The Inpatient Management of COPD Exacerbations

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Symptoms and Physical Exam

- Symptoms
  - Increased volume or viscosity of sputum production
  - Increased sputum purulence
  - Dyspnea (worse than baseline)
  - Cough
- Physical Exam Findings
  - Tachypnea
  - Accessory muscle use
  - Wheezing, decreased breath sounds
  - Somnolence
    - Could indicate worsening hypercapnia

Precipitating Factors

- Bacterial and viral infections
  - Account for up to 70% of exacerbations
- Environmental triggers
  - Pollution
- Pulmonary embolism
  - Meta-analysis showed that 25% of inpatients with COPD exacerbation also had co-existing PE (unable to determine cause/effect relationship) (3)

Diagnostics

- Chest X-ray
- CBC, BMP
- ABG
- Consider the following to rule out other etiologies of symptoms or identify concurrent co-morbidities (dependent on ROS and Physical Exam):
  - Sputum gram stain/culture, respiratory viral panel
  - EKG, troponin, BNP, D-dimer

Inpatient Management

- Beta adrenergic agonists
- Anticholinergic agents
- Supplemental oxygen
- Glucocorticoids
- Antibiotics
- Antivirals
- Noninvasive ventilation
- Invasive ventilation

Beta Adrenergic Agents

- Short-acting beta agonists (SABAs)
- Can be given via nebulizer or metered dose inhaler, but nebulized route preferred (4)
- Common agents and doses
  - Albuterol 2.5 mg in 3 ml nebulized; can be administered hourly if necessary
  - levalbuterol 1.25 mg nebulized; can be administered hourly if necessary

Anticholinergic Agents

- Inhaled short-acting anticholinergic agent
- Can be given via nebulizer or metered dose inhaler, but nebulized route preferred (4)
- Common agents and doses
  - Ipratropium bromide 0.5 mg nebulized; can be administered every 4 hours if necessary
  - Consider ipratropium-albuterol (0.5 mg – 3 mg) combination nebulized solution if ordering both SABA and short-acting anticholinergic agent

Oxygen Therapy

- Goal oxygen saturation 88-92%
- Goal PaO_2 60-70 mmHg
- Devices
  - Nasal cannula, venturi mask, high flow nasal cannula, non-invasive ventilation, invasive ventilation
- In general, COPD exacerbations alone do not lead to significant hypoxemia requiring oxygenation support >40% FiO_2. If significant hypoxemia is present, consider alternate or co-existing conditions (pneumonia, ARDS, acute on chronic heart failure, or PE)

Systemic Glucocorticoids

- Evidence supports that the use of systemic glucocorticoids in COPD exacerbation can improve lung function (FEV_1), decrease the risk of treatment failure, decrease the risk of relapse at one month, and decrease hospital length of stay. (5)
- PO vs Intravenous
  - No significant difference in mortality if given PO or IV. Consider IV if in severe exacerbation, NPO status , or suspicion for poor absorption via GI tract. (5)

Systemic Glucocorticoids

- Dose
  - Suggested doses vary significantly
  - Prednisone 40 mg- 60 mg PO daily (6)
  - Methylprednisolone 40 mg -125 mg IV every 12 hours or every 6 hours (6)
- Duration of therapy
  - 5 -day course is non-inferior to 14 - day course (1)

Antibiotics

- Evidence suggests that appropriate use of antibiotics in COPD exacerbations can reduce the risk of treatment failure, relapse, recovery time, and hospital length of stay (4)
- If patient has concurrent fever or radiographic evidence of pneumonia, treat empirically with antibiotics
- However, if fever or radiographic evidence of pneumonia is not present, antibiotics should still be given to patients with COPD exacerbations that have:
  - Require mechanical ventilation (non-invasive or invasive ventilation) **OR**
  - At least two of the three cardinal symptoms of increased dyspnea, increased sputum volume, and increased sputum purulence (4, 8)

Antibiotics

- If patient has one of the above criteria for initiation of antibiotics, determine if the patient has risk factors for *Pseudomonas* (7)
  - Colonization or previous infection with *Pseudomonas*
  - Antibiotic use in past 3 months
  - Chronic systemic glucocorticoid therapy
  - Very severe COPD (FEV1 <30% predicted)
  - Bronchietasis on chest imaging
- If at risk for Pseudomonas, cefepime or piperacillin-tazobactam are appropriate choices
- If no risk factors for *Pseudomonas,* levofloxacin, moxifloxacin, or ceftriaxone are appropriate choices
- Duration of 5 to 7 days (4)

Antivirals

- Rhinovirus is the most common virus isolated
- Oseltamivir for patients with documented influenza infection

Noninvasive Ventilation

- Should be the preferred mode of ventilation for patients with COPD exacerbation and acute respiratory failure with hypoxemia or hypercapnia (4)
  - Can improve oxygenation and ventilation (BiPap)
  - Decreases need for intubation
  - Decreases hospital length of stay
  - Decreases mortality

Invasive Ventilation

- Implemented after failure, intolerance, or contraindication to non-invasive ventilation
- Ensure that mechanics on ventilator do not have evidence of auto-PEEP
  - Decrease inspiratory time to allow more time for expiration
  - Lower tidal volumes and respiratory rate

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