European Journal of Internal Medicine 128 (2024) 20–22

Contents lists available at ScienceDirect

European Journal of Internal Medicine

journal homepage: www.elsevier.com/locate/ejim

Invited Review Article

Managing and discharging COPD patients hospitalized because of an exacerbation of respiratory symptoms: An opportunity to improve outcomes

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1. The problem

Many patients with chronic obstructive pulmonary disease (COPD) develop episodes of exacerbation of respiratory symptoms (ECOPD) that may require hospitalization (H-ECOPD). Long-term prognosis during and following an H-ECOPD is poor, with a five-year mortality rate of about 50 % [1,2]. Factors independently associated with higher mortality risk include older age, lower body mass index, more severe respiratory symptoms, poorer quality of life, worse lung function, lower lung density (i.e., emphysema) and thickened bronchial walls on CT-scan, presence of comorbidities (e.g., cardiovascular disease or lung cancer), previous hospitalizations for ECOPD, clinical severity of the index exacerbation, and need for long-term oxygen therapy or ventilatory support at discharge [1,3].

On the other hand, more than a third of H-ECOPD patients are re-hospitalized during the first 90 days after discharge [4], and close to 70 % of these early readmissions are due to decompensation of other morbidities [5]. With this as a background, there is a high need to analyze the shortcomings of currently applied standards regarding the care for patients with H-ECOPD, both during hospitalizations and after discharge. In particular, the requisites for effective management during the hospitalization and after hospital discharge need to be discussed. Admittedly, due to the complexity of the episodes of ECOPD, it is difficult to standardize the appropriate diagnosis and management of H-ECOPD patients as well as when and how to discharge them since the cause(s), severity, impact, treatment and time course of the episode of H-ECOPD vary significantly between patients [6], and healthcare systems and availability of community resources differ markedly from country to country [3].

Below we provide a clinical insight comment where we discuss the cause(s) of these problems and highlight the opportunity they offer to improve outcomes after H-ECOPD by proposing some general recommendations on how to manage H-ECOPDs during hospitalization and after discharge. These recommendations are primarily based on the 2024 Global Initiative for Chronic Obstructive Lung Disease (GOLD) document and are summarized in Fig. 1 [3]. Importantly, we shall not address the management and discharge planning of patients with COPD admitted with respiratory failure requiring mechanical ventilatory support at home, an important topic well covered in recent consensus documents [7,8].

2. The causes

Episodes of ECOPD are complex and heterogeneous. Potential indications for hospitalization include the presence of severe symptoms (worsening of resting dyspnoea, tachypnoea, decreased oxygen saturation, confusion and drowsiness), acute respiratory failure, presence of serious comorbidities (e.g., heart failure, newly occurring arrhythmias) and/or insufficient home support [3,6].

Appropriate in-hospital management of ECOPD should consider this heterogeneity and the diagnostic work-up should carefully consider other diseases frequently co-occurring in patients with COPD (e.g., heart failure, pulmonary embolism and pneumonia, among others). Treatment of ECOPD often include nebulized bronchodilators, systemic

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https://doi.org/10.1016/j.ejim.2024.08.024
Received 23 August 2024; Accepted 28 August 2024
Available online 5 September 2024

corticosteroids, antibiotics, and in the more severe cases, supplemental oxygen therapy and, sometimes, invasive or non-invasive ventilatory support [3]. Yet, it is important to consider also the management of the other multimorbid diseases that frequently co-occur in patients with COPD that can mimic an ECOPD episode and/or worsen the prognosis of the patient [1,6]. Diagnosis and specific treatment of these frequently occurring contributors to the acute decompensations of COPD patients might help to improve outcomes. Of particular concern is the increased risk of, sometimes unnoticed, cardiovascular events during and after hospitalization [9,10]. Comorbidities, previous exacerbations and hospitalizations, and increased length of stay are significant risk factors for 30- and 90-day all-cause readmission after hospitalization because ECOPD [5,10,11]. Unfortunately, in-hospital management is not always as personalized as it should be [12,13].

3. The opportunity: a few key recommendations

We propose that there is an opportunity to reduce early-readmission and mortality after hospitalization from ECOPD if the following recommendations are considered:

