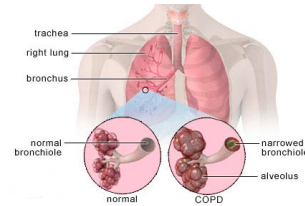


## COPD WITH RESPIRATORY FAILURE

By: Emily Coker & Jaswant Singh

## CHRONIC OBSTRUCTIVE PULMONARY DISEASE

- Disease that limits airflow through inflammation of the lining of the bronchial tubes or by destruction of the alveoli.
- Seen in people of all ages, but common among individuals who smoke and are over the age of 45.
- Fourth leading cause of death in America.



## CHRONIC OBSTRUCTIVE PULMONARY DISEASE

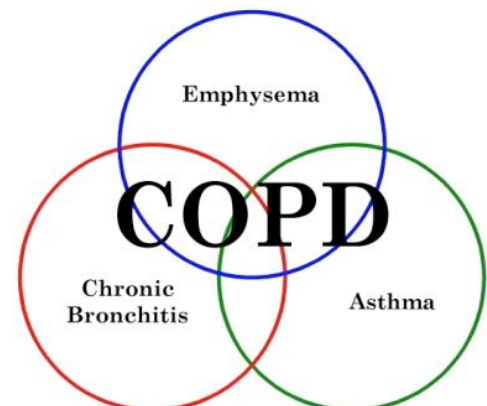
- Patients with COPD have continuous systemic inflammation which is associated with osteoporosis.
- Four studies support a positive correlation between low body weight and/or BMI with decreased bone mineral density in subjects with COPD.
- Additional risk factors reported include older age, smoking, and corticosteroid use. **(Grade II) (ADA Evidence Analysis Library, 2012).**

## COPD MEDICAL TREATMENT

- Stop smoking and protect yourself from pollution
- Corticosteroids decrease inflammation in the airways
- Bronchodilators open and relax the airway
- Expectorants make it easier to cough
- Side effects with the steroids treatment weight gain, mood changes osteoporosis, fluid retention, increased blood pressure.

## RELEVANT RESEARCH:

- Four studies report significant association of cumulative corticosteroid use with changes in biochemical bone markers, decreased bone mineral density, and increased fracture risk. **(Grade II) (ADA Evidence Analysis Library, 2012).**



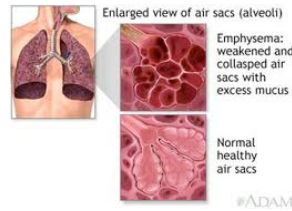
## CHRONIC BRONCHITIS

- Chronic bronchitis cause by inflammation of the lining of bronchial tubes.
- Results from smoking cigarette or repeated exposure to smoke and environment pollutants.
- Diagnosis one must have a productive cough and shortness of breath that lasts about 3 months or more each year for 2 or more years in a row.



## EMPHYSEMA

- Caused by the destruction of the lung tissue, which is a late complication of chronic bronchitis.
- Loss of connective tissue results in loss of surface area.
- Bronchioles lose their elasticity.
- Air is trapped in the lungs.
- Results in extreme fatigue and physical exhaustion.



## EMPHYSEMA

- Rare cases emphysema is caused by deficiency of Alpha 1-antitrypsin protein or Alpha 1-protease inhibitor.
- ATT is produced by the liver, travels to the lungs to protect them from destruction.

## RESPIRATORY FAILURE

- Respiratory failure occurs when the respiratory system is no longer able to perform its normal function.
- Results from COPD or Cystic Fibrosis.
- Acute Respiratory Distress Syndrome (ARDS) results from direct damage to lung tissue as is seen with pneumonia and COPD.
- Symptoms of ARDS are dyspnea, severe hypoxemia, decreased lung function.

## RESPIRATORY FAILURE, (CONTINUED):

- Respiratory failure may be managed by supplemental oxygen through a mechanical ventilator.
- Enteral nutrition is preferred method of nutritional support due to its role in maintaining GI function, reduced risk of sepsis and low cost.
- 25 kcals per kilogram appears to be adequate for most patients.
- Monitor the patient to prevent overfeeding because overfeeding is associated with increased levels of CO<sub>2</sub> in the blood which raises the Respiratory Quotient.

## RESPIRATORY FAILURE, (CONTINUED):

- Patients with Acute Respiratory Distress Syndrome (ARDS) have increased protein requirements. Range 1.2-1.5g/kg/day.
- Enteral and parenteral products high in fat and low in carbohydrates developed specifically for patient with ARDS have demonstrated decreases in both PaCO<sub>2</sub> and time on mechanical ventilation.
- ARDS is associated with the development of pulmonary edema. Fluid restriction formula may be helpful.
- ARDS is associated with the production of oxygen, free radical, and inflammatory mediators derived from Arachidonic acid.

## RELEVANT RESEARCH:

- Recent research suggests that the omega 3 and 6 fatty acids EPA (eicosapentaenoic acid) and GLA (gamma-linolenic acid) can reduce the severity of inflammatory injury.
- Phosphate is essential for optimal pulmonary function and normal contractibility of the diaphragm.
  - When low levels of phosphate in the blood, or hypophosphatemia, occurs, it can lengthen a patient's hospital stay and dependence on mechanical ventilation.

