

Guidelines

For The Management Of

Chronic Obstructive Air Way Disease (COPD)

By

Dr. Sinan Butrus

Dr. Layla Al-Shahrabani

F.I.C.M.S
Clinical Standards
& Guidelines

F.R.C.P (UK)
Director of Clinical
Affairs

2009 AD

2709 K

Kurdistan Higher Council

For Medical Specialties

Bordi Kurdistan Bo Psporayati Pziski

Setting Clinical and Professional Excellence

The diagnosis of COPD should be suspected in any patient who has a history of smoking and any of the following:

- Chronic cough or
- Chronic sputum production or
- Dyspnea on exertion or rest

The diagnosis of COPD must be confirmed by spirometry, FEV₁ that is less than 80 % of the predicted normal value and an FEV₁/FVC ratio of less than 0.70. These values should be compared to age-related control to avoid over diagnosis of COPD in the elderly.

Acute Exacerbation AECOPD

Signs and symptoms may include any of the following:

sustained (24-48 hours) Increased dyspnea or dyspnea at rest, cough & sputum production

Change in sputum color or character

Change in mental status

Hypoxemia & cyanosis

Use of accessory muscles of respiration

Fever

Increased respiratory rate greater than 25 breaths per minute

Increased heart rate greater than 110 beats per minute

Development or increase in wheezing

Decrease in FEV₁ or peak expiratory flow

Referral to the emergency department if patient presents with any of the following:

*Unstable vital signs

*Impaired level of consciousness or altered mental status

*Severe breathlessness

*New or worsening hypoxemia (SaO₂ < 90 %) or hypercapnia

*Inability to tolerate oral medications such as antibiotics or steroids.

Indication to initiate ventilatory support :

*Patient experience progressive worsening of respiratory acidosis and/or altered mental status

*Clinically significant hypoxemia that has not corrected with supplemental oxygen delivered by either a nasal cannula or a face mask.

* If blood gases available:

a. PaCO₂ 55 mm Hg

b. PaCO₂ of 50 to 54 mm Hg and nocturnal desaturation (oxygen saturation by pulse oximeter 88% for 5 continuous minutes while receiving oxygen therapy 2 L/min)

Initial management

- ❖ Increase frequency of bronchodilator use and consider giving via a nebuliser
- ❖ Give oral antibiotics if sputum is purulent or evidence of chest infection :
 - Amoxicillin-clavulanate (Augmentin), 500 mg/125 mg mg tablet three times daily or one 875 mg/125 mg tablet twice daily
 - Clarithromycin 500 mg twice daily
 - Azithromycin 500 mg initially, then 250 mg daily
 - Levofloxacin (Levaquin), 500 mg daily
 - Moxifloxacin (Avelox), 400 mg daily

- Doxycycline 100 mg twice daily
- Trimethoprim-sulfamethoxazole 800/160 every twice daily
- ❖ Prednisolone 30 mg daily for 5 -14 days when indicated.

Indications for hospital treatment include:

- Severe breathlessness, cyanosis, worsening peripheral edema.
- Impaired level of consciousness, acute confusion.
- SaO₂ <90%, arterial pH level <7.35
- Changes present on CXR
- Significant co- morbidity (particularly cardiac disease and insulin-dependent diabetes).
- Inability to cope at home, living alone.
- General condition poor or deteriorating; poor level of activity or confined to bed.
- Already receiving long-term oxygen therapy (LTOT).

Hospital management:

- ❖ Arterial blood gases (or oxygen saturation if facilities are not available)
- ❖ CXR.
- ❖ Electrocardiogram.
- ❖ Full blood count, sugar, urea & electrolyte.
- ❖ Sputum microscopy and culture if purulent.
- ❖ Blood cultures if fever present
- Oxygen:24-28%- 2ltr/min,aiming to keep the O₂ saturation above 90%
- High-dose of short-acting β₂ agonist &/or anticholinergic;
Albuterol in 2.5-5.0 mg via nebulizer every 20 minutes as needed
Ipratropium can be added in a dose of 0.5 mg per nebulization
- Consider intravenous theophyllines, if response to nebulised bronchodilators is poor,
Aminophylline 10-15 mg /kg/ day ,in 3 divided doses
- Systemic antibiotic: wide spectrum antibiotic covering G⁺ & G⁻ bacteria as third-generation cephalosporin or augmented penicillin, plus a fluoroquinolone or an aminoglycoside for synergy.
- Methylprednisolone sodium succinate (Solu-Medrol) intravenously 1 - 2 mg /kg every 6-12 hours. After 2-3 days, the patient can be switched to orally administered prednisone in a dose of 60 mg daily with tapering dose over a two weeks period to avoid adverse effects from sudden withdrawal.
if methylprednisolone not available, start IV Hydrocortisone 100mg as a stat dose and then QDS if oral not tolerated
- Consider ventilatory support with team work decision (pulmonary specialist & anesthetist) when there is indication

