

DEFINITION

Acute exacerbation of chronic obstructive pulmonary disease (AECOPD) is the acute sustained worsening of baseline symptoms (cough, sputum production, and dyspnea) in those with chronic cough and sputum production (chronic bronchitis) or chronic airflow obstruction (COPD).

IMMEDIATE CONSULTATION REQUIRED IN THE FOLLOWING SITUATIONS

- Signs of severe exacerbation including:
 - Use of accessory muscles of respiration
 - Paradoxical chest wall movement
 - New or worsening central cyanosis
 - Reduced alertness (change in mental status)
 - Unable to adequately differentiate AECOPD from another potentially serious etiology such as acute coronary syndrome, congestive heart failure, pneumonia, pneumothorax, or pulmonary embolus

CAUSES

Common causes of AECOPD are:

- Bacterial or viral infection of the tracheobronchial tree
- Air pollution/smoking
- Heart failure
- Pulmonary embolism
- Pneumothorax
- Non-pulmonary infection

Common pathogens include:

- *Haemophilus influenzae*
- *Moraxella catarrhalis*
- *Streptococcus pneumoniae*
- *Pseudomonas aeruginosa*

PREDISPOSING AND RISK FACTORS

- Smoking
- Second and/or third hand smoke

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(AECOPD) ADULT**

- Air pollution
- Occupational exposure to respiratory irritants
- Age (> 50 years as most COPD is evident in the fifth decade)
- Gastroesophageal reflux disease (GERD)
- ≥ 3 exacerbations in prior 12 months
- Comorbidities (e.g., cardiac ischemia, heart failure, pneumonia, diabetes mellitus, renal, or hepatic failure)
- History of asthma
- Improper use of medication and oxygen

HISTORY

- Smoker or exposure to smoke
- ≥ 40 years of age, if under 40 years of age consider Alpha-1 Antitrypsin Deficiency
- Frequent chest infections
- Shortness of breath
- Worsening dyspnea, sometimes at rest
- Increased cough
- Increased sputum production
- Change in colour or tenacity of sputum
- Development of or increase in wheezing
- Loss of energy
- Anorexia
- Increase in respiratory rate
- Tachycardia
- Increase in cyanosis
- Fever
- Malaise
- Confusion
- Depression
- Insomnia
- Decreased exercise tolerance
- Peripheral edema

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(AECOPD) ADULT**

- Immunization status

PHYSICAL FINDINGS

- Temperature may be elevated with acute infection
- Heart rate may be elevated
- Respiratory rate elevated
- Expiratory phase may be prolonged
- SpO₂ may be reduced
- Client may appear thin or wasted
- Degree of respiratory distress varies
- May be using accessory muscles of respiration
- Cyanosis may occur
- Clubbing of fingers may be present
- Chest diameter may increase ("barrel chest")
- Breathing may be pursed-lipped
- If hypoxia is significant, confusion, irritability, and diminished level of consciousness may result
- Tactile fremitus decreased
- Hyperresonance
- Decreased diaphragmatic excursion (chronically hyperinflated lungs)
- Air entry reduced
- Breath sounds distant (if barrel chest is present)
- Scattered wheezes and crackles may be present
- Altered mental status

DIFFERENTIAL DIAGNOSIS

AECOPD can be life threatening and these clients often have multiple comorbidities. Consideration should be given to the complexity of this diagnosis. The differential diagnoses include many serious entities. If any uncertainty exists regarding the diagnosis, consultation with a physician/RN(NP) is required.

- Cardiac disease
 - Heart failure (including acute heart failure)
 - Cardiac arrhythmia (e.g., atrial fibrillation)

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(AECOPD) ADULT**

- Acute coronary syndrome
- Pulmonary embolism
 - Risk Factors
 - Immobilization for at least 3 days
 - Surgery in the past 4 weeks
 - Malignancy (treated within the last 6 months)
 - Clinical signs of deep vein thrombosis
 - Hemoptysis
 - Heart rate > 100 beats/minute
 - Signs and Symptoms
 - Tachypnea, focal wheeze
 - Hypoxia
 - Tachycardia (HR > 100 bpm)
 - Distended neck veins
 - Lungs - can be clear to auscultation; or reveal decreased breath sounds; or egophony due to pleural effusion
 - Pleuritic chest pain
- Other pulmonary conditions:
 - Pneumonia
 - Asthma exacerbation
 - Tension pneumothorax
 - Spontaneous pneumothorax
 - Severe bronchiectasis
 - Pleural effusion
 - Lung cancer
 - Hyperventilation
 - Noncompliance with medication regimen

COMPLICATIONS

Severe exacerbation is seen with loss of alertness or a combination of two of the above typical symptoms and signs of COPD exacerbation.

