Asthma + Respiratory
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# NZ COPD GUIDELINES

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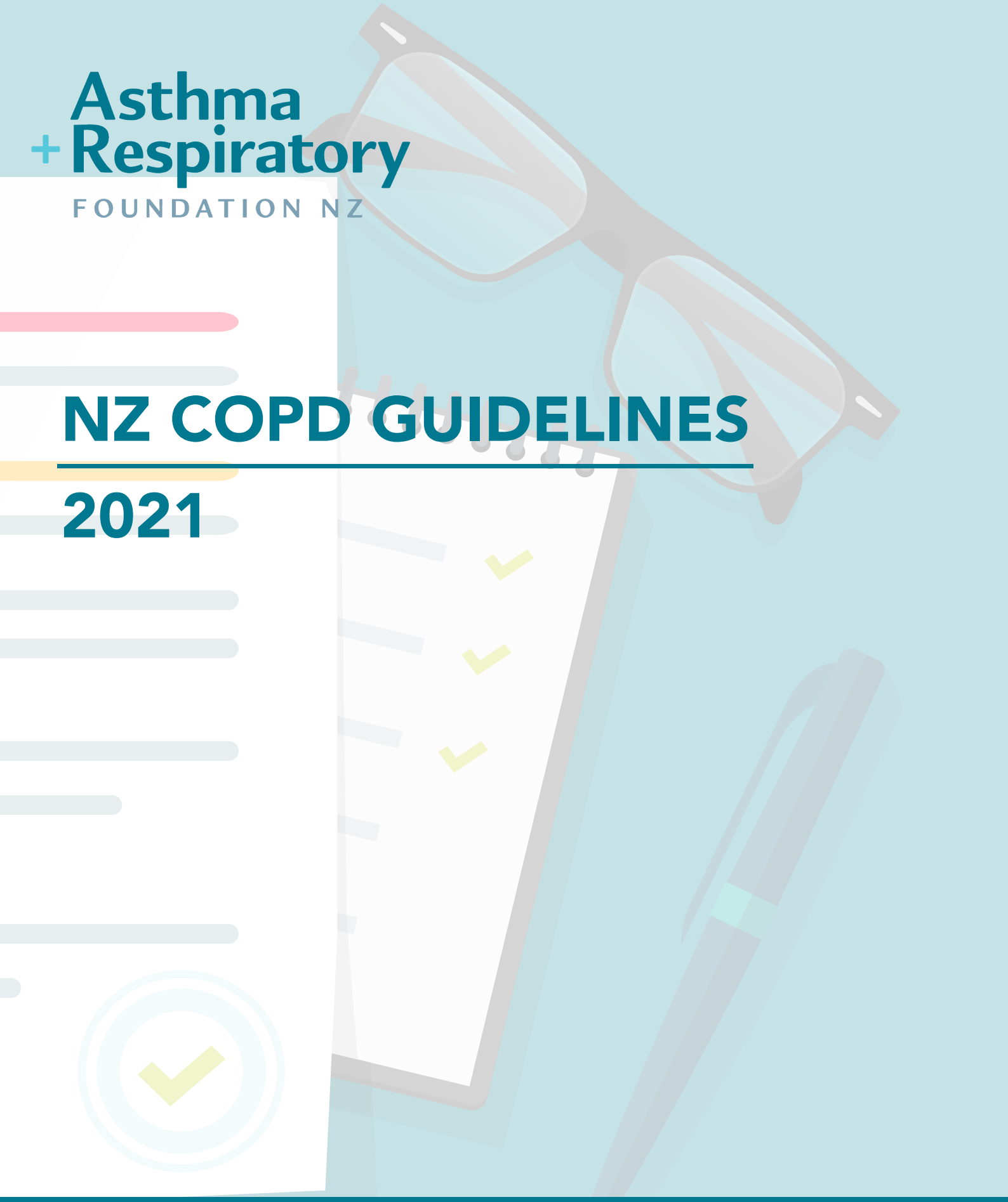

# New Zealand COPD Guidelines: Quick Reference Guide

Robert J Hancox, Stuart Jones, Christina Baggott, David Chen, Nicola Corna, Cheryl Davies, James Fingleton, Jo Hardy, Syed Hussain, Betty Poot, Jim Reid, Justin Travers, Joanna Turner, Robert Young


## ABSTRACT

The purpose of the Asthma and Respiratory Foundation of New Zealand's *COPD Guidelines: Quick Reference Guide* is to provide simple, practical, evidence-based recommendations for the diagnosis, assessment, and management of chronic obstructive pulmonary disease (COPD) in clinical practice. The intended users are health professionals responsible for delivering acute and chronic COPD care in community and hospital settings, and those responsible for the training of such health professionals.


Chronic obstructive pulmonary disease (COPD) encompasses chronic bronchitis, emphysema, and chronic airflow obstruction. It is characterised by persistent respiratory symptoms and airflow limitation that is not fully reversible.

COPD is associated with a range of pathological changes in the lung. The airflow limitation is usually progressive and associated with an inflammatory response to inhaled noxious particles or gases.[1,2]

Symptoms include cough, sputum production, shortness of breath, and wheeze. At first, these are often ascribed to "a smokers cough", "getting old" or being "unfit". Cough and sputum production may precede wheeze by many years. Symptoms may worsen and become severe and chronic, but not all of those with cough and wheeze advance to progressive disease.

Patients with COPD often have exacerbations, when symptoms become much worse and require more intensive treatment. These exacerbations have a significant mortality.

Many patients have extra-pulmonary effects and important co-morbidities that contribute to the severity of the disease. Important co-morbidities include asthma, bronchiectasis, lung cancer and heart disease. COPD can lead to debilitation, polycythaemia, osteoporosis, cachexia, depression and anxiety.

COPD is often confused with asthma. They are separate diseases, although some asthmatics develop irreversible airflow obstruction and some patients with COPD have a mixed inflammatory pattern. Asthma–COPD overlap (ACO) may be present when it can be difficult to distinguish between the diseases, or in patients who have both conditions.[3]

## Guidelines review

The following documents were reviewed to formulate this *Quick Reference Guide*: COPD-X Australian and New Zealand Guidelines 2020[1] and the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2020.[2] A systematic review was not performed, although relevant references were reviewed when necessary. Readers are referred to the COPD-X and GOLD documents for the more comprehensive detail and references that they provide. References are only provided when they differ from the COPD-X guidelines.

## Grading

No levels of evidence grades are provided, due to the format of the *Quick Reference Guide*. Readers are referred to the above documents for the level of evidence on which the recommendations in this *Quick Reference Guide* are based.

## Guideline development group

This group included representatives from a range of professions and disciplines relevant to the scope of the guidelines. The group did not include consumer representation.

Robert J Hancox, Stuart Jones, Christina Baggott, James Fingleton, Jo Hardy, Syed Hussain, and Justin Travers are respiratory physicians. Robert Young is a general physician. David Chen is a respiratory physiotherapist. Cheryl Davies is manager of the Tu Kotahi Maori Asthma Trust. Nicola Corna and Betty Poot are respiratory nurse practitioners. Jim Reid is a general practitioner. Joanna Turner is a pharmacist and research and education manager at the Asthma and Respiratory Foundation of New Zealand.

## Peer review

The draft guidelines were peer-reviewed by a wide range of respiratory health experts and representatives from key professional organisations, including representatives from Asthma New Zealand, the Australian College of Emergency Medicine, Hutt Valley District Health Board, the Medical Research Institute of New Zealand, the New Zealand Medical Association, the New Zealand Nurses Organisation Te Rūnanga o Aotearoa, the NZNO College of Respiratory Nurses, Physiotherapy New Zealand, the Royal New Zealand College of General Practitioners, the New Zealand branch of the Thoracic Society of Australia and New Zealand, and Wellington Free Ambulance.

## Dissemination plan

The guidelines will be translated into tools for practical use by health professionals and used to update health pathways and existing consumer resources. The guidelines will be published in the *New Zealand Medical Journal* and on the Asthma and Respiratory Foundation of New Zealand (ARFNZ) website, as well as being disseminated widely via a range of publications, training opportunities, and other communication channels to health professionals, nursing, pharmacy and medical schools, primary health organisations, and district health boards.

## Implementation

The implementation of the guidelines by organisations will require communication, education, and training strategies.

## Expiry Date

The expiry date for the guidelines is 2025.

# COPD in Māori

Māori rights in regard to health, recognised in Te Tiriti o Waitangi and other national and international declarations, promote and require both Māori participation in health-related decision making as well as equity of access and health outcomes for all New Zealanders.