1) Provide optimal and *personalized* medical care *during* hospitalization. As mentioned above, it often includes nebulized short-acting nebulized bronchodilators, and supplemental oxygen if needed. Antibiotics and systemic steroids are also often used during H-ECOD but the following caveats need careful attention. Antibiotics should only be used in patients with clinical signs of a bacterial infection, i. e. purulent sputum. Besides, there are data suggesting that guidance by levels of C reactive protein may reduce antibiotic use without evidence of harm [14] The standard recommendation for oral steroid use is 40 mg prednisolone once daily for 5 days. A recent meta-analysis showed that this short-term treatment is non-inferior to longer treatment periods [15]. Steroid treatment may cause major side effects, in particular if patients have frequent episodes of ECOPD. With this as a background, it has been hypothesized that steroid treatment during H-ECOPD may be directed by the blood eosinophil counts as a biomarker and that this may lead to reducing prednisolone use without causing adverse effects. A randomized clinical trial in primary care (hence, not in H-ECOPD) showed non-inferiority of this approach vs. the standard care [16]. Finally, considering the frequent, important cardiovascular diseases, particularly heart failure, atrial fibrillation and ischemic heart disease, a proactive strategy for early detection of cardiovascular diseases should be implemented from the very beginning, as it has been shown to be effective [17].
2) Assess carefully the *recovery* of all the clinical conditions and symptoms that led to hospitalization. Consider hospital discharge when the patient is physiologically and mentally able to face the destination environment and when adequate family and/or social support is available once the patient returns to the community.
3) Review that co-occurring *morbidities* are appropriately addressed, and that all *medications* are compatible among them and are well understood by the patient and caregivers. In particular, considering the high risk of cardiovascular (CV) complications, an aggressive prophylactic treatment of CV *risk factors* should be implemented together with initiation of appropriate treatment of previously undiagnosed CV diseases [9,10].
4) Use *care bundles*, which are a collection of best practice interventions, ideally based on evidence, that may be applied to the management of a particular condition [12]. After an ECOPD admission, a care bundle may include education, optimization of medication, supervision and correction of inhaler technique, assessment and optimal management of comorbidities, early rehabilitation, telemonitoring and follow-up after discharge (Fig. 1) [12]. Although this approach seems sensible, there is yet insufficient evidence demonstrating that it decreases readmission rates, short-term mortality or that it is cost-effective [12,17-19]. However, it is considered good clinical practice to cover these issues before discharge and their effectiveness may be increased if the program includes motivational interview-based health coaching [20]. Education on the importance of adherence to medication and, particularly, on the proper use of inhalers is of particular relevance in this context because they are frequently misused or not used at all.
5) Organize *appropriate follow-up* after discharge (Fig. 1).
   a. Early follow-up visit (within *one month*) should be undertaken whenever possible since it reduces early readmissions [21] and patients not attending early follow-up have increased 90-day mortality [3]. Early follow-up permits a careful review of

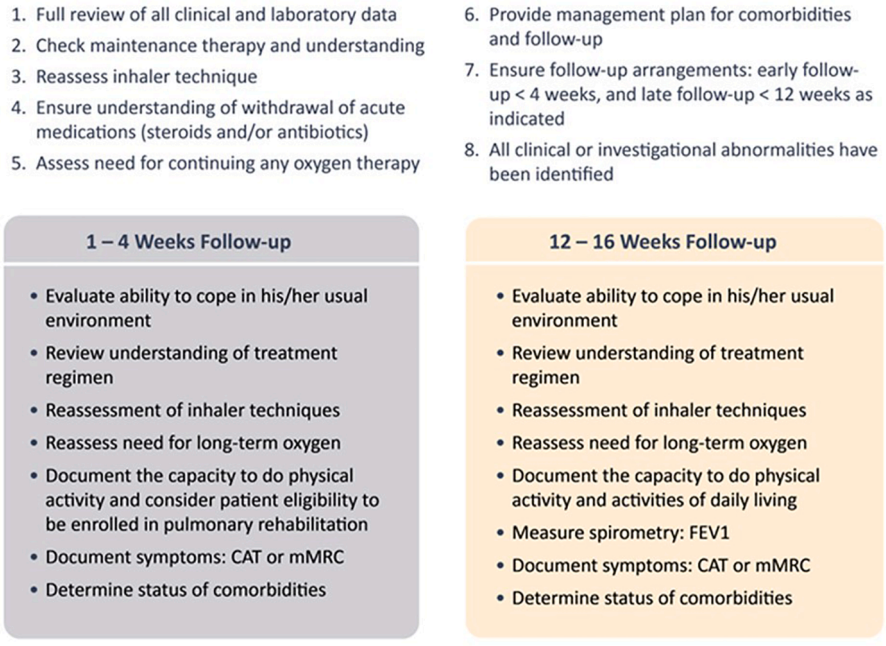

Fig. 1. Discharge criteria and recommendations for follow-up. Reproduced with permission from GOLD 2024 [3].

discharge therapy and an opportunity to implement changes in therapy. Checking the appropriate use of inhalers again is essential here. Likewise, during the first few weeks following discharge patients have a very high CV risk [9] and evaluation should not be restricted to the lung but include the CV system too [17,22].

b. Additional follow-up at *three months* is recommended to ensure return to a stable clinical state; review the patient's symptoms and determine the severity of airflow obstruction by spirometry. If discharged on supplemental oxygen, arterial blood gas assessment will determine the need for its long-term use [23].

4. Conclusions

Hard outcomes including mortality and rate of early readmissions after hospital discharge because of H-ECOPD are poor and represent an unacceptable failure of health care systems around the world [3]. In this clinical insight, we discuss their potential cause(s) and provide some recommendations which, if implemented routinely, could benefit these patients and improve the efficiency of the health care systems at large. In particular, starting at admission and continuing at discharge and then during follow up we would recommend to focus not only on the treatment of COPD itself but always implement a proactive strategy for detection of the major underdiagnosed comorbidities, and subsequent treatment of those identified, with particular attention to CV events.

Conflict of interest statement

All authors are current/past members of the GOLD Scientific Committee but declare that none has a conflict of interest in relation to this manuscript.

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