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(AECOPD) ADULT**

Moderate to severe exacerbation requires immediate consultation with a physician/RN(NP) to develop a treatment plan or plan for evacuation.

Complications include:

- Acute bronchitis
- Pneumonia
- Pulmonary hypertension
- Cor pulmonale (right heart failure)
- Respiratory failure
- Polycythemia (abnormally high hemoglobin)

INVESTIGATIONS AND DIAGNOSTIC TESTS

- SpO₂
- The need for a chest x-ray, ECG, and spirometry should be discussed and determined during consultation with a physician/RN(NP).
 - Chest x-ray may be normal or may show atypical findings. If accessible, a chest x-ray may assist in ruling out any suspicion of pneumonia, pulmonary edema, and pneumothorax.

MAKING THE DIAGNOSIS

The defining features of AECOPD are based on the following findings:

- Increase in dyspnea
- Increase in sputum volume
- Increase in sputum purulence
- Increased cough

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ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE
(AECOPD) ADULT

Criteria for mild, moderate, and severe acute exacerbations of COPD:

<p>Mild Exacerbation Can be controlled with increase in dose of regular medications.</p>	<p>One of the following findings:</p> <ul style="list-style-type: none"> • Increase in dyspnea • Increase in sputum volume • Increase in sputum purulence <p>Plus, any of the following:</p> <ul style="list-style-type: none"> • Upper respiratory infection within 5 days • Fever without apparent cause • Increased wheezing • Increased cough • 20% increase in heart rate over baseline • 20% increase in respiratory rate over baseline
<p>Moderate Exacerbation Requires treatment with systemic steroids or antibiotics.</p>	<p>Two of three findings:</p> <ul style="list-style-type: none"> • Increase in dyspnea • Increase in sputum volume • Increase in sputum purulence
<p>Severe Exacerbation Requires hospitalization or evaluation in emergency department.</p>	<p>All three findings:</p> <ul style="list-style-type: none"> • Increase in dyspnea • Increase in sputum volume • Increase in sputum purulence

Characteristics of AECOPD:

Uncomplicated AECOPD	Complicated AECOPD
<ul style="list-style-type: none"> • < 65 years old • FEV > 50% • < 3 exacerbations per year • No cardiac disease 	<ul style="list-style-type: none"> • > 65 years old • FEV < 50% • > 3 exacerbations per year • Cardiac disease

Determining factors for management of AECOPD:

- The severity of the exacerbation

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(AECOPD) ADULT**

- The severity of the underlying COPD
- Comorbid conditions
- Clinic resources
- Judgment and reliability of the client and caregivers
- The distance the client lives from the health centre or clinic

MANAGEMENT AND INTERVENTIONS

Goals of Treatment

- Prevent disease progression
- Decrease or abolish breathlessness and other respiratory symptoms
- Improve exercise tolerance
- Reduce the frequency and severity of exacerbation
- Improve quality of life
- Reduce impairment and disability
- Reduce mortality

Appropriate Consultation

- Consult a physician/RN(NP) as needed, considering the complexity of this condition.
- Any client with SpO₂ < 90% who does not respond to treatment requires consultation.

Non-Pharmacological Interventions

- Smoking cessation
- Avoid second and/or third hand smoke

Pharmacological Interventions

Treatment may include:

- Appropriate low flow (< 3 LPM) supplemental oxygen, if required to keep SpO₂ between 88-94% or greater depending on client's baseline and to relieve dyspnea
- Aggressive bronchodilator therapy
- Corticosteroids required for moderate to severe exacerbation
- Antibiotics required for moderate to severe exacerbation

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(AECOPD) ADULT**

- Adjuvant Therapy - initiate IV therapy as required

The medications of choice and dosages depend on the client's current drug regimen and adherence to it, as well as the severity of the exacerbation (particularly the degree of respiratory distress).