- The burden of COPD among Māori is one of the most significant health disparities in New Zealand: hospitalisation rates for Māori are 3.5 times higher than non-Māori, non-Pacific, and non-Asian rates, and COPD mortality for Māori is 2.2 times higher.[8]
- Māori whānau also have greater exposure to environmental triggers for COPD, such as smoking and poor housing.
- This burden of COPD translates to large inequities in lost years of healthy life and underscores the urgent need for health service models to address high and growing need for COPD treatment in Māori.
- Māori should be considered a high-risk group requiring targeted care. This should address risk factors such as poor housing, overcrowding, health literacy, inadequate tailoring of health information, obesity, smoking, and poor access to pulmonary rehabilitation and healthcare services.
- Māori have much worse lung function for given levels of smoking,[9] and the burden of COPD affects Māori 15–20 years younger than non-Māori.[10] This makes smoking cessation even more important for Māori, and COPD should be considered at a younger age among Māori smokers.
- There is a very high incidence of lung cancer among Māori.

Major barriers to good COPD management for Māori include poor access to care, inattention to culturally accepted practices, discontinuous and poor-quality care, and inadequate provision of understandable health information. As Māori place a high

value on whakawhanaungatanga (the making of culturally meaningful connections with others), the absence of culturally appropriate practices can hinder attendance in mainstream pulmonary rehabilitation programmes.[11] Cultural safety and a pro-equity approach is essential.

It is recommended that:

- Healthcare providers should undertake clinical audit or other quality-improvement activities to monitor and improve COPD care and outcomes for Māori.
- A systematic approach to health literacy and COPD education for Māori whānau is required.
- Healthcare providers should support staff to develop cultural safety skills for engaging Māori with COPD and their whānau.
- Assess patients using a Māori model of care: https://www.health.govt.nz/our-work/populations/maori-health/maori-health-models.

Māori leadership is required in the development of COPD management programmes, including pulmonary rehabilitation, to improve access to COPD care and facilitate 'wrap around' services that address the wider determinants of health (such as housing, financial factors, access to health care and access to pulmonary rehabilitation programmes) for Māori with COPD.

# COPD in Pacific people

Similar considerations apply to Pacific people, who also have a disproportionate burden of COPD. Pacific people's hospitalisation rates are 2.7 times higher than those of other New Zealanders.[8]

It is recommended that:

- Pacific people should also be considered a high-risk group requiring targeted care.
- The approach should include addressing risk factors such as poor housing, overcrowding, health literacy, obesity, smoking and poor access to pulmonary rehabilitation and healthcare services.
- Healthcare providers should consider using a Pacific model of care, such as a Fonofale model:
  - https://thehub.swa.govt.nz/resources/pacific-mental-health-services-and-workforce-moving-on-the-blueprint/
  - https://whanauoraresearch.co.nz/wp-content/uploads/formidable/Fonofalemodelexplanation1-Copy.pdf

# Pathogenesis

Most people with COPD will have smoked cigarettes or inhaled noxious particles causing lung inflammation. Airway inflammation is a normal response to smoking but seems to be accentuated in those who go on to develop COPD. Some people develop COPD without smoking or apparent exposures. COPD may also develop in patients with other chronic lung diseases such as asthma.

The inflammatory process in COPD is mostly neutrophil, macrophage, and T-lymphocyte mediated. This inflammation leads to narrowing of peripheral airways and destruction of alveoli, causing airflow obstruction and decreased gas transfer.

Inflammation, fibrosis, and sputum production in small airways causes air trapping during expiration leading to hyperinflation. This reduces inspiratory capacity and causes shortness of breath on exercise.

In patients presenting at a young age (particularly those younger than 40), alpha-1 antitrypsin deficiency should be considered. This genetic defect causes a reduction in the major anti-protease in lung parenchyma, leaving the lung susceptible to the destructive effects of neutrophil elastase and other endogenous proteases, which are released as part of the inflammatory response to smoking.

# Diagnosis

A diagnosis of COPD should be considered in anyone who presents with cough, sputum production, wheeze, or shortness of breath, particularly those above the age of 40 years. There is usually a history of cigarette smoking or exposure to smoke other noxious substances.

- Physical examination and chest x-ray are rarely diagnostic in early COPD, but they may be valuable in excluding other diagnoses and co-morbidities

such as lung cancer, pulmonary fibrosis and cardiac failure.

- Other causes for the patient's symptoms should always be considered, as common comorbidities such as heart disease and obesity may co-exist with COPD and in some patients will be the dominant cause of breathlessness.
- The diagnosis of COPD should be confirmed by spirometry (see *Spirometry*). If this is not available in primary care, patients should be referred for this. There are few contra-indications, but a small proportion of patients cannot do adequate spirometry.
- Spirometry should be avoided during infections, because of the risk of transmitting infections such as influenza, SARS-CoV-2 (COVID-19), or tuberculosis.
- Peak flows are not useful for diagnosing or managing COPD.
- Usually asthma and COPD are easy to differentiate. Asthma is an episodic disease and usually, but not always, presents at a younger age or with a history of being "chesty" as a child. However, a mixed pattern of asthma-COPD overlap (ACO) exists, and it is sometimes difficult to distinguish which is the principal cause of airway limitation (see section *Asthma and COPD overlap (ACO)*).

## Assess severity

Spirometry assesses the severity of airflow obstruction. Used in conjunction with the severity of symptoms, this helps to assess the severity of COPD (Table 1). Although Table 1 also shows the typical symptoms, the severity of the symptoms does not necessarily correspond to the severity of airflow obstruction.

The effect of breathlessness on daily activities can be quantified using the modified Medical Research Council (mMRC) Dyspnoea Scale (Table 2).

The COPD Assessment Test (CAT) is an eight-item questionnaire that can measure the symptomatic impact of COPD and response to treatment (Appendix 2).

Functional tests, such as the six-minute walk test, shuttle walk tests and sit-to-stand tests, can help to assess functional limitation, disease progression and response to treatment.

## Spirometry

Spirometry is the most useful test of lung function to diagnose and assess the severity of COPD. This may be done both before and after a bronchodilator to assess reversibility, but the diagnosis and severity are determined by *post-bronchodilator* measurements.

- Irreversible airflow obstruction is indicated by a *post-bronchodilator* forced expiry volume in once second to forced vital capacity ($FEV_1$/FVC) ratio<0.70 (see footnote on page 81).
- The *severity* of the obstruction is diagnosed using the post-bronchodilator $FEV_1$ as a % of the predicted value (Table 1).
- It is possible to have airflow obstruction with an $FEV_1$/FVC ratio<0.70 (see footnote on page 81) but an $FEV_1$ in the normal range.
- A restrictive pattern on spirometry is not consistent with a diagnosis of COPD and, if it is not due to technically inadequate spirometry, suggests an alternative cause of symptoms (eg, morbid obesity, neuromuscular weakness, or interstitial lung disease). Patients with a restrictive pattern may benefit from specialist referral for further investigation.
- Some patients with COPD cannot blow out long enough to do a true FVC. The Forced Expiratory Volume at 6 seconds ($FEV_6$) can be used as an approximation of the FVC.
- A small subset of patients with normal spirometry have evidence of emphysema on CT scan and impairment of gas exchange. There is limited evidence to guide management in these patients, but if they are symptomatic or having exacerbations, we recommend treatment for COPD according to this guideline.

## Reversibility testing

When performing reversibility testing, the first measurements should be done before bronchodilators:

- Bronchodilators should be withheld for the duration recommended in the

**Table 1:** Severity classification for COPD. (Adapted from Lung Foundation Australia's Stepwise Management of Stable COPD available at https://lungfoundation.com.au/wp-content/uploads/2018/09/Information-Paper-Stepwise-Management-of-Stable-COPD-Apr2020.pdf.)

| **Classification of severity of chronic obstructive pulmonary disease (COPD)** | | | |
|---|---|---|---|
| | **Mild** | **Moderate** | **Severe** |
| Typical symptoms | Few symptoms | Breathless walking on level ground | Breathless on minimal exertion |
| | Breathless on moderate exertion | Increasing limitation of daily activities | Daily activities severely curtailed |
| | Little or no effect on daily activities | Recurrent chest infections | Exacerbations of increasing frequency and severity |
| | Cough and sputum production | Exacerbations requiring oral corticosteroids and/or antibiotics | |
| Lung function | $FEV_1$≈60–80% predicted | $FEV_1$≈40–59% predicted | $FEV_1$<40% predicted |

$FEV_1$=forced expiratory volume in one second. $PaO_2$=partial pressure of oxygen, arterial. $PaCO_2$=partial pressure of carbon dioxide, arterial.

**Table 2:** Modified Medical Research Council (mMRC) Dyspnoea Scale for grading the severity of breathlessness during daily activities.*

| **Grade** | **Symptom complex** |
|---|---|
| 0 | I only get breathless with strenuous exercise |
| 1 | I get short of breath when hurrying on level ground or walking up a slight hill |
| 2 | On level ground, I walk slower than people of the same age because of breathlessness, or I have to stop for breath when walking at my own pace on the level |
| 3 | I stop for breath after walking about 100 metres or after a few minutes on level ground |
| 4 | I am too breathless to leave the house or I am breathless when dressing or undressing |

* The mMRC Dyspnoea Scale is very similar to the original MRC Scale, which ranges from 1 to 5 rather than 0 to 4 (ie, MRC grade 3=modified MRC grade 2).

consensus ATS/ERS guidelines.[4] This ranges from 4–6 hours for a short-acting beta agonist (SABA) to 48 hours for an ultra long-acting beta agonist (LABA).