Differential diagnosis of COPD

Chronic asthma
 Cardiac: ischemia , congestive heart failure, arrhythmia
 Bronchitis , bronchiectasis
 Pneumonia
 Pleural effusion

Pneumothorax
Pulmonary embolism
Recurrent aspiration
Upper airway infection; obstruction

Differentiation of COPD from Asthma

Clinical Features	COPD	Asthma
Smoker or ex-smoker	Nearly all	Possibly
Symptoms under age 35	Rare	Often
Chronic productive cough	Common	Uncommon
Breathlessness	Persistent and progressive	Variable
Night time waking with breathlessness and or wheeze	Uncommon	Common
Commonly associated with atopic symptoms and seasonal allergies	Uncommon	Common
Significant diurnal or day-to-day variability of symptoms	Uncommon	Common
Favorable response to inhaled glucocorticoids	Inconsistent	Consistent

Diagnostic workup of COPD

Six-Minute Walking Distance: The distance walked in 6 minutes (6MWD) is a good predictor of all-cause and respiratory mortality in patients with moderate COPD

Pulmonary Function Tests: diagnosis and assessment of the severity of disease, and they are helpful in following its progress.

Oximetry & arterial blood gases ABG: should be considered in any patient needs admission

Sputum cultures: consider in patients with persistently purulent sputum or during recurrent infectious exacerbations especially if no response to initial antibiotic treatment

Complete blood count: looking for anemia, polycythaemia & evidence of infection in acute exacerbations.

Chest Radiography

Electrocardiography: to exclude cardiac causes of dyspnea

CT scan: for diagnosing emphysema (outlined bullae), diagnosing various forms of COPD { lower lobe disease may suggest Alpha 1-antitrypsin(AAT)deficiency} & to determine whether surgical intervention would benefit the patient

Echocardiography: mainly for cardiac cases

Alpha1-antitrypsin: should be suspected if there is early onset of COPD, a family history of COPD, little or no history of smoking/ noxious gases or a predominance of basilar emphysema

Brain natriuretic peptide (BNP): might be helpful in differentiating respiratory from heart failure as it is increased in heart failure but must be taken in context with the overall clinical picture.

Goals of management

Aiming to improve patient’s functional status , exercise tolerance and quality of life by preserving optimal lung function

- Smoking cessation
- Improve & relief of symptoms
- Preventing the recurrence of exacerbations
- Limitation of complications

Therapy Interventions

NONPHARMACOLOGIC INTERVENTIONS

Smoking cessation is the most important factor in preventing or treating COPD

Nutritional management should be provided, weight loss should be encouraged in obese patients

Regular exercise should be promoted

Pharmacotherapy

Bronchodilators and Inhaled Glucocorticoids

Mucolytics, Antioxidants, and Antitussives

Oxygen Therapy

Pulmonary Rehabilitation

Alpha I-Antitrypsin Augmentation Therapy

Management of associated conditions/Cor-Pulmonale

Lung Volume Reduction Surgery, Lung Transplantation Surgery

Approaches to management

Step	Symptoms	Maintenance Therapy	Rescue therapy	Other Interventions
A	Asymptomatic	No medication indicated	----	Smoking cessation; influenza, and other vaccinations
B	Symptoms less than daily	No scheduled medication indicated	SABA	Smoking cessation; influenza, and other vaccinations
C	Symptoms not controlled with rescue therapy or daily symptoms	Scheduled SAAC or Combination SABA + SAAC	SABA	Smoking cessation; influenza, and other vaccinations
D	Symptoms not controlled	Combination SAAC + LABA &/or LAAC	SABA	Smoking cessation; influenza, and other vaccinations Consider Pulmonary Rehabilitation
E	Exacerbations of more than one per year and severe disease (FEV ₁ < 50%)	Consider adding an inhaled glucocorticoid	SABA	Smoking cessation; influenza, and other vaccinations Refer to Pulmonary Rehabilitation