- If there is a reoccurring exacerbation within the past 3 months and if antibiotics have been used within the last 3 months, choose an alternative antibiotic.
- The maximal effective doses of short-acting β_2 -agonists [SABA, e.g., salbutamol (Ventolin)] and short-acting bronchodilators [SABD, e.g., ipratropium bromide (Atrovent)] in COPD exacerbation are unknown.
- Appropriate use of metered-dose inhaler (MDI) with a spacer device or dry powder devices provides optimal drug delivery and should be encouraged over nebulizers.
- Assess client's ability to use hand held inhalers to maximum benefit.
- Nebulization may be required if there is a barrier to inhaler use.

Drug Treatment

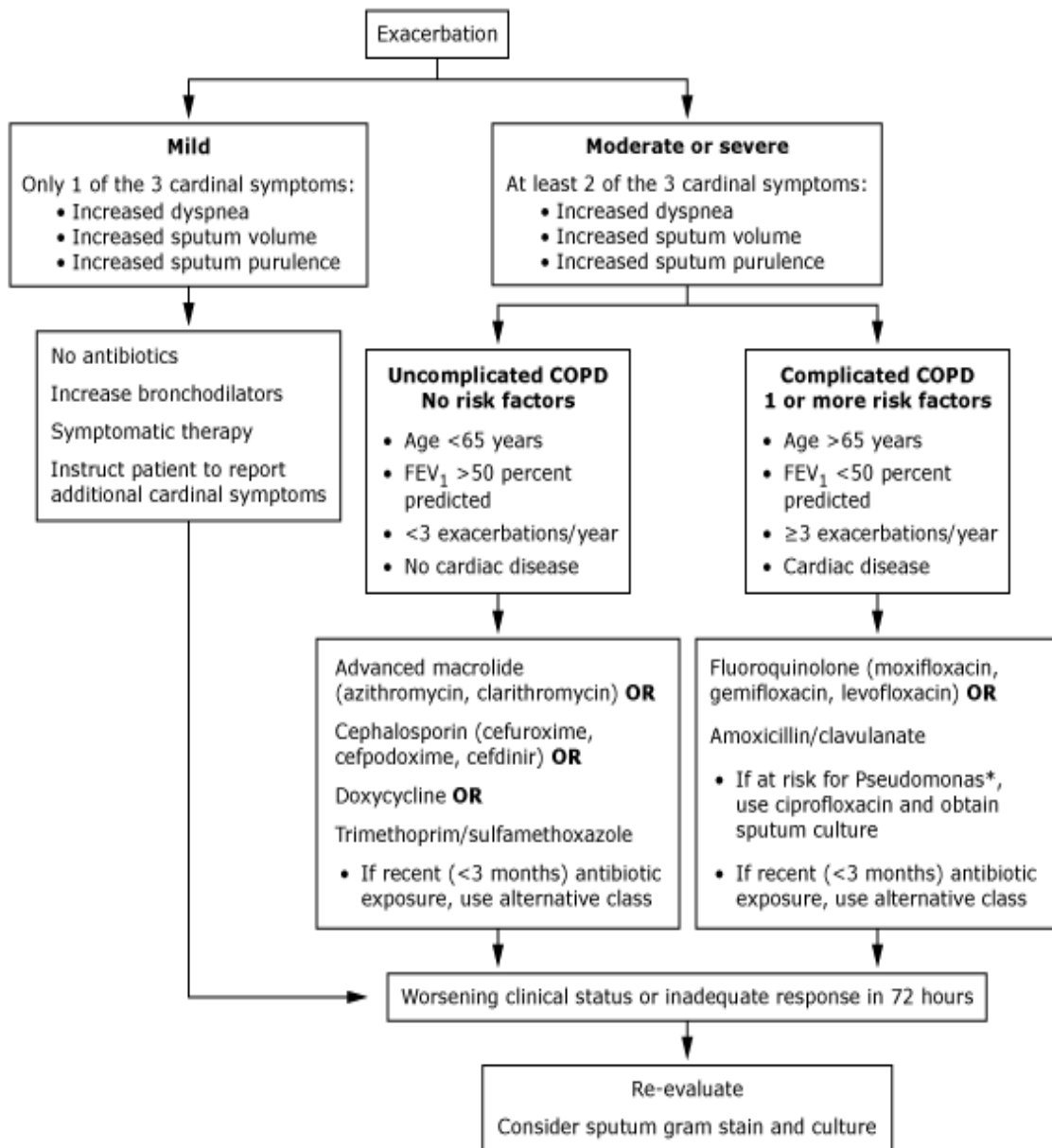
- SABA [e.g., salbutamol (Ventolin)] 3 or 4 puffs q4h prn; may increase to 6-8 puffs q2h in severe exacerbation
 - Salbutamol nebulizer 2.5-5 mg q 30 minutes, 3 doses maximum
- SABD [e.g., ipratropium bromide (Atrovent)], 2-4 puffs qid prn; may increase to 6-8 puffs tid-qid if tolerated.
 - Ipratropium bromide nebulizer 250 micrograms tid, maximum dose 2000 micrograms per day
- Steroids
 - Consultation with a physician/RN(NP) must occur prior to administration of steroids. The following doses may be recommended:
 - Oral steroids (e.g., prednisone) 30-40 mg orally daily for 5-7 days
 - Corticosteroids should be considered in combination with antibiotics in moderate to severe exacerbations as it decreases the risk of treatment failure and the number of hospitalizations.
 - Corticosteroids are not required in mild exacerbations as defined above.
- Antibiotic Therapy