- Spirometry is repeated at least 15 minutes after giving a bronchodilator (usually 400mcg salbutamol via spacer).
- Many patients with COPD will have some improvement after a bronchodilator ("partial reversibility"), but if spirometry becomes normal ($FEV_1$/FVC>0.7* and $FEV_1$>80% predicted), COPD is excluded (by definition).
- The consensus definition of a significant bronchodilator response is arbitrarily defined as a ≥12% change from baseline with an absolute improvement of ≥200ml, but this does not predict who will benefit from bronchodilator treatment.
- If the response to bronchodilator is substantial (>400mL improvement in $FEV_1$) then asthma or Asthma-COPD Overlap is likely.

# Non-pharmacological management (Box 1)

## Smoking cessation

Stopping smoking is the most important treatment for COPD: every person who is still smoking should be offered help to quit. Reducing smoking-related health risks requires complete cessation of all tobacco and other smoked products, including marijuana/cannabis.

- All forms of nicotine replacement therapy, in association with smoking cessation support, are useful in aiding smoking cessation and increase the rate of quitting.
- Oral bupropion, varenicline, and nortriptyline have been shown to be effective and should be considered in those patients struggling to give up despite nicotine replacement therapy.
- Most of these are fully funded in New Zealand and a prescription for this should be discussed with a health professional.
- Referral to a local smoking cessation support service is recommended.

E-cigarettes and vaping are probably less harmful to health than smoking, but short-term studies suggest that they are not risk free.[5] E-cigarettes and vapes that contain nicotine are highly addictive.

- E-cigarettes used *within the context of a supportive smoking cessation programme* have been shown to aid in smoking cessation in selected groups of motivated patients.
- The long-term safety of e-cigarettes and vaping have not been shown. Smokers using e-cigarettes or vaping to quit smoking should be advised to stop using e-cigarettes and vaping as soon as possible after quitting smoking.
- No e-cigarette or vape is currently approved as a smoking cessation tool.
- E-cigarettes and vapes should never be used near an oxygen source, as this is a fire risk.

## Physical activity

Patients with COPD benefit from physical activity and should be encouraged to:

- Be active on most, preferably all, days of the week.
- Do at least 20–30 minutes of exercise per day. More is better.
- Exercise to an intensity that should cause the patient to "huff and puff" or

*Note: There is disagreement about the criteria for airflow obstruction. The $FEV_1$/FVC ratio naturally declines with age, and defining airflow obstruction by an $FEV_1$/FVC ratio <0.70 may miss mild airflow obstruction in younger patients and over-diagnose it in the elderly. Some guidelines recommend using an age-specific lower limit of normal. But for clinical purposes, the <0.70 cut-point is easy to apply and unlikely to greatly influence management in those with mild airflow obstruction. The grading of severity also varies between guidelines, with the GOLD guidelines using different categories to COPD-X (in Table 1). But this is also unlikely to greatly influence clinical management.

feel breathless: Getting out of breath will not cause harm.

- Do muscle strengthening activities on two or more days each week.

## Pulmonary rehabilitation

Pulmonary rehabilitation should be offered to all patients with COPD. Although there may be barriers to attending pulmonary rehabilitation classes, there are a variety of ways to deliver pulmonary rehabilitation to patients in different settings depending on local respiratory services and patient preferences.

- Pulmonary rehabilitation reduces breathlessness, improves quality of life, and reduces depression in patients with COPD.
- Patients gain significant benefit from rehabilitation regardless of the degree of breathlessness, but the most breathless patients benefit the most.
- Exacerbations of COPD are an indication for referral to pulmonary rehabilitation and an early return to pulmonary rehabilitation after exacerbation should be encouraged. This has been shown to reduce further hospitalisations and may reduce mortality.
- Exercise training is the cornerstone of pulmonary rehabilitation, and regular post-rehabilitation exercise is required to sustain the benefits.
- The benefits of pulmonary rehabilitation decline over time and repeat attendance at pulmonary rehabilitation programmes should be encouraged in patients with functional decline or exacerbations.
- If someone is unable to access a pulmonary rehabilitation programme, an in-home exercise programme should be considered.

## Breathlessness management strategies

In addition to pulmonary rehabilitation, patients may benefit from seeing a respiratory physiotherapist for individualised breathing exercises or breathless management strategies:

- Diaphragmatic breathing and pursed lips breathing exercises may benefit some patients. These support and correct the breathing pattern disorders caused by COPD and improve exercise capacity, but they have inconsistent effects on dyspnoea or health-related quality of life scores.
- Constant load threshold inspiratory muscle training improves inspiratory muscle strength, quality of life, dyspnoea, and exercise capacity.
- Hand-held fan therapy: the airflow and cooling effects of the fan, alongside other breathlessness management strategies, such as relaxation, pacing, and positioning, can reduce dyspnoea.

Other things that may help:

- Hospital clinical teams working with the primary healthcare team can help enhance quality of life and reduce disability for patients with COPD.
- Patients may also benefit from local support groups.
- Consider including a cognitive behavioural component in the self-management plan to assist with reducing anxiety and breathlessness.
- Consider screening for urinary incontinence related to cough.

Other useful resources are given in Appendix 4 and 5.

## Sputum management/sputum clearance techniques

Patients with chronic sputum production may benefit from seeing a physiotherapist (ideally a respiratory physiotherapist) for an individualised chest clearance plan. Airway clearance techniques enhance sputum clearance, reduce hospital admissions, and improve health-related quality of life, and they may also improve exercise tolerance and reduce the need for antibiotics.

- A wide variety of airway clearance techniques are available. No one technique is superior for all patients.
- The choice of technique should be based on the clinician's assessment, resource availability, and patient acceptability.

## Nutrition

Both malnutrition and obesity are common and contribute to morbidity and mortality in COPD. Poor eating habits, sedentary lifestyles, smoking, and cortico-

steroid use further compromise nutritional status.

- The key goals of nutritional management are to eat a balanced diet, to achieve and maintain a healthy weight, and to avoid unintentional weight loss. Consider referral to a dietician, or high-calorie nutritional supplements, for those who are malnourished.
- There is evidence that weight loss is beneficial for those who are obese.
- Unintentional weight loss should be investigated for potential malignancy.

### Housing

There is good evidence that a warm, dry, and smoke-free home is associated with better asthma control, and it is likely that the same is true for COPD.

### Assisted ventilation

Non-invasive ventilation (NIV) with bi-level positive airway pressure reduces mortality and need for intubation in patients admitted to hospital with acute hypercapnic respiratory failure as a result of an exacerbation of COPD (see section *Management*). In most instances, NIV is not required once the patient has recovered.

- People who have chronic hypercapnic respiratory failure, despite adequate treatment, and have needed assisted ventilation (invasive or non-invasive) during an exacerbation, or with worsening hypercapnia on long-term oxygen therapy, should be referred to a specialist centre for consideration of long-term NIV.
- Red flags to consider for need for home NIV:
    - Previously required assisted ventilation
    - Obstructive sleep apnoea
    - Obesity hypoventilation
    - Persistent nocturnal hypoxia
    - Neuromuscular conditions
    - Spinal/chest wall deformities

### Interventional approaches to the management of COPD

Thoracic surgery is rarely performed for COPD. The two situations where it may be considered are bullectomy or lung volume reduction surgery. Neither procedure increases life expectancy. Both have significant complication rates and are only performed in specialist centres after careful multi-disciplinary assessment.

#### Bullectomy

Bullectomy can be considered where there is a very large bulla compressing other lung tissue. Removing the bulla allows the preserved lung tissue to function better.

#### Lung volume reduction surgery

Lung volume reduction surgery can improve exercise capacity in people with upper-lobe predominant emphysema. The surgery has a significant early mortality, but there is no difference in long-term mortality.

#### Interventional bronchoscopy

Bronchoscopic lung volume reduction approaches have been developed as alternatives to lung volume reduction surgery. These aim to reduce gas-trapping and improve lung mechanics in advanced emphysema, which can lead to improved lung function, symptoms, and quality of life in carefully selected patients. Endobronchial valve therapy has the most evidence and is available in New Zealand. It is only effective in those with intact fissures and no collateral ventilation as one-way valves are inserted to cause collapse of lung segments. Endobronchial valve therapy does not reduce mortality and has significant complication rates.

### Lung transplantation

Consideration for lung transplantation is appropriate in younger patients (usually <65) with very severe obstruction and severe symptoms, or progressive deterioration despite optimised management, including smoking cessation and pulmonary rehabilitation. Referral to the transplant service should be made by a respiratory specialist.

## Improving patient understanding

### Identify and manage social and cultural issues

Health literacy, cultural context, and the degree of social isolation or support are key factors affecting a person's understanding of and attitude to COPD. See also sections *COPD in Māori* and *COPD in Pacific people*.

