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Management of exacerbations of COPD

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Exacerbations of chronic obstructive pulmonary disease (COPD) are an important cause of morbidity and mortality in the condition, and their incidence increases with its severity. Some patients suffer frequent exacerbations leading to hospital admission, with considerable impact on their quality of life and activities of daily living. COPD exacerbations are associated with considerable physiological deterioration and increased airway inflammatory changes caused by factors such as viruses, bacteria and, possibly, common pollutants. Current evidence suggests that appropriate management and prevention of exacerbations may modify the long-term course of COPD.

Aetiology

Figure 1 lists the common microbial agents associated with exacerbations of COPD.

Viruses have been shown to cause prolonged exacerbations and are associated with increased lower airway inflammation. There is evidence that chronic infection or prolonged carriage after acute infection may occur with adenovirus and respiratory syncytial virus.

The role of bacteria is complex. Patients with bacteria in their sputum are more likely to suffer exacerbations, and experience prolonged recovery and greater severity. Many studies have shown no change in bacterial species during exacerbations, though changes may be seen in the strains obtained from patients.

Diagnosis and differential diagnosis

COPD has four principal symptoms – dyspnoea, cough, sputum (volume or purulence) and wheeze. The diagnosis of an acute exacerbation is based on an acute deterioration in sputum purulence and volume, and dyspnoea. These may be associated with

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What's new ?

- COPD patients with a history of frequent exacerbations experience a worse quality of life and faster disease progression
- Respiratory viruses, typically rhinovirus, are important aetiological factors in exacerbations
- Non-invasive positive-pressure ventilation has been shown to reduce mortality, need for tracheal intubation and duration of hospital stay in patients with acute hypercapnic respiratory failure caused by exacerbations

symptoms of an upper respiratory tract infection (cold or sore throat). New signs (e.g. pedal oedema, cyanosis, crepitations in the chest, mental confusion, history of co-morbidity) in addition to these symptoms indicate a severe exacerbation and warrant consideration of referral to hospital.

The differential diagnosis includes:

- pneumonia
- pulmonary embolism
- pneumothorax
- cardiac disease (congestive cardiac failure, arrhythmias)
- rib fracture
- inappropriate use of sedatives.

Management

Management in the community

Initial treatment of an exacerbation of COPD comprises more frequent use of bronchodilators (e.g. salbutamol, ipratropium bromide) with an inhaler or in nebulized form temporarily. Antibiotics according to local sensitivities are indicated in patients with any two of increased dyspnoea, increased sputum volume and increased sputum purulence.

Use of oral corticosteroids has been related to earlier discharge from hospital and more rapid physiological recovery from exacerbations. The mechanism of these effects in COPD is largely unknown, and relatively short courses (about 2 weeks) are effective. However, the beneficial effects must be balanced against the side-effects. Current guidelines suggest that oral corticosteroids (prednisolone, 30–40 mg once daily) may be considered according

Micro-organisms associated with COPD exacerbations

Viruses

- Rhinovirus
- Coronavirus
- Respiratory syncytial virus
- Influenza virus
- Parainfluenza virus

Bacteria

- Non-typable *Haemophilus influenzae*
- *Streptococcus pneumoniae*
- *Moraxella catarrhalis*
- *Pseudomonas*
- *Staphylococcus aureus*

to the severity of the exacerbation. In patients already taking oral corticosteroids, the dose is reduced over a longer period.

A significant proportion of patients may not recover even after 1 month of treatment, and the authors suggest a review of those in the community at 4–6 weeks after diagnosis. Procedures to be undertaken at this visit are described below.

Hospital management

Referral: regular assessment is required after initiation of therapy in the community. Referral to hospital should be considered when there is no improvement or the patient deteriorates. Referral should also be considered for those with a severe exacerbation (see above) and when any of the following criteria apply:

- presence of a new cardiac arrhythmia
- insufficient home support
- elderly patient
- uncertain diagnosis.

Accident and Emergency Department

Initial management – rapid management of these patients may prevent complications requiring intensive care. Airway, breathing and circulation should be assessed immediately on arrival. Controlled oxygen should be given via a Venturi mask to patients with an arterial oxygen saturation (Sao_2) of less than 90% or an arterial partial pressure of oxygen (Pao_2) of less than 8 kPa. Because carbon dioxide retention occurs insidiously with rising Pao_2 in these patients, the aim is to maintain Sao_2 at 92–94%. Arterial blood gases should be rechecked at 30 minutes to assess the pH. While this is performed, a postero-anterior chest radiograph and ECG are requested. Spirometry may be helpful; a forced expiratory volume in 1 second (FEV_1) of less than 1.0 litre is considered an index of a severe exacerbation. Haemoglobin concentration and blood potassium levels should be measured.

While the patient is in the A&E department, nebulized bronchodilator therapy with both β_2 -agonists and anticholinergic agents should be started, oral corticosteroids administered and aminophylline considered. Most studies of intravenous aminophylline have demonstrated only minor benefits in COPD exacerbations, though the sample size in these studies has been relatively small. Antibiotics may be prescribed as above.

Further treatment – early discharge from the A&E department with out-patient follow-up may be considered in patients who suffer an uncomplicated exacerbation without severe symptoms, in those with no respiratory failure, and when adequate home and community nurse support is available. Otherwise, the patient should be admitted to the ward.

Non-invasive positive-pressure ventilation (NIV) should be considered in patients with an arterial pH of less than 7.35 on maximal medical therapy. NIV has been shown to improve mortality and reduce the need for intubation and duration of hospital stay in these patients. In the absence of NIV or delay in its application, doxapram (a respiratory stimulant that may be helpful in acute respiratory failure) may be considered, with cardiac monitoring. A recent Cochrane review suggests that doxapram: ‘may improve blood gas exchange in the short term’. Patient monitoring is crucial at this stage because mortality increases once the pH declines below 7.26; ideally, patients should be cared for in a high-dependency unit. Referral to an ICU is required for those who deteriorate further with increasing hypoxia and worsening pH.

In-hospital management: continued monitoring of arterial blood gases is required while respiratory failure is still present, and attention to fluid status is vital. As the patient’s symptoms improve, medication should be tapered back to the levels used before admission. Spirometry is used to confirm the severity of disease before discharge. Serial peak flow measurements are not helpful during exacerbations; they may vary little, and the median decrease at exacerbation is small.

Discharge – the median duration of stay in hospital is about 1 week. Discharge is considered when:

- the patient has been clinically stable for 24 hours, and understands how to administer his or her treatment
- home and follow-up care arrangements are completed
- the patient, family and physician are confident that the patient can manage successfully at home.

Out-patient follow-up

Hospital assessment at 6 weeks is recommended for all patients, to consider their coping skills and measure FEV_1 . About 75% of patients have fully recovered by this time. Inhaler technique and the long-term need for nebulizers are assessed, and the patient may be given advice on how to recognize symptoms of a COPD exacerbation.

Prevention of exacerbations

There is now clear evidence that frequent COPD exacerbations are associated with poor quality-of-life scores, greater levels of hospitalization, more rapid decline in lung function and greater airway inflammation. Measures to reduce the risk of exacerbation are therefore important. Viral infections are important possible therapeutic targets, though there are currently few appropriate interventions. Influenza vaccine is strongly recommended for all COPD patients, and patients are advised to avoid upper respiratory tract infections. Both inhaled corticosteroids and long-acting anticholinergic agents have been shown to reduce the frequency of exacerbations, and there is evidence that mucolytic agents may have a role. ♦

FURTHER READING

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