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(AECOPD) ADULT**

- Mild exacerbations may not require antibiotic therapy; an increase in the current medication regimen may be all that is required.
- In moderate to severe exacerbations, care should be taken with initiation of antibiotic therapy because of the risk of renal impairment, drug interaction with warfarin, and prolonged QT interval with macrolides and quinolones.
- Selected antibiotic regimens for moderate AECOPD:
 - Choose one of the following:
 - Doxycycline 100 mg orally q12h for the first day then once daily for 6 days
 - Sulfamethoxazole/Trimethoprim (SMX/TMP) 400/80 mg 2 tabs orally q12h or 1 DS tab (800/160 mg) orally q12h for 7 days
 - Amoxicillin 500 mg orally q8h for 7 days
 - Azithromycin (Zithromax) 500 mg orally once daily for 3 days, or 500 mg once on day 1, then 250 mg once daily on days 2-5
 - Amoxicillin-clavulanate (co-amoxiclav, Augmentin) 875 mg orally q12h or 500 mg orally q12h for 7 days
 - Levofloxacin (Levaquin) 500 mg orally once daily for 7 days

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(AECOPD) ADULT

Outpatient Management of AECOPD



Note. Adapted from Etiology, Management of Acute Exacerbation of COPD by J. Stoller, 2013, September 5. Retrieved from <http://www.uptodate.com>

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(AECOPD) ADULT**

Client and Caregiver Education

- Counsel about appropriate use of medications (purpose, dose, frequency, side effects, etc.).
- Counsel about proper use of inhaler.
- Counsel about smoking cessation (if applicable).
- Recommend adequate hydration (6-8 glasses of fluid per day; there is no evidence that drinking more than this quantity is of any benefit).
- Recommend adequate nutrition: frequent, smaller meals high in protein and calories.
- Recommend an exercise program (e.g., walking) to improve general fitness and sense of well-being.
- Recommend a weight-loss program (if applicable).
- Discuss natural history, expected course, and prognosis of disease.
- Teach about symptoms and signs of exacerbation and acute infection to encourage self-monitoring and early presentation when condition deteriorates ([COPD action plan](#)).
- Counsel to avoid travel at high altitudes. When air travel cannot be avoided, the client should have access to oxygen (especially when travelling in an unpressurized aircraft).

Prevention

Prevention of AECOPD exacerbations include:

- Smoking cessation
- Avoid air pollutants
- Appropriate immunizations including annual influenza vaccination and pneumonia vaccination for those with chronic disease or ≥ 65 years of age
- Client knowledge of current treatment regimens including inhaler technique
- Client recognition of exacerbation of symptoms

Monitoring and Follow-Up

- Follow-up daily until acute symptoms are clearly improving.
- Monthly, if symptoms are poorly controlled.

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(AECOPD) ADULT

Referral

- Client should be referred out for investigation if COPD has not been formally diagnosed with spirometry and pulmonary function tests.

DOCUMENTATION

- As per employer policy

REFERENCES

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