**Box 1:** Key messages for non-pharmacological management of COPD.

*A four-step consultation plan for COPD is shown in Appendix 1.*

Recommendations:

- Smoking cessation is the most important component of management, and every patient who is still smoking should be offered help to quit.
- Offer pulmonary rehabilitation to all patients with COPD.
- Promote regular exercise (20–30 minutes per day).
- Address obesity and under-nutrition.
- Some patients will benefit from review by a respiratory physiotherapist and breathing exercises.
- Individual breathlessness plans, including handheld fan therapy, can help manage symptoms.
- A subset of carefully selected patients may benefit from thoracic surgery, endobronchial valve therapy or referral for transplantation. These options should be considered as part of respiratory specialist review in secondary care.

- These factors impact on COPD management, appropriate inhaler technique, adherence to treatment and appropriate use of self-management plans.
- These factors also have a considerable impact on the success of smoking cessation.
- Awareness of the social and cultural factors will enhance communication between clinicians and patients and improve health outcomes.
- There are many practical challenges for people living with COPD, such as completing everyday tasks, holding down a job, and having access to transport. Awareness of these challenges and referral to support services where available can be beneficial.

## Optimise knowledge of COPD and adherence to treatment

- Patient understanding of the disease, appropriate inhaler technique and adherence to treatment are important factors in COPD management.
- There are many inhalers available to treat COPD, and people can easily get confused about these. Demonstrate the use of the inhalers and ensure that patients can use them correctly.
- Clinicians should ask about the patient's understanding of the disease and the rationale for treatment, to clarify misunderstandings, and to work to remove barriers to adherence and good self-management. It is important to provide information to the patient and whānau in a format that they can understand.

## Develop an action plan

Personalised action plans (self-management plans) improve quality of life and reduce hospital admissions and should be offered to all people with COPD.

- Action plans should be personalised and focus on recognising and treating deteriorating symptoms.
- Patients at risk of exacerbations may be offered antibiotics and prednisone to have at home as part of their action plan. The patient should be advised of a timeframe for clinical review once they have started these medicines for an acute exacerbation of COPD.
- Action plans should be checked at each COPD review.

The Asthma and Respiratory Foundation of New Zealand's COPD Action Plan is shown in Appendix 3.

Electronic versions are available at: www.nzrespiratoryguidelines.co.nz.

## Develop a breathlessness plan

- A breathlessness plan can reduce the severity and impact of breathlessness.

Interventions and techniques that can improve breathlessness include self-management education, breathing exercises, sitting upright and leaning forwards ('positioning'), using pursed lip breathing, and a hand-held fan.

- Oxygen is *not* an effective treatment for breathlessness in patients who are not hypoxic.
- Smoking cessation also improves breathlessness.

Asthma and Respiratory Foundation of New Zealand's 'Breathlessness Strategies for COPD' is shown in Appendix 4 and is available at www.nzrespiratoryguidelines.co.nz.

# Pharmacological management (Box 2)

The purpose of pharmacological management in COPD is symptom control and prevention of exacerbations, with the aim of improving quality of life.

- Check inhaler adherence and inhaler technique regularly. Make sure that these are optimal before escalating treatment.
- Treatment escalation should follow a stepwise approach based on breathlessness and exacerbation frequency. It should take into account patient preferences, regimen complexity, cost, and side effects.
- Effects of treatment on dyspnoea should be apparent within six weeks.
- Effects on exacerbation frequency may need to be assessed over 6 to 12 months.

## Inhaled medication for COPD

- Short-acting beta$_2$ agonists (SABA: salbutamol or terbutaline) and the short-acting muscarinic antagonist (SAMA: ipratropium), either individually or in combination, can be taken as-needed to provide short-term relief of breathlessness. Short-term response to SABA or SAMA (reversibility testing) does not predict benefit from long-acting bronchodilator therapy.
- For patients with ongoing dyspnoea despite as-needed SABA, SAMA, or combination SABA/SAMA, a regular long-acting muscarinic antagonist (LAMA) such as tiotropium, glycopyrronium, or umeclidinium is recommended, unless there is evidence of asthma/COPD overlap (see *Asthma and COPD overlap (ACO)*). Do not continue to use ipratropium in patients taking a LAMA, except in emergencies.
- It is not necessary to have a trial of regular short-acting bronchodilators before starting a LAMA if symptoms, exacerbation history or spirometry suggest that a long-acting bronchodilator is desirable.
- Both LAMAs and LABAs improve lung function, symptoms and quality of life, but LAMAs are recommended as the first-line long-acting medication for COPD because they reduce exacerbation risk and have fewer side effects. If LAMAs are contra-indicated, a long-acting beta agonist (LABA) such as salmeterol, formoterol, or indacaterol is recommended.
- In patients who remain breathless or who continue to exacerbate despite treatment with a single long-acting bronchodilator, dual LAMA/LABA therapy is recommended (eg, glycopyrronium/indacaterol, umeclidinium/vilanterol, or olodaterol/tiotropium). Combination therapy with a LABA and LAMA improves lung function, reduces symptoms, and reduces exacerbations compared to either drug alone.
- LABA/LAMA is preferred over inhaled corticosteroid (ICS)/LABA as initial therapy for *most* patients with frequent exacerbations because ICS increases the risk of pneumonia.
- These medications may have risks, particularly at higher doses in patients with cardiac disease. If there is no evidence of benefit, consider stopping them.
- Patients with an eosinophilic pattern of disease may benefit from ICS/LABA instead of LABA/LAMA. Retrospective analyses suggest that blood eosinophil counts predict the benefit of ICS in preventing exacerbations: people with blood eosinophil counts <100cells/μL are least likely to benefit and people

**Box 2:** Key messages for pharmacological management of COPD.

*A suggested four-step consultation plan for COPD is shown in Appendix 1.*

Recommendations:

- Inhaler technique, device suitability, and adherence to treatment should be reviewed regularly and before any medication changes.
- SABAs and SAMAs can be used for symptom relief.
- We suggest a LAMA as the first-line long-acting bronchodilator, both for breathlessness and reduction of exacerbation risk.
- Escalate to LABA/LAMA if LAMA does not control breathlessness/exacerbations.
- The main role for ICS is to prevent exacerbations in patients with frequent exacerbations.
- Higher blood eosinophils are associated with a greater response to ICS and may identify patients who should receive ICS/LABA in preference to LABA/LAMA.
- Patients with Asthma/COPD overlap should receive ICS irrespective of blood eosinophils, lung function, and exacerbation frequency: preferably as combination ICS/LABA
- Within each drug class, choice of treatment should be guided by a patient's preference for inhaler device.
- Treatment may be escalated more quickly for patients with severe COPD or frequent exacerbations.
- Provide all patients with a written/electronic personalised COPD action plan (see appendix)

Do not*:

- Do not routinely prescribe a SAMA to patients on a LAMA.
- Do not prescribe long-term oral corticosteroids as maintenance therapy for COPD.
- Do not routinely prescribe theophylline.
- Do not use short-term response to bronchodilator (eg, reversibility testing) to predict benefit from long-term bronchodilator therapy.
- Do not routinely prescribe nebulised therapy in patients with stable COPD.
- Do not withdraw ICS in patients with asthma/COPD overlap or raised blood eosinophils.

**Do not recommendations are intended as guidance to highlight prescribing practices that are rarely appropriate. Clinicians must consider the circumstances of individual patients to decide whether they apply in a specific case.*


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with counts ≥300cells/μL are most likely to benefit. A single blood test may not be representative as eosinophil counts can vary over time. Blood eosinophil counts performed when a patient is taking oral steroids will not be informative.

- An ICS should form part of the regimen for any patient with asthma/COPD overlap. This should usually be prescribed as an ICS/LABA combination inhaler to avoid the risk of LABA monotherapy in patients with poor adherence to a separate ICS inhaler.
- Prescriptions should be based on drug class. Choice of specific LABAs and LAMAs should be guided by patient preference and their ability to use the inhaler device. A list of inhalers available in New Zealand is available at www.nzrespiratoryguidelines.co.nz. Dry-powder inhalers have a substantially lower impact on greenhouse gases than pressurised metered-dose inhalers.
- Six weeks is a reasonable timeframe to assess improvement in breathlessness following a medication change.
- The COPD assessment test is an eight-item questionnaire that can be used to measure the symptomatic impact of COPD and response to therapy (see *Assess severity* and Appendix 2).

## Role of triple therapy (LABA/LAMA/ICS)

- Escalation to triple LABA/LAMA/ICS therapy should be considered in patients who continue to exacerbate (twice or more a year) despite adherence to dual LAMA/LABA or ICS/LABA therapy and optimal inhaler technique.
- A subset of patients with persistent breathlessness and exercise limitation, despite LABA/LAMA combination therapy, may benefit from triple therapy with LABA, LAMA, and ICS. However, the increased risk of pneumonia with regular ICS should be considered.
- Direct escalation to dual or triple therapy, without stepwise up-titration, may be reasonable in the setting of a severe or recurrent exacerbations.