SAAC – Short-acting anticholinergic; SABA – Short-acting beta-agonist; LABA – Long-acting inhaled beta-agonist; LAAC – Long-acting anticholinergic

With **(D)** Consider adding a slow release theophylline with caution due to adverse effects.
Nighttime respiratory symptoms are frequently controlled, but theophylline may lead to insomnia.

Inhaled bronchodilators can be grouped according to mechanism or duration of action:

1-Short-acting β_2 -adrenergic-receptor agonists SABA (Albuterol sulfate)

Short-acting cholinergic-receptor antagonists SAAC (Ipratropium bromide)

The effect of both groups of drugs starts within 15 min & last for 4-6 hours.

Albuterol and Ipratropium are equally effective & can be used interchangeably as *rescue therapy* in acute exacerbations for acute relief of symptoms or as *maintenance* for mild diseases with caution in cases of IHD & cardiac arrhythmia.

2-Long-acting β_2 -adrenergic-receptor agonists LABA (Formoterol fumarate, Salmeterol xinafoate) have an effect last for 8 - 12 hours;

long-acting anticholinergic agent LAAC (Tiotropium bromide) has duration of effect of more than 24 hours.

Both groups are used as *maintenance treatment* only & should be considered for patients with COPD with an $FEV_1 < 70\%$ predicted.

Theophylline If symptoms continue despite combined inhaled-bronchodilator therapy, theophylline may be prescribed, the sustained release formulations may provide longer control and better benefit for nocturnal dyspnea

Corticosteroids

Inhaled corticosteroids are indicated in patients with severe COPD ($FEV_1 < 50\%$ predicted) & who have had at least one exacerbation in the prior year, they reduce the frequency of exacerbations.

Intravenous steroids no benefit of IV over oral steroid formulations, and thus IV steroids should be reserved only for those patients unable to tolerate oral intake

A short course of oral glucocorticoids with a dose equivalent to 30 - 40 mg of prednisone per day (5 - 14 days) should be considered for patients with COPD exacerbation

Antibiotics

Are recommended in patients with an acute exacerbation

For uncomplicated exacerbations of COPD, consider azithromycin , second generation cephalosporin, trimethoprim/ sulfamethoxazole, doxycycline

For complicated exacerbations of COPD consider beta-lactam/beta-lactamase inhibitor [amoxicillin/clavulanate] or fluoroquinolone [levofloxacin, moxifloxacin]

Mucolytics agents reduce sputum viscosity, improve secretion clearance and chest discomfort but they have not been shown to improve dyspnea or lung function, and may elicit bronchospasm so when used as an inhalational therapy a bronchodilator should be added.

Oxygen therapy

1-Oxygen therapy should be initiated in patients who have:

*Exertional & nocturnal hypoxemia ($SaO_2 < 88\%$)

*Hypoxemia ($SaO_2 < 89\%$) and signs of tissue hypoxia such as hematocrit > 55 , pulmonary hypertension, or cor pulmonale.

2-Titrate oxygen delivery to maintain $SaO_2 > 90\%$.

Humidification generally is not necessary when the patient receives oxygen by nasal cannula at flow rates of less than 5 L/min

3-Patients who started to receive oxygen therapy while unstable or on suboptimal medical therapy should be reevaluated within one to 3 months for need of long-term oxygen therapy (LTOT), as this therapy for more than 15 hours/day prolongs life in hypoxemic patients with PaO₂ of 88% or less & should be reevaluated at least annually for continued need of LTOT.

4-Patients prescribed oxygen should be cautioned about the potentially extreme fire hazard of smoking or fire source in the presence of oxygen

Vaccine The pneumococcal vaccine should be offered to all patients older than 65 years or to patients of any age who have an FEV₁ of less than 40% of predicted. The influenza vaccine should be given annually to all COPD patients.

