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Review Article

Review of clinical guidelines for the management of acute exacerbation of chronic obstructive pulmonary disease in primary care setting

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ABSTRACT

Chronic obstructive pulmonary disease (COPD) is a chronic condition affecting the respiratory system leading to dyspnea, cough and sputum, and also impacting the quality of life significantly as the condition progresses. It affects more than 400 million people globally and anticipated that the prevalence will continue to increase. The condition is marred by exacerbations intermittently, worsening the symptoms and requiring use of bronchodilators, corticosteroids and where needed the antibiotics. There are many international clinical guidelines available on management of acute exacerbations in COPD and their recommendations. We compared the available international guidelines on their advice on the management of acute exacerbation of COPD. We selected Global Initiative for Chronic Obstructive Lung Disease (GOLD) report 2026, COPD-X plan: Australian and New Zealand guidelines for the management of COPD 2025, National Institue for Health and Care Excellence (NICE) COPD 2018 guideline and management of COPD exacerbations: European Respiratory Society and Americal Thorasic Society (ERS/ATS) guideline 2017. The 4 guidelines recommendations on use of bronchodilators, corticosteroids and antibiotics during acute exacerbation of COPD are mutually similar and agree on use of these, except ERS/ATS guideline which has not commented on antibiotic use. The dosage of steroids is similar from the guidelines and the choice of antibiotic also. We concluded that bronchodilators, corticosteroids and antibiotics during acute exacerbation of COPD is recommended by major international clinical guidelines.

Keywords: Chronic obstructive pulmonary disease, Acute exacerbation of COPD, Clinical guidelines, Bronchodilators, Corticosteroids

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a chronic medical condition defined as a heterogeneous lung condition characterised by chronic respiratory symptoms (dyspnea, cough, sputum production and/or exacerbations) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction.[1] COPD affects more than 400 million people and is the third cause of death worldwide.[2] The COPD burden continues to rise all over globe.[2] There is substantial regional variations in the prevalence and risk factors. The condition is associated with chronic suffering, significant impact and major socioeconomic consequences.[3] The condition gradually progressively worsens usually over a period of many years and has intermittent acute exacerbations.

THE ACUTE EXACERBATION OF COPD

The acute exacerbation is defined as an acute event with sympotms worsening over a few days (up to 14 days) and characterized by increased dyspnea and/or cough and sputum that may be accompanied by tachypnea and/or tachycardia and is often associated with increased local

and systemic inflammation caused by infection, pollution, or other insult to the airways.[4] The exacerbation is triggered by multiple precipitating factors like bacterial and viral Infection, tobacco smoke, air pollution, seasonal temperatures and more.[5] The data from cohort study found 48.7% participants of SPIROMICS study experienced at least one acute exacerbation of COPD.[6] Patients with previous COPD exacerbations are at higher risk of future acute exacerbations and each exacerbation can worsen disease progression and shorten survival.[5,7] The Exacerbations are treated with bronchodilators, corticosteroids and where needed antibiotics.[8]

PURPOSE OF THE ARTICLE

There are clinical guidelines published from different parts of the world on the management of COPD. The guidance from the guidelines can vary on the management of acute exacerbation of COPD. Global initiative for COPD published Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2026 report, updating the previous guidance. This report is applicable to all the COPD patients and can be used by multiple stakeholders, the patients, the clinicians, the health systems and more. We also notice that there are other major international guidelines on the management of acute exacerbation of COPD, from which we selected 3.

The COPD-X plan: Australian and New Zealand guideline for the management of COPD, published in 2025, COPD in over 16s: diagnosis and management by NICE published in 2018 and updated in 2019, and The management of COPD exacerbations: a European Respiratory society/American Thorasic Society guideline, published in 2017.[4,9-11] This review compares the guidance on the use of bronchodilators, corticosteroids and antibiotics for the exacerbation of COPD from these guidelines and contrasts the recommendations. As primary care based physicians, we looked at the recommendations only to patients likely to be treated in the community or ambulatory patients and not the hospital based or in-patients.

SEVERITY CLASSIFICATION OF ACUTE COPD EXACERBATION

Acute exacerbation of COPD can cause variable symptoms of different severity which can negatively impact health status. As the definition expresses, there is increased airway inflamation, increased mucus production and gas trapping, causing more cough, dyspnea and sputum production. GOLD report considered Rome proposal to claassify severity as below.[12]

Table 1: Classification of the severity of COPD exacerbations.[4]