## ICS withdrawal

- The risk of pneumonia in patients with severe COPD is increased with regular ICS. Withdrawing ICS should be considered if:
    - There is no evidence of benefit from ICS in terms of improved symptoms or fewer exacerbations.
    - The patient develops pneumonia or other ICS adverse effects.
    - The patient does not have a history of frequent exacerbations and is stable.
- If ICS treatment is withdrawn, the patient should be reviewed at 4–6 weeks to ensure that this doesn't cause a deterioration in symptoms.
- Withdrawal of ICS may not be appropriate if the blood eosinophil count is elevated. A blood eosinophil count ≥300cells/μL has been shown to be associated with an increased exacerbation risk after ICS withdrawal.

**Table 3:** Simplified maintenance inhaler management of COPD.

| When treating | Start with | If needed, move on to |
|---|---|---|
| COPD without frequent exacerbations | LAMA | LABA/LAMA |
| COPD with frequent exacerbations | LAMA | LABA/LAMA (consider ICS/LABA if eosinophilia), then LABA/LAMA/ICS |
| Asthma/COPD overlap | ICS/LABA | ICS/LABA plus LAMA |

- ICS should not be withdrawn in patients with a diagnosis of asthma/COPD overlap (see section *Asthma and COPD overlap (ACO)*).

## Additional therapies

- There is no evidence that routine use of nebulisers is beneficial in patients with COPD.
- Theophylline has not shown consistent benefits on exacerbation, lung function, symptoms, or quality of life in randomised controlled trials. In view of the narrow therapeutic index and side-effect profile of theophylline, we do not recommend its routine use in the management of COPD.
- There is no evidence of benefit from long-term oral corticosteroids.
- Long-term macrolide antibiotics, such azithromycin and erythromycin, can reduce risk of exacerbations over one year in former smokers who have exacerbations despite optimal inhaled treatment. Azithromycin is not currently funded in New Zealand for this indication. Long-term macrolide therapy is associated with significant risks, including bacterial resistance, gastrointestinal and cardiovascular side effects, and hearing impairment. Long-term macrolides should rarely be initiated without specialist advice.
- Regular treatment with mucolytics (eg, erdosteine, carbocysteine, or N-acetylcysteine) may reduce the risk of exacerbations in some patients. These treatments are not currently funded in New Zealand.
- In patients with severe and very severe COPD and a history of exacerbations, PDE4 inhibitors (eg, roflumilast) improve lung function, reduce the risk of exacerbations, and have modest benefits for symptoms and quality of life. They have significant gastrointestinal side effects. These treatments are not currently funded in New Zealand
- Alpha-1 antitrypsin augmentation therapy may slow the progression of emphysema in patients with alpha-1 antitrypsin deficiency. This is not currently funded in New Zealand.

## Oxygen therapy

- Oxygen is a treatment for hypoxia, not dyspnoea. Oxygen does not reduce the sensation of breathlessness in patients who are not hypoxic. Oxygen may not improve breathlessness even in those who are hypoxic.
- Oxygen is a drug therapy and should be prescribed.
- Long-term oxygen therapy has survival benefits for COPD patients with severe hypoxaemia. It must be used for at least 16 hours a day. The survival benefits are not apparent until months or years after starting treatment.
- Evaluation of the patient and consideration for long-term oxygen therapy supply should be done by a specialist respiratory service (Box 3). The causes of the hypoxia should be explored, and the patient's pharmacological and non-pharmacological management should be optimised. A target saturation range and oxygen flow rate should be established.
- Patients should adhere to the amount of oxygen prescribed and be monitored for adverse effects.

### Flying with oxygen

Flying is generally safe for patients with COPD, including those with chronic respiratory failure who are on long-term oxygen therapy.

- Before flying, patients should ideally be clinically stable.
- Supplemental oxygen is unlikely to be required if the resting oxygen saturation is ≥95%, and is likely to be required if oxygen saturation is ≤88%. Patients with oxygen saturation values between these levels might require specialist assessment.
- Those already on long-term oxygen therapy need an increase in flow rate of 1–2L per minute during the flight.
- Patients receiving oxygen therapy will need to contact the airline prior to flying.

## Vaccination

- Yearly influenza vaccination reduces serious illness and death in patients with COPD and should be actively promoted to patients with COPD.

**Box 3:** Criteria for oxygen.

Criteria for supply of long-term oxygen therapy (LTOT):

- Assess when the patient's respiratory condition is stable—at least six weeks after hospital discharge or an acute respiratory illness.
- Arterial oxygen tension ($PaO_2$) (measured by arterial blood gas) less than 7.3kPa (55mmHg) indicates the need for long-term oxygen (oxygen saturation usually <88%).
- $PaO_2$<8.0kPa (60mmHg) (oxygen saturation up to 91%) may also be an indication for long-term oxygen if there is evidence of polycythaemia (haematocrit > 0.55) and/or cor pulmonale/right heart failure.

Criteria for oxygen in palliative care:

- Terminal illness with a life expectancy less than 3 months
- Oxygen saturation $SpO_2$ <90%
- Dyspnoea not adequately controlled by optimal treatment for dyspnoea and pain (physiotherapy, narcotics, anxiolytics)

*There is a fire risk associated with oxygen use and smoking or other flammable sources such as gas appliances, open flames and vaping devices. Current smoking, use of heated tobacco, e-cigarettes, or vaping devices are absolute contra-indications to $O_2$ supply.*

- Pneumococcal vaccination probably decreases the incidence of pneumonia and reduces the risk of exacerbations in patients with COPD, but the evidence for this is conflicting and pneumococcal vaccination is not currently funded for this indication in New Zealand.
- Two types of pneumococcal vaccine are approved for use. If the healthcare professional and patient consider this an appropriate treatment, a suggested schedule is one dose of 13-valent protein conjugate vaccine (PCV13, Prevenar 13®) given first, followed at least eight weeks later by the first dose of 23-valent polysaccharide vaccine (23PPV, Pneumovax 23®). A second dose of 23PPV is given a minimum of five years later and a third dose at age ≥65 years.

# Acute exacerbations

COPD exacerbations are characterised by a change in the patient's baseline dyspnoea, cough, and/or sputum that is beyond normal day-to-day variations, is acute in onset, and may warrant a change in regular medication or hospital admission. Key symptoms of exacerbations include increased shortness of breath, increased sputum purulence and volume, increased cough, and wheeze.

Exacerbations of COPD are associated with an accelerated loss of lung function, particularly in patients with mild disease. Prolonged exacerbations are associated with worse health status and more frequent future exacerbations.

Early diagnosis and prompt management of exacerbations of COPD may prevent functional deterioration and reduce hospital admissions. Education of the patient, carers, other support people, and family may aid in the early detection of exacerbations.

## Assessment (Figures 1 and 2)

- Most exacerbations can be managed at home. Indications for hospitalisation include, but are not limited to, a sudden worsening of symptoms, confusion or drowsiness, signs such as cyanosis and peripheral oedema, failure to respond to medical management, low oxygen saturation by pulse oximetry ($SpO_2$), the presence

of serious co-morbidities, including heart failure and newly occurring arrhythmias, and insufficient home support or lack of telephone or transport.

- A guide to acute severity assessment is shown in Table 4.
- Several prognostic scores have been proposed. The most validated one is DECAF, but this includes COPD with pneumonia and requires a blood gas, complete blood count (for eosinophils), and chest x-ray, which are unlikely to be available in primary care. An alternative is CURB-65, which was developed for pneumonia but has been found to be equally effective at predicting short term-mortality in COPD in New Zealand studies.[6] CRB-65 is a simpler version that does not require any laboratory measures (Table 5).
- A chest x-ray and electrocardiogram help to identify alternative diagnoses and complications, such as pulmonary oedema, pulmonary embolus, pneumothorax, pneumonia, pleural effusion, arrhythmias, myocardial ischaemia, and others. Biomarkers (troponins, B-natriuretic peptide, D-dimer) can help to identify comorbidities and abnormalities of these are associated with a worse prognosis.

