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CDU Curriculum: COPD Exacerbation

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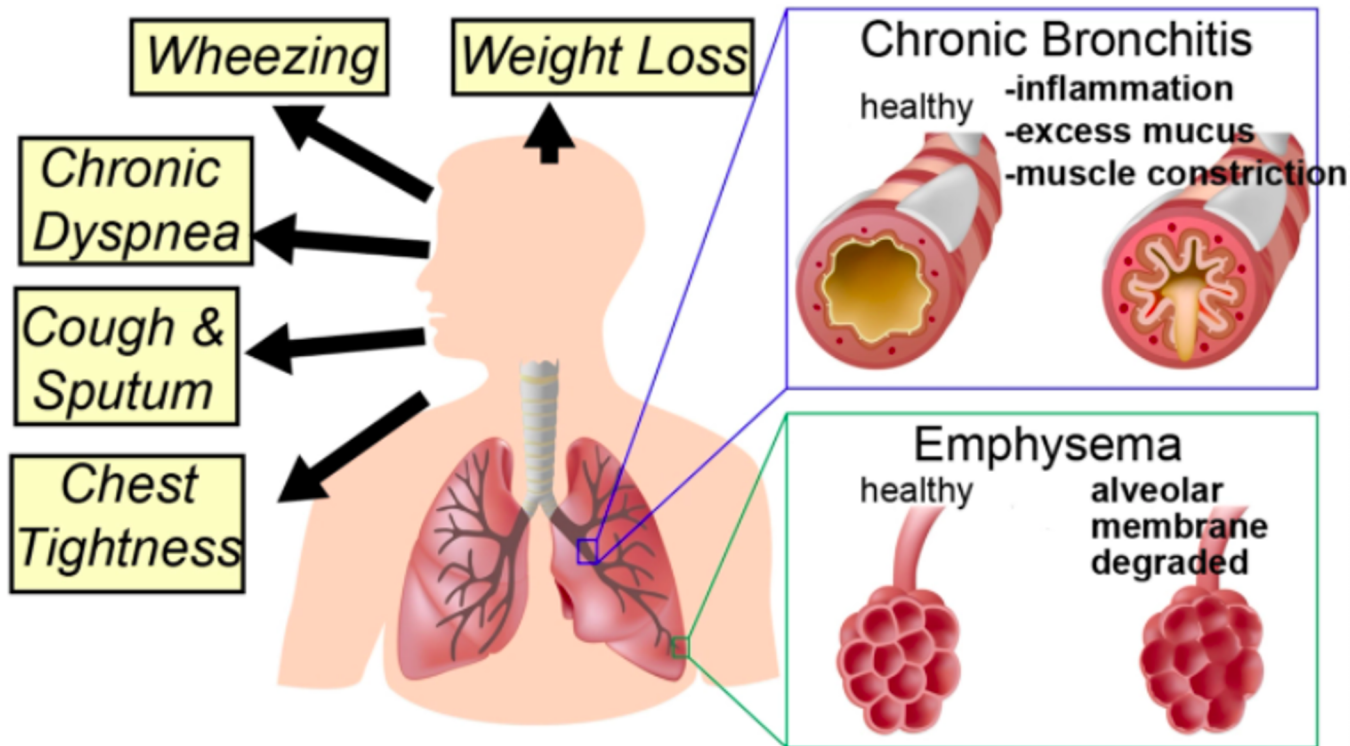
Epidemiology of COPD

- COPD is one of the top 3 causes of death worldwide and 90% of these deaths occur in low to middle income countries
- More than 3 million people died of COPD in 2012 accounting for 6% of deaths globally
- In the US, COPD accounts for a large financial burden on the healthcare system approximately 54 billion dollars annually, mostly as a result of hospitalizations and treatment of acute exacerbations
- Cigarette smoking is the most important cause for the development of COPD

Pathophysiology of COPD

- Chronic airway inflammation that leads to airway limitation and obstruction (FEV1:FVC < 0.7 = obstructive lung disease)
- In upper airways, increase in number and size of mucus-producing goblet cells results in the formation of mucous plugging
- In the smaller airways (< 2 mm diameter) damage to the endothelium impairing the mucociliary response contributes most to the airway resistance and obstruction
- In addition to airway obstruction, COPD patients also experience damage to the lung parenchyma; this pathological state is known as emphysema
- Most COPD patients will have mixed features of both emphysema and chronic bronchitis (presence of chronic productive cough for 3 months in 2 successive years)

Chronic Obstructive Pulmonary Disease



Brief ED management, info about diagnostic testing

- **VBG/ABG:** Routine use is not recommended. Consider if SpO₂ < 90 or concerned about symptomatic hypercapnia
- **Peak flow:** < 100 indicates severe exacerbation
- **CXR:** Particularly if considering an additional or alternative diagnosis such as CHF, pulmonary effusions, pneumonia
- **EKG:** Most common dysrhythmia is atrial fibrillation and MAT
- **Lab work:** COPD exacerbation is a clinical diagnosis. Can consider basic lab work, CBC and BMP; however, will not likely change overall clinical management (Also can consider RPP if immunocompromised/critically ill)
- **Sputum cultures:** can be considered in pts with risk fx of Pseudomonas, hospitalization or IV antibiotic use in last 90 days

Differential Diagnosis for acute dyspnea:

- Pleural effusion
- Asthma exacerbation
- Interstitial lung disease
- Pneumonia
- Cardiogenic pulmonary edema
- Pulmonary embolism
- Pulmonary hypertension
- Cor pulmonale



