronic obstructive pulmonary disease. *Respiratory Research*. 2011; 12: 101.
9. Mannino DM, Thorn D, Swensen A, Holguin F. Prevalence and outcomes of diabetes, hypertension and cardiovascular disease in COPD. *Eur Respir J*. 2008; 32: 962-969.
10. Takaoka ST, Weinacker AB. The value of preoperative pulmonary rehabilitation. *Thorac Surg Clin*. 2005; 203-211.
11. Rabe, KF; Hurd, S; Anzueto, A; Barnes, PJ; Buist, SA; Calverley, P; Fukuchi, Y; Jenkins, C; Rodriguez-Roisin, R; van Weel, C; Zielinski, J. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease – GOLD Executive Summary. *Am J Respir and Crit Care Med*. 2007; 176: 532-555.
12. <http://www.cdc.gov/healthliteracy/developmaterials/guidancestandards.html>