## Management (Box 4, Figures 1 and 2)

Use breathless management strategies (Appendix 4): sit, rest arms on a chair or table, use a fan, and practise breathing control techniques

### Bronchodilators

- Short-acting inhaled beta$_2$ agonists with or without short-acting anti-muscarinics are the initial bronchodilator of choice to treat an acute exacerbation. These can be delivered via pressurised metered dose inhaler and spacer, dry powder inhalers, or nebuliser. We recommend salbutamol via a spacer. One actuation of the inhaler should be used each time and repeated as necessary.
- Spacer technique is important when using a pressurised metered dose inhaler. In an exacerbation, we recommend one actuation into the spacer followed by 4—6 tidal breaths. Observe and repeat if required.
- The bronchodilator effect of 8—10 puffs of 100mcg salbutamol via spacer is equivalent to a 5mg salbutamol nebuliser. We recommend that no more than five puffs are used at a time (given individually via spacer).
- If patients do not respond to multiple doses of inhaled short-acting beta$_2$ agonist, additional bronchodilator

**Box 4:** Key messages for exacerbation management in COPD.

Recommendations:

- Early diagnosis and prompt management of exacerbations of COPD may prevent functional deterioration and reduce hospital admissions.
- Most mild to moderate exacerbations can be managed at home.
- Short-acting inhaled beta$_2$ agonists with or without short-acting anti-muscarinics are the initial bronchodilators of choice to treat an acute exacerbation.
- Give short course oral corticosteroids (eg, prednisone 40mg once daily for five days).
- Give short-course antibiotics for purulent sputum and/or other evidence of infection.
- Titrate oxygen to target saturations of 88–92%
- Non-invasive ventilation (NIV) reduces mortality in patients with hypercapnic respiratory failure due to an acute exacerbation of COPD.
- Careful discharge planning and referral to pulmonary rehabilitation may reduce the risk of future exacerbations and admissions.

**Table 4:** Assessment of exacerbation severity. (Adapted from the National NZ Ambulance Guidelines 2019.[7] Not all patients will have all of these features.)

| **Mild to moderate** | **Severe** | **Life-threatening / imminent respiratory arrest** |
|---|---|---|
| More short of breath than usual | Very short of breath | Extremely short of breath |
| Able to speak in sentences | Only a few words per breath | Unable to speak |
| Usually have wheeze | | May not have a wheeze |
| Some chest/neck indrawing | Severe neck/chest indrawing | May be no chest/neck indrawing |
| | Tripod positioning | |
| $SpO_2$ near usual level | $SpO_2$ well below their usual level | $SpO_2$ rapidly falling |
| Normal level of consciousness | May be agitated | Severe agitation and/or falling level of consciousness |

**Table 5:** Assessment of short-term (one-month) prognosis.

| **CURB65*** | **CRB65*** | **DECAF*#** |
|---|---|---|
| C – Confusion | C – Confusion | D – Dyspnoea: unable to leave house = 1 point; unable to wash/dress = 2 points |
| U – Urea >7mmol/L | | E – Eosinophils<0.05x 109/L |
| R – Respiratory rate ≥30/min | R – Respiratory rate ≥30/min | C – Consolidation on CXR |
| B – Blood pressure: systolic<90, diastolic<60 mmHg | B – Blood pressure: systolic<90, diastolic<60 mmHg | A – Acidaemia: Blood pH <7.3 |
| 65 – age ≥65 | 65 – age ≥65 | F – atrial Fibrillation |
| | | |
| Low risk score ≤1: ~2% mortality | Low risk score ≤1: ~4% mortality | Low risk score ≤1: ~3% mortality |
| High risk score ≥3: ~20% mortality | High risk score ≥2: ~17% mortality | High risk score ≥4: ~20% mortality |

*Score 1 point for the presence of each factor. #DECAF scores have been validated in patients with COPD *and* pneumonia, and CURB65 and CRB65 have not.

**Figure 1:** Pre-hospital management of acute exacerbation of COPD.

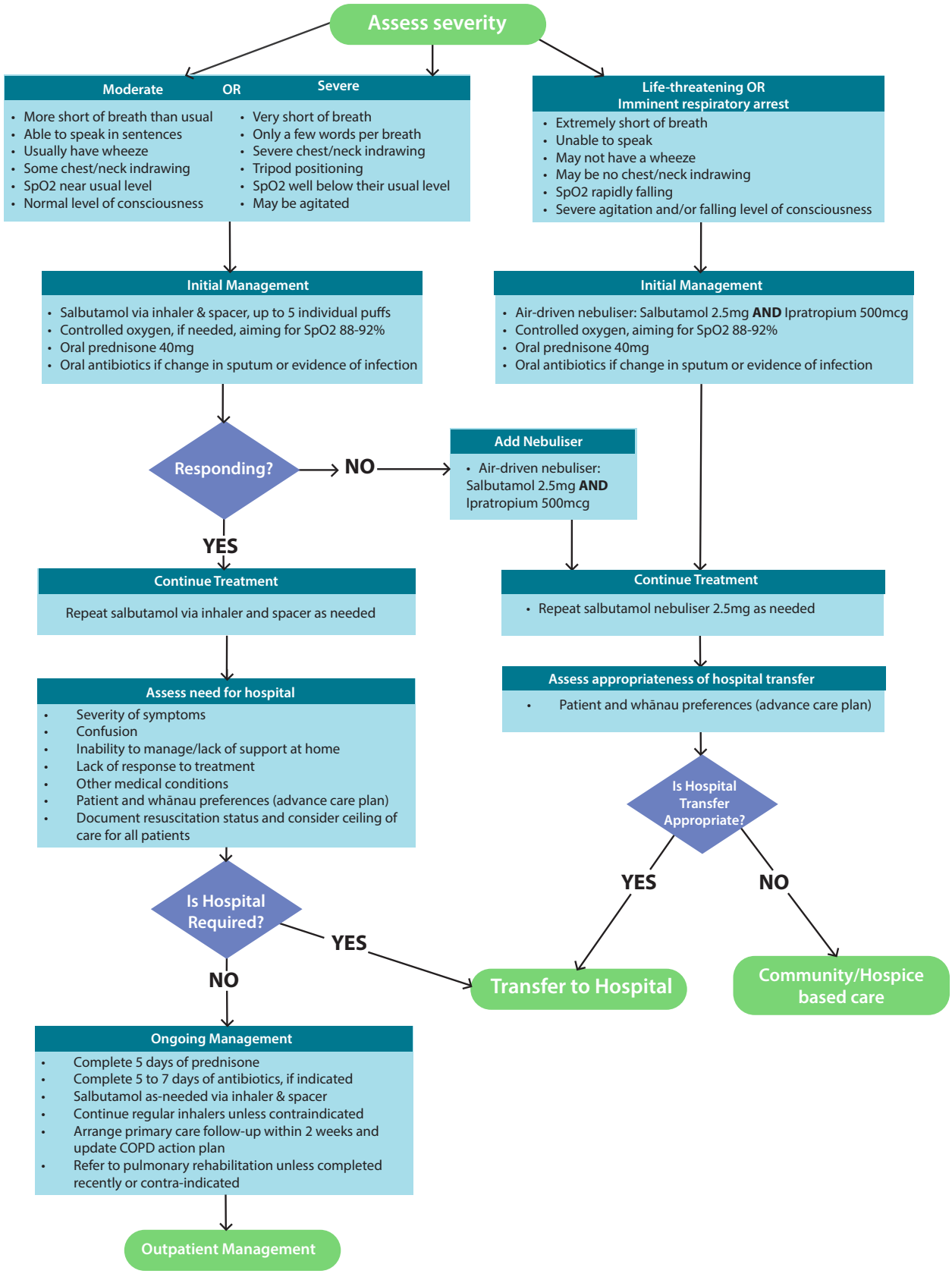
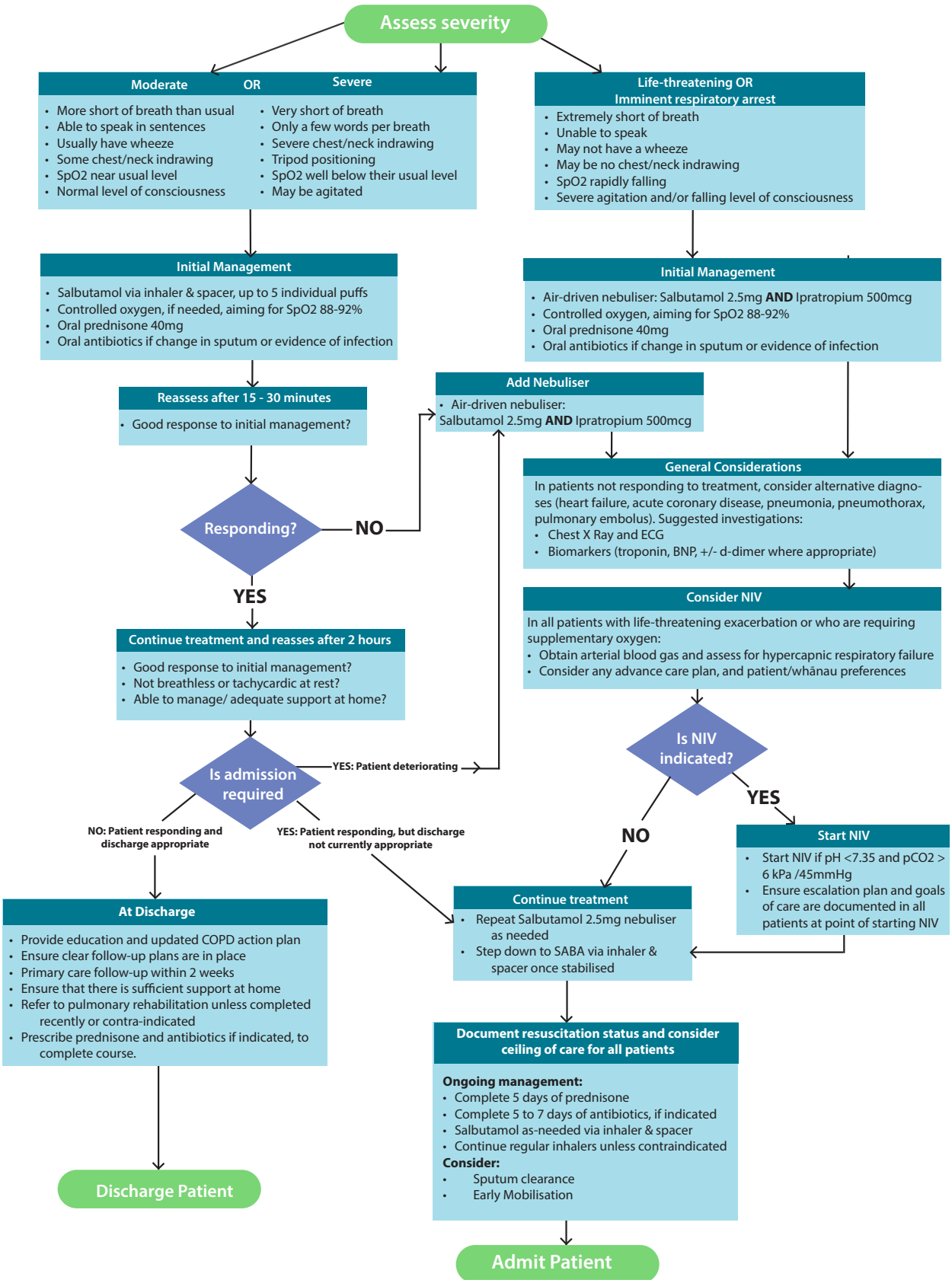