Severity	Variable thresholds to determine severity
Mild (default)	Dyspnea visual analogue scale (VAS) <5
	Respiratory rate (RR)<24 breaths/min
	Heart rate (HR) <95 bpm
	Resting SaO_2 ≥92% breathing ambient air (or patient's usual oxygen prescription) AND change ≤3% (when known)
	CRP <10 mg/l (if obtained)
Moderate (meets at least 3 of 5	Dyspnea VAS≥5
	RR ≥24 breaths/min
	HR ≥95 bpm
	Resting SaO_2 <92% breathing ambient air (or patient's usual oxygen prescription) AND change >3% (when known)
	CRP ≥10 mg/l (if obtained)
	If obtained, ABG may show hypoxemia (PaO_2 7080 mmHg)
Severe	Dyspenea, RR, HR, SaO_2 and CRP same as moderate
	If obtained, ABG may show hypoxemia (PaO_2≤60 mmHg) and/or hypercapnia and acidosis ($PaCO_2$ >45 mmHg and pH <7.35 mmHg)

REVIEW OF THE GUIDELINES ON THE MANAGEMENT OF ACUTE EXACERBATION OF COPD

Acute exacerbation of COPD, depending on the severity, requires prompt treatment at the earliest as otherwise the condition tends to deteriorate leading to longer suffering, slow response and worsening outcomes.[13] The management includes multiple options including bronchodilators, corticosteroids, antibiotics, antioxidants, fluid-balance, oxygen therapy and treatment of comorbidities.

We looked at the recommendations of bronchodilators, corticosteroids and antibiotics from the above selected international guidelines. We documented each of the intervension separetely below with the respective guideline recommendations.

Bronchodilators

GOLD report recommends inhaled Short Acting Beta2 Agonists (SABA), with or without short-acting anticholinergics, as the initial bronchodilators for acute treatment of COPD exacerbation. Use pressured Metered Dose Inhaler (pMDIs) or nebuliser device. Air-driven nebuliser preferable than oxygen-driven to prevent hypercapnea. Patients can receive one dose of nebulised medication every hour for 2-3doses or use a pMDI one or two puffs every one hour for two or three doses. It is recommended that patients do not receive high doses of SABA due to possible side effects. IV methylxanthines (theophylline or aminophylline) are not recommended due to significant side effects.

COPD-X plan recommends inhaled beta-agonist (salbutamol, terbutaline) and antimuscarinic agent (ipratropium) by pMDI or by jet nebulisation. The dose range to titrate response, can be hourly to six-hourly.

NICE recommends managing by taking increased doses of short-acting bronchodilators. It states that both nebulisers and hand-held inhalers can be used to administer inhaled therapy during exacerbation. If a person with COPD is hypercapnic or acidotic, the nebulise should be driven by compressed air rather than oxygen. Only use IV theophylline as an adjunct if there is an inadequate response to nebulised bronchodilators.

European respiratory society/American Thorasic society combined guideline has not commented in their guideline on use of bronchodilators.

Corticosteroids

GOLD report recommends a dose of 40 mg prednisolone-equivalent per day for 5 days. Therapy with oral prednisolone is equally effective to IV administration. Nebulised budesonide alone may be a suitable alternative for treatment of exacerbatons in some patients.

COPD-X plan recommends-consider prescribing systemic corticosteroids to reduce the severity of and shorten recovery from exacerbations (oral route, when possible; 30 to 50 mg daily for 5 days-up to 2 weeks).

NICE guideline recommends, in the absence of significant contraindications, consier oral corticosteroids or people in the community who have an exacerbation with a significant increase in breathlessness that interfees with daily activities. Offer 30mg oral prednisolone daily for 5 days.

European respiratory society or American Thorasic Society combined guideline recommends a short course (≤14 days) of oral corticosteroid for the ambulatory patients.

Antibiotics

GOLD report recommends-antibiotics should be given to patients with COPD who have these: at lease two of these symptoms- increase in dyspnea, fever, sputum volume, and sputum purulence, if increased purulence of sputum is one of these symptoms. And patients with prior positive sputum culture during prior exacerbation. It recommends a duration of ≤5 days of antibiotic treatment for outpatient treatment of COPD exacerbations.

COPD-X plan guideline recommends-consider prescribing antibiotic therapy for COPD exacerbations with clinical features of infection (increased volume and change in colour of sputum and/or fever). It recommends use of amoxycillin or doxycycline for 5 days.

NICE guideline NG114 recommends, consider an antibiotic for people with an acute exacerbation of COPD, but only after taking into account, the severity of symptoms, particularly sputum colour changes and increases in volume or thicknss beyond the person's normal day-to-day variation.

Give oral antibiotics first line if the person can take oral medicines, and the severity of their exacerbation does not require IV antibiotics. It recommends 5 days course of antibiotic.

ERS/ATS recommendation: For ambulatory patients having a COPD exacerbation, we suggest the administration of antibiotics. Antibiotic selection should be based upon local sensitivity patterns.

Table 2: Summary of guideline recommendations for bronchodilators, corticosteroids and antibiotics during acute exacerbation of COPD.

Guidelines	Bronchodilators	Corticosteroids	Antibiotics
GOLD report	Recommended	Recommended. Suggested dose prednisolone 40 mg daily for five days	Recommended
COPD-X plan	Recommended	Recommended. Suggested dose Prednisolone 30-50 mg daily for five days, upto two weeks.	Recommended
NICE guideline	Recommended	Recommended. Suggested daily dose of prednisolone 30 mg daily for five days	Recommended
ERS/ATS guideline	Not-commented	Recommended. No dose suggestion, but recommends short course (<14 days)	Recommended

Table 3: First line or empirical antibiotics recommended by guidelines during acute exacerbation of COPD.