Brief ED management, info about diagnostic testing

- **Oxygen**:** Maintain PaO₂ > 60 mmHg or SpO₂ 88-92%
- **Albuterol (Beta-2 Agonist) and Ipratropium(Muscarinic antagonist) - Duoneb:** improves airflow obstruction, 3 successive rounds 15-30 minutes apart, and every 4 hours following
- **Steroids:** similar efficacy between oral and IV
 - Options: 1. Hydrocortisone 100-125 mg Q6h 5 d. 2. Methylprednisolone 1-2 mg/kg IV daily 3. Prednisone 60 mg first dose, then 40 mg PO daily x 5 d. (no taper is required)
- **Antibiotics:** indicated for purulent sputum, increased sputum production or requiring NIPPV
- **NIPPV:** reduces need for intubation and mechanical intubation, reduces length of hospital stay

Antibiotics use in COPD

- **Per Jefferson Antibiotic Guidelines and Stewardship:**
 - Antibiotics should be initiated only in pts with 2 cardinal symptoms (increased sputum purulence PLUS dyspnea and/or increased sputum amount)
 - Or in pts who are critically ill or requiring ventilatory support
 - Duration: typically 5 days

Exacerbation Severity	Microbiology	Antibiotic therapy ¹
Mild ≤1 of the following symptoms: <ul style="list-style-type: none"> • Increased sputum purulence • Increased dyspnea • Increased sputum volume 	n/a	Antibiotics not indicated
Moderate/Severe² Increased sputum purulence PLUS at least one of the following: <ul style="list-style-type: none"> • Increased dyspnea • Increased sputum volume OR Critically ill and/or requiring ventilator support	<i>Streptococcus pneumoniae</i> , <i>Haemophilus influenzae</i> , <i>Moraxella catarrhalis</i>	Amoxicillin/clavulanate* 875mg po q12h OR Azithromycin 500 mg po/IV daily OR Cefuroxime* 500mg po q12h OR Doxycycline 100 mg po/IV q12h
Moderate/Severe with risk factors for <i>Pseudomonas aeruginosa</i>^{2,3}	<i>Streptococcus pneumoniae</i> , <i>Haemophilus influenzae</i> , <i>Moraxella catarrhalis</i> , <i>Pseudomonas aeruginosa</i> , <i>Enterobacteriaceae</i>	Levofloxacin* 750 mg po/IV daily ⁴ OR Zosyn* 3.375g IV q8h OR Cefepime* 2g IV q8h

CDU Pathway

- Inclusion criteria: probability of discharge within 24 hours > 80%
- Exclusion criteria:
 - Meets criteria for inpatient admission
 - Respiratory rate > 30
 - Pulse ox < 90% on room air or new hypoxia despite baseline O2 requirement
 - Need for continuous nebulizer treatment or BiPAP
 - Impending respiratory fatigue or failure
 - Altered mental status, concern for hypercapnia

Typical CDU Plan

- Review ED diagnostic tests, labwork, imaging
- Serial exams
- Vital signs every 4 hours
- Continuous pulse oximetry
- Nebulizer treatment every 2-4 hours
- Steroids
- Antibiotics if/when appropriate
- Home care coordination as needed

Patient Disposition: Home vs Hospital Stay?

- Criteria for home:
 - Observation course stable
 - Clinical status improving
 - Tolerating medications
 - Ambulating without significant oxygen desaturation
 - Follow up arranged
- Criteria for hospital:
 - No improvement in clinical status
 - Unstable vital signs or continued hypoxia
 - LOS exceeds 23 hours

Is ED Observation Beneficial for COPD Exacerbation?

Budde J, Agarwal P, Mazumdar M, Yeo J, Braman SS. Can an Emergency Department Observation Unit Reduce Hospital Admissions for COPD Exacerbation?

- Retrospective study of all COPD-related ED visits to an urban, academic medical center between 2/2013 - 4/2017. Examined total proportion of visits admitted to the hospital before and after availability of an observation unit and proportion of COPD visits discharged directly from the ED
- 12.8% reduction in hospital admissions after observation unit availability (79.6 vs 66.8%, $p = 0.0049$) without a change in the proportion discharged directly from the ED
- **Bottom line: Availability of an observation unit can decrease admissions for COPD exacerbations without affecting the number of patients discharged from the Emergency Department**

References

- Budde J, Agarwal P, Mazumdar M, Yeo J, Braman SS. Can an Emergency Department Observation Unit Reduce Hospital Admissions for COPD Exacerbation? *Lung*. 2018 Jun;196(3):267-270. doi: 10.1007/s00408-018-0102-1.
- Brochard L et al. “Noninvasive ventilation for acute exacerbations of chronic obstructive pulmonary disease. *NEJM*. 1995. 333(13):817-22.
- Department of Emergency Medicine Clinical Decision Unit Treatment Guidelines and Handbook
- Chronic Obstructive Pulmonary Disease. Life in the Fast Lane. Available from <https://litfl.com/chronic-obstructive-pulmonary-disease>
- COPD exacerbation. Wiki EM. Available from https://wikem.org/wiki/COPD_exacerbation
- Global Strategy for the Diagnosis, Management, and Prevention of COPD, Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2021. Available from <http://goldcopd.org/> TJUH
- Guideline for Antimicrobial Treatment of COPD Exacerbations. Available from TJUH Intranet: Antimicrobial Guidelines and Stewardship.
- Tabatabai R, Gruber P. Chronic Obstructive Pulmonary Disease. Chapter 64, Rosen’s 9th Edition, *Emergency Medicine: Concepts and Clinical Practice*



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