**Figure 2:** Hospital management of exacerbation of COPD.



treatment such as ipratropium is recommended.

- Nebulisers may increase the risk for aerosolisation of viruses such as SARS-CoV-2 (COVID-19). There is no evidence that nebulisers are more effective than inhalers via a spacer, and we recommend that nebulisers should be avoided in any patient who could be infected with respiratory viruses. If they are used, appropriate aerosolisation infection precautions should be implemented.
- If a salbutamol nebuliser is necessary, we recommend a maximum dose of 2.5mg at a time. Patients with COPD often have cardiac co-morbidities. Higher doses are associated with an increased risk of tremors, elevated heart rate, palpitations, and lower blood pressure, without evidence of any additional benefit.
- If nebulisers are given for acute COPD exacerbations, they should be air driven to reduce the risk of type 2 respiratory failure due to high flow oxygen.
- Maintenance LABA, LAMA, and ICS should be continued during an exacerbation.
- We do not recommend the routine use of intravenous (IV) magnesium for COPD exacerbations.
- We do not recommend adrenaline for COPD exacerbations in the absence of anaphylaxis.

## Corticosteroids

- Systemic corticosteroids (eg, prednisone 40mg once daily) can improve lung function, improve oxygenation, and shorten recovery time. They should usually be given for five days. Longer courses should generally be avoided due to the risk of side effects.
- Intravenous steroids should be avoided. There is no evidence of benefit compared with oral corticosteroids for treatment failure, relapse, or mortality. Hyperglycaemia rates are higher with IV corticosteroids.

## Antibiotics

- Respiratory tract infections are the most common precipitants of exacerbations of COPD. These may be viral, bacterial, or mixed. Common bacterial pathogens include *Haemophilus* influenzae, *Streptococcus* pneumonia, and *Moraxella* catarrhalis. *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* have also been reported. *Pseudomonas aeruginosa* and *Staphylococcus aureus* are uncommon but occur more frequently in severe COPD.
- Antibiotics, when indicated by the presence of purulent sputum, fever and/or raised inflammatory markers (CRP >40), can shorten recovery time and reduce the risk of relapse and treatment failure, and should be prescribed for 5–7 days.
- Oral antibiotics such as amoxicillin or doxycycline are recommended. If treatment failure or resistant organisms are suspected, amoxycillin-clavulanate can be prescribed. If pneumonia, *Pseudomonas* or *Staphylococci* are suspected, appropriate antibiotics should be used.

## Oxygen

- If indicated, oxygen should be prescribed and titrated via nasal prongs or a controlled flow device to target saturations of 88–92%.
- Oxygen delivery via a high-flow humidified nasal device can improve ventilation and airway clearance as well as reduce the physiological dead space and work of breathing.

## Supported ventilation

- Non-invasive ventilation (NIV) reduces mortality by about 50%, reduces need for intubation, and shortens length of stay in patients with rising arterial carbon dioxide tension ($PaCO_2$) levels due to COPD. It should be considered in patients who present with hypercapnic respiratory failure (arterial pH <7.35, $PaCO_2$ >6kPa/45mmHg).
- An arterial blood gas should be considered in every patient with a severe exacerbation, an oxygen saturation less than 90%, or signs of cor pulmonale.
- A *venous* blood gas pH ≤7.34 has good sensitivity and specificity for acidaemia (pH ≤7.35) but *does not*

reliably predict arterial $PaCO_2$ and cannot diagnose hypercapnic respiratory failure. An arterial blood gas is necessary to assess the need for NIV.

- Ward-based NIV can reduce the requirement for HDU/ICU admission but should be conducted in an appropriately monitored setting with trained clinical staff.
- At the time of initiating NIV, the goals and limits of care should be considered and a clear written escalation plan established.

### Airway clearance techniques

- Patients with excess sputum production benefit from airway clearance techniques during an exacerbation.
- Airway clearance techniques should be individualised to the patient.

### Before discharge

- Ensure that adequate education is provided regarding COPD management, including smoking cessation, use of inhalers, and the development of an acute management/action plan.
- Ensure that clear follow-up plans are in place, as the risk for further exacerbations is greatest following an exacerbation.
- Ensure that there is sufficient support at home for the patient to manage during their recovery. This may require social work, physiotherapy, occupational therapy, and other allied health input.
- Recommend primary care follow-up within two weeks.
- Consider follow-up spirometry if this has not been done.
- Refer to a pulmonary rehabilitation programme unless recently completed or contra-indicated.

### After an exacerbation

- Having an exacerbation is the greatest risk factor for a further exacerbation.
- Each exacerbation is associated with a faster decline in lung function and increased mortality.
- Exacerbations should be used as an opportunity to review the pharmacological and non-pharmacological strategies in place and to develop a personalised action plan.
- Review of inhaler technique and adherence should occur in every patient following an exacerbation (see section *Optimise knowledge of COPD and adherence to treatment*).
- All medications should be reviewed following an exacerbation of COPD and adjusted as appropriate.
- Refer to a pulmonary rehabilitation programme unless recently completed or contra-indicated.

# Comorbidities and treatable traits

## Identify and manage comorbidities

- People with COPD often have other conditions. Lung cancer, bronchiectasis, ischaemic heart disease, congestive heart failure, diabetes, anxiety, depression, gastro-oesophageal reflux, and osteoporosis are all more common among people with COPD than in the general population.
- These conditions can negatively impact on the management of COPD and, in turn, the presence of COPD can negatively impact on the treatment and prognosis of comorbid conditions.
- A systematic approach to the assessment and management of comorbidities has been proposed as part of the treatable traits concept. This approach recommends that management is personalised to the individual, with the use of biomarkers where available, and the systematic multidimensional identification and treatment of all comorbidities or disease characteristics, which may contribute to the patient's presentation and are potentially amenable to treatment ('treatable traits'). There is preliminary evidence to suggest that this approach improves quality of life.

## Lung cancer

- There is a strong association between COPD and lung cancer, more so than is explained by the shared risk factor of smoking.

- Haemoptysis is not a symptom of COPD and should be investigated to rule out lung cancer. Unexplained weight loss and a new persistent cough may also be symptoms of lung cancer.
- Although patients with severe COPD may be unfit for surgery because of poor lung function, they may still be eligible for curative-intent cancer treatment. Newer radiotherapy techniques such as stereotactic ablative radiotherapy can deliver curative-intent treatment with little effect on lung function.
- A person with lung cancer who has a poor life expectancy due to advanced COPD or other comorbidities may not require any treatment for an early stage, slow-growing and asymptomatic lung cancer.

## Cardiac disease

- People with COPD are at increased risk of ischaemic heart disease and cardiac failure because of the shared risk factors of age and smoking status. Severe COPD is associated with pulmonary hypertension and cor pulmonale. People with COPD should have a cardiovascular risk assessment done.
- Smoking cessation reduces cardiovascular risk as well as the rate of lung function decline in COPD.
- If beta-blockers are needed for cardiac disease, then cardioselective beta-blockers such as bisoprolol should be used. Inhaled SABA and LABA therapy can be used alongside cardioselective beta-blocker therapy.
- Bronchodilators may have pro-arrhythmic effects. There is an acceptable safety profile for long-acting beta agonist and anticholinergic bronchodilators at prescribed doses, but caution should be employed with high doses of short-acting beta$_2$-agonists during a COPD exacerbation or when using theophylline. There may be a risk of developing arrhythmias such as atrial fibrillation in these situations.