Guidelines	First line (empirical) oral antibiotics suggested
GOLD report	Aminopenicillin with clavulanic acid, a macrolide, a tetracycline or, in selected patients, a quinolone.
COPD-X plan	Amoxicillin and doxycycline
NICE NG114	Amoxicillin, doxycycline and clarithromycin
ERS/ATS	Based upon local antibiotic sensitivity pattern

DISCUSSION

From the primary care physician prospective, we looked at the recommendations for bronchodilators, corticosteroids and antibiotics by the recognised international guidelines on acute exacerbation of COPD management in the community or primary care settings. As the prevalence of COPD is excessive and we face the patients with acute exacerbation often, more so during extremes of weather or when the air quality is bad due to pollution, understanding and appropriate management of the condition is vital.[14] This prevents further deterioration of COPD, improves the sympotms in patient and prevents hospitalization and further complications.[5]

We found that the GOLD report was the most extensive guideline and covered many aspects of acute exacerbation of COPD.[4]

Bronchodilators have been recommended by three guidelines for the management of acute exacerbation except for the ERS/ATS guideline which has not commented.[11] The guidelines recommend use of Short acting bronchodilators. GOLD report and COPD-X plan specify the use of SABA and anticholinergic drugs while NICE has not specified them but used the word short acting bronchodilators.[9] COPD-X plan has given the recommended dosages as well while other guidelines have not. All the three guidelines have recommended bronchodilator use either a hand-held pMDIs or nebuliser route, without any preference but drug delivery. GOLD report recommended use of air-driver nebuliser and not oxygen driven nebuliser while NICE guideline recommends this in patients who are hypercapnic or acidotic. GOLD reports that there are no trials comparing nebulised SABA with nebulised Long Acting Beta2 Agonists (LABA) for COPD exacerbations, so not given any recommendation on this. COPD-X plan have not commented on LABA and also NICE guideline.

Corticosteroids have been recommended by all the 4 guidelines for the acute exaacerbation of COPD. All the guidelines suggest short course or 5 days of prednisolone with 3 guidelines giving specific dose strength, for mild to moderate exacerbations in the community setting. COPD-X plan and ERS/ATS guideline have suggested use of steroids upto 14 days. All the guidelines advise against steroid treatment for more than 14 days as risk of pneumonia and increased mortality. GOLD report mentions of nebulised budesonide alone being a suitable alternative in some patients. GOLD report, COPD-X plan and ERS/ATS guidelines have cited studies about eosinophil count and use of corticosteroids. The studies have suggested to use corticosteroids for exacerbation of COPD if eosinophil counts are raised, but if the count are normal or low, not to use the cortisteroids. NICE has not commented on use of eosinophil count to guide cortisteroid use in their guideline.

Antibiotics use have been recommended by all the guidelines during the episode of acute exacerbation of COPD. The guidelines except for ERS/ATS, have recommended use of antibiotics in patients with increased volume of sputum with change of colour or purulence. GOLD report and NICE guideline also recommend use of antibiotics in patients with prior sputum culture positivity during exacerbations. All guidelines recommend use of antibiotics for 5 days, except for ERS/ATS, which has not commented on duration. The guidelines have recommended penicillin or tetracycline empirical or first line antibiotic for the acute exacerbation, GOLD report and NICE also adding macrolide to first line antibiotic list, while ERS/ATS have suggested to use the local antibiotic sensitivity pattern as guide.

All the four guidelines support each other in the recommendations of management of acute exacerbation of COPD with bronchodilators, corticosteroids and antibiotics in except ERS/ATS has not commented on bronchodilator use. The recommendations are for the mild to moderate exacerbation based in the community or ambulatory patients. The guidelines have extensive scientific evidence and the recommendations are applicable to our practice in the primary care.

We compared the guidance of these with that of GOLD report (2024), the previous version. The guidance on bronchodilators, the corticosteroids and the antibiotics for management of exacerbation of COPD has not changed.

Limitations

We have covered the major 4 international guideline to compare but for the local application, the comparision should have included the local practicing guideline also. We hope to do this in our next review. Also the article is ot covering the recommendations on the prevention of exacerbation, and other treatment options available. The review is focused on ambulatory patients in primary care but does not serve all the patients like those with

comorbidities like heart failure, arrythmias, those on oxygen therapy.

CONCLUSION

The 4 international guidelines compared for the management of acute exacerbation of COPD recommend use of bronchodilators, corticosteroids and antibiotics during the event. They clarify that pMDI or nebuliser can be used as mode of medication delivery for bornchodilator. The guidelines have guided on the dosages of bronchodilators and corticosteroids, and also on the empirical antibiotics to be used.

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