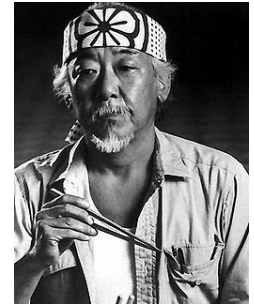
## ASSESSMENT

**Client Name: Daishi Hayato**

Age: 65 years old

Gender: Male

Ethnicity: Asian American



- Household members:
  - Wife, 62
  - four adult children: live out of the area
- Occupation: Retired manager of local grocery chain
- Education: Bachelor's degree

## CHIEF COMPLAINT

- Patient was brought to the emergency room by his wife after experiencing the sudden onset of severe dyspnea while working in his yard.



## MEDICAL HISTORY

- Upon arrival to emergency room, patient received a chest radiograph which revealed a tension pneumothorax of his left lung.
- Patient has a long-standing history of COPD, secondary to chronic tobacco use (2 pack/day smoker for 50 years).
- Patient experiences marked limitation of his exercise capacity due to onset of dyspnea on exertion.

## MEDICAL HISTORY

- Wife related general appetite is only fair.
  - Usually, breakfast is the largest meal.
  - His appetite has been decreased for past several weeks.
- She states that his highest weight was 135lbs, but she feels he weighs much less than that now.

## MEDICAL HISTORY

- Patient experiences two-pillow orthopnea, swelling in lower extremities, and intermittent claudication, or cramping in his left calf when walking.
- Diagnosed with emphysema over 10 years ago.
- Underwent cholecystectomy 20 years ago, and total dental extraction 5 years ago.

## MEDICATION

- Combivent (metered dose inhaler)
  - 2 inhalations 4x/day
- Lasix
  - 40 mg/day
- Oxygen via nasal cannula
  - During sleep



## NUTRITION DIAGNOSIS (PES)

- Involuntary weight loss (NC-3.2)- related to acute respiratory distress, COPD and decreased appetite as evidence by 13lb wt. loss in "several" weeks.



Healthy alveolus



Alveolus damaged by pulmonary disease

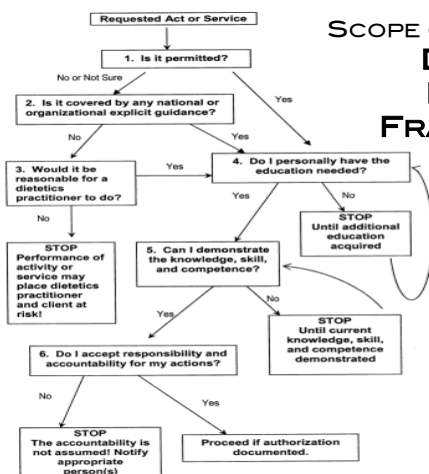
## KCAL NEEDS

- $66.5 + (13.8 \times 55.5) + (5 \times 162.56) - (6.8 \times 65) = 1203.2 \times 1.2 = 1444$
- $25\text{kcal} \times 55.5 = 1387 / 35\text{kcal} \times 55.5 = 1942\text{kcal}$
- Protein:  $1.2\text{g} \times 55.5\text{g} = 66.6\text{g} / 1.5\text{g} \times 55.5 = 83.25\text{g}$
- Ireton Jones equation: Ventilator-dependent
- $1784 - 11(65) + 5(55.5) + 244(1) + 239(0) + 804(0) = 1313$

## RELEVANT RESEARCH

- Significant delay in gastric emptying time after the higher fat supplement. While respiratory quotient increased significantly after both meals ( $p=0.01$ ). **(Grade II) (ADA Evidence Analysis Library 2012)**
- Patients with COPD who are malnourished (as defined by BMI) may have lower lung function measurements, more dyspnea, and lower nutritional intake. **(Grade II) (Katsura et al 2005; Evidence Analysis Library 2012)**

## SCOPE OF DIETETICS PRACTICE FRAMEWORK



## NUTRITION INTERVENTION

- Initiate Enteral Nutrition (ND-2)
  - Enteral nutrition initiated on day 2:
    - Nutrivent
    - $1829 \text{ kcal} / 1.5 = 1219\text{mL} / 24 \text{ hours} = 51 \text{ mL/hour}$
    - $1.219\text{L} \times 100\text{gCHO} = 121.9\text{g CHO}$
    - $1.219\text{L} \times 94 = 114.6\text{g fat}$
    - $1.219\text{L} \times 0.78 = 950.82\text{mL H}_2\text{O}$
    - $1219 - 950 = 879\text{mL H}_2\text{O} / 6 \text{ hours} = 219.75\text{mL flush every 6 hours}$



## NUTRITION INTERVENTION

- Due to high residuals the patient was started on Parenteral nutrition formula: ProcalAmine.
- On day 4, the patient was restarted on enteral nutrition.
- On day 5 parenteral nutrition was discontinued.
- Enteral feedings continued until day 8, when patient was weaned from ventilator.

## OUTCOME GOALS: SHORT AND LONG TERM

- Enteral and Parenteral nutrition to help stabilize the patient.
- Get the patient healthy enough to wean from the mechanical ventilator.
- Prevent further weight loss.

## MONITOR AND EVALUATE

- Weight
- Kcal consumption to prevent overfeeding

## FOLLOW-UP / POST-HOSPITAL STAY

- Once the patient is released from the hospital, provide knowledge on **mechanically softened diet**.
- Encourage:
  - fluids
  - consumption of small, frequent meals
  - use of oxygen while eating to prevent fatigue and increase kcal consumption.
- Referral to smoking cessation specialist.

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