Pulmonary Rehabilitation

The goals of an exercise program are to improve daily function, exercise tolerance, and the dyspnea accompanying daily activities and exercise and reduce the number and duration of hospitalizations related to respiratory disease.

Lung Volume Reduction Surgery & Lung Transplantation Surgery

May be an option (for patients with severe symptom despite maximal medical therapy) to improve symptoms and restore function in patients who have emphysema, such as bullectomy, lung volume reduction surgery and lung transplantation

Special Considerations for a Patient in Need of Surgery

Administration of local anesthesia presents a very low risk, even in the presence of severe COPD. General anesthesia increases the risk for pulmonary emboli

Patients with severe COPD (FEV₁ < 50 % predicted) undergoing any operation that is done under general anesthesia should be considered for preoperative evaluation including pulmonary function test, ABG, and chest X-ray

1-Bronchodilator therapy should be optimized prior to planned surgery.

2-Patients should be instructed to stop smoking at least 6 - 8 weeks before surgery.

3-Deep breathing, early mobilization, adequate pain control spirometry should be encouraged to reduce postoperative pulmonary complications.

4-Patients who are on oral glucocorticoids should receive stress doses of intravenous glucocorticoids (Hydrocortisone 200-400 mg /day) in the perioperative period to reduce the risk of adrenal insufficiency.

Planning Air Travel for a Patient with Stable COPD

When exposed to low concentrations of O₂, as occurs during flight, normal subjects compensate with hyperventilation to maintain normal or near PO₂. Patients with reduced PO₂ (< 80 mm Hg), severely reduced FEV₁, or hypercapnia may be unable to compensate to maintain near normal PO₂ in-flight. Therefore, these patients may experience hypoxemia during flight so O₂ supplementation is required for these patients.

To prevent hyperoxic induced depression in ventilation in these patients, the in-flight PO₂ should be approximately 55 - 60 mm Hg (SaO₂ ~ 85 - 90 %).

Patients with known bullous disease are of the increased risk for pneumothorax during air travel.

References

1. Zab Mosenifar, MD; Chief Editor: Zab Mosenifa: Chronic Obstructive Pulmonary Disease : Medscape Oct 10, 2011
<http://emedicine.medscape.com/article/297664>
2. Diagnosis and Management of Chronic Obstructive Pulmonary Disease : Health Care Guideline: Eighth Edition March 2011:
http://www.icsi.org/chronic_obstructive_pulmonary_disease_2286.html
3. Gold 2010: At a Glance Outpatient Management for COPD
4. Fabrizio Luppi¹, Francesca Franco: Treatment of Chronic Obstructive Pulmonary Disease and Its Comorbidities: Proc Am Thorac Soc Vol 5. pp 848–856, 2008
<http://pats.atsjournals.org/content/5/8/848.short>
5. E. Rand Sutherland, Reuben M. Management of Chronic Obstructive Pulmonary Disease: N Engl J Med June 24, 2004; 350:2689-2697
6. Soto FJ, Varkey B: Evidence-based approach to acute exacerbations of COPD. Curr Opin Pulm Med. 2003 Mar;9(2):117-24.
7. Francisco J. Soto,; Basil Varkey: Evidence-Based Approach to Acute Exacerbations of COPD: Summary and Recommendations
http://www.medscape.com/viewarticle/449622_7
8. M. Palmqvist, G. Persson et al, Inhaled dry-powder:; formoterol and salmeterol in asthmatic patients: Eur Respir J 1997; 10: 2484–248
9. www.patient.co.uk/doctor/Acute-Exacerbations-of-COPD.htm.
10. www.home.intekom.com/pharm/smith_kb/augmt-iv.html.
11. Clinical Indications for Noninvasive Positive Pressure Ventilation in Chronic Respiratory Failure Due to Restrictive Lung Disease, COPD, and Nocturnal Hypoventilation—A Consensus Conference Report^{*}: Chest, March 2012, 141 (3)
<http://chestjournal.chestpubs.org/content/116/2/521.full>
12. Amal J, Martin T : Mechanical ventilation in acute respiratory failure complicating COPD Walters Kluwer Health, Feb 2012
www.uptodate.com/mechanical-ventilation-in-acute-respiratory-failure-complicating-COPD