## Mental health disorders

- Anxiety and depression are common in COPD. Breathlessness, activity limitation, and loss of social connections are risk factors for the development of anxiety and depression. In turn, anxiety and depression increase the perception of breathlessness and may increase symptom burden, leading to a reduction in social activity and exercise avoidance.
- Treatment of anxiety and depression should not change in the presence of COPD. Participation in a pulmonary rehabilitation programme reduces anxiety and depression scores.
- Smoking and therefore COPD are common among people with mental health disorders, and COPD may be underdiagnosed and undertreated in this group.

## Other comorbidities

- The presence of gastro-oesophageal reflux is a risk factor for COPD exacerbations, possibly due to lung injury from aspiration. It is sensible to treat reflux symptoms with proton pump inhibitors, although it has not been proven that this reduces the risk of COPD exacerbations.
- Allergic rhinitis may increase COPD symptoms.
- Obstructive sleep apnoea syndrome and obesity-hypoventilation syndrome lead to worse night-time hypoxaemia in people with COPD. Appropriate treatment of these comorbidities with nocturnal continuous positive airways pressure (CPAP) or NIV can improve sleep quality, reduce pulmonary hypertension, and may reduce mortality.
- Identification of coexisting non-COPD lung disease such as bronchiectasis or interstitial lung disease is an opportunity to use disease-specific treatment to improve respiratory symptoms. (See also section *Asthma and COPD overlap (ACO)*).

## Multiple comorbidities and frailty

- People with multiple comorbidities are more vulnerable to adverse

outcomes including mortality. COPD treatments may impact on control of comorbid conditions. For example, prednisone taken for a COPD exacerbation can adversely affect diabetic glycaemic control.

- COPD is a risk factor for falls. Hypoxemia, dyspnoea, and fatigue are associated with impaired balance.
- Cognitive impairment is common in COPD, particularly during exacerbations. This can affect COPD disease education and adherence to medication and self-management plans.
- Some COPD treatments such as pulmonary rehabilitation or lung transplantation may not be able to be delivered safely due to comorbidities.
- People with COPD and comorbidities may be taking many medications. COPD medication can add to the problem of polypharmacy and we recommend a regular medicines review.

# Asthma and COPD overlap (ACO) (Box 5)

Patients with features of both asthma and COPD appear to have a worse prognosis than those with COPD alone according to many, but not all, studies. Treatment recommendations are based on expert opinion only because asthma and COPD overlap (ACO) patients have largely been excluded from controlled trials.

- Patients with ACO are broadly characterised by the following:
  - asthma diagnosed before aged 40 years old, and
  - a smoking history of >10 pack years or comparable aero-pollutant exposure, with
  - highly variable expiratory volumes ($FEV_1$ >400ml) and/or
- elevated eosinophils (>0.3x$10^6$).
- We recommend inhaled corticosteroids in low or moderate doses to target asthma-like inflammatory pathways in combination with single or dual long-acting bronchodilator.
- We recommend ICS/LABA as initial therapy followed by the addition of LAMA (ie, triple therapy) if there are persistent symptoms or exacerbations.
- We recommend using either an asthma or COPD action plan depending on the dominant clinical features.
- Although recent studies in asthma favour the use of combined budesonide/formoterol reliever inhalers, the role of these inhalers in ACO remains uncertain, as there are no data to support this approach at this time.

# End-of-life care

## Advance care planning

End-of-life care is important in advanced COPD. As the goals of care change, patients and their family/whānau require realistic advice and support to make informed decisions and plan for the future.

- Discussion about advance care plans and advance directives should

**Box 5:** Principles of management of asthma–COPD overlap.

- There are no data to support the use of ICS alone in asthma–COPD overlap.
- Data from asthma trials suggest that LABA monotherapy may be harmful.
- Observational evidence suggests that ICS combined with long-acting bronchodilators should be the mainstay of therapy in ACO.
- Non-pharmacological approaches to the management of COPD are also recommended in people with ACO (eg, smoking cessation, vaccinations, exercise, pulmonary rehabilitation and treatment of comorbidities).
- ICS withdrawal is not recommended in patients with ACO, due to possible increases in exacerbations and mortality.

be undertaken as part of usual management at a suitable time in the disease course.

- Advance care plans can be made at any stage of the disease and do not need to wait until the patient is approaching the end of life.
- Most patients with life-limiting conditions prefer to identify their goals of treatment and discuss preferences for end-of-life care early. Good communication with patients who have a terminal illness is associated with better end-of-life care and fewer medical interventions.
- A useful strategy when deciding whether end-of-life discussions are appropriate is to consider the question: "Would I be surprised if this patient died in the next 12 months?"
- The following features should also prompt health practitioners to consider initiating discussions about advance care plans, centred on the patient's preferences for end-of-life care:
    - Breathless at rest or on minimal exertion or housebound
    - Weight loss or cachexia
    - $FEV_1$<30% of predicted
    - Meets criteria for long-term oxygen therapy
    - Two or more hospitalisations in the previous year for exacerbations
- An admission with respiratory failure requiring non-invasive ventilation
- A structured advance care plan will reduce the burden of setting the ceiling of care by unfamiliar staff and family members during an acute admission and allow implementation of a patient's choice of health care when they are no longer capable of expressing their choice.
- In general, patients and their family/whānau want an honest conversation that is balanced between realistic information and appropriate hope.
- Consider involving local hospice and/or palliative care services.

More details and Advance Care Plans are available at: www.advancecareplanning.org.nz.

## Palliation of dyspnoea

### Morphine

- Morphine reduces respiratory effort and the sensation of breathlessness.
- Lower doses are usually required than used for pain (eg, 2.5mg to 5mg every four hours, or as required).
- Consider lower doses for older patients.
- Dose can be gradually titrated as for pain. But aim for comfort rather than resolution of dyspnoea.
- If greater than two doses per day of morphine liquid are regularly being used with effect, convert to low-dose, slow-release morphine capsules (eg, 10 mg twice a day). In this case, it would also be reasonable to make small amount of as-required morphine liquid (2.5mg to 5 mg as required) available to the patient.
- Oral morphine doses are generally <40 mg per day when used for dyspnoea alone.

### Benzodiazepines

- Evidence for benzodiazepines for breathlessness in COPD is lacking. Benzodiazepines may be harmful and are not recommended as a first-line treatment of breathlessness.
- Benzodiazepines increase the risk of falls among patients with COPD and may also increase the risk of COPD exacerbations and pneumonia.
- Benzodiazepines should not be used in patients at risk of hypercapnic respiratory failure.

# Appendix 1: The four-step COPD consultation.

| 1. Assess COPD control and exacerbation risk | 2. Consider other relevant clinical issues | 3. Decide whether the treatment plan needs to be changed | 4. Complete the COPD self-management (action) plan |
|---|---|---|---|
| Review history of COPD exacerbations in last 12 months (requiring oral corticosteroids or antibiotics)<br><br>Complete CAT score<br><br>Complete mMRC (breathlessness score)<br><br>Review last spirometry result<br><br>Assess current status:<br>• Breathlessness<br>• Exercise tolerance<br>• Sputum volume<br>• Sputum colour<br>• Oxygen saturations<br>• Flu vaccine<br>• Weight | Assess the patient's knowledge of their personal signs and symptoms of an exacerbation<br><br>Ask about adherence with maintenance treatment<br><br>Check frequency of using reliever medication<br><br>Check inhaler technique<br><br>Review smoking status and cessation strategies<br><br>Assess whether the patient is coping with activities of daily living<br><br>Consider a nutritional assessment<br><br>Consider whether patient requires further specialist review if symptoms and presentation don't correlate<br><br>Review for any co-morbid conditions | Consider whether additional drug treatment is required if COPD is not adequately controlled such as increasing breathlessness or recent exacerbation<br><br>Consider withdrawal of ICS if patient is stable and there is no evidence of benefit or recent pneumonia. If ICS is withdrawn review patient in 4–6 weeks<br><br>Consider if a home supply of antibiotics and oral corticosteroid is required<br><br>Discuss an exercise plan and/or refer to pulmonary rehabilitation and/or physiotherapy<br><br>Recommend annual flu vaccine and consider pneumococcal vaccine<br><br>Refer for assessment for domiciliary oxygen if resting oxygen saturations <88% on room air when well and smoke free<br><br>Refer for support services/ specialist review if appropriate | Complete the details on the front page of the patient's plan<br><br>Review the signs and symptoms of worsening COPD and of a chest infection with the patient (unwell, very unwell and extremely unwell)<br><br>Remind the patient what to do when unwell:<br>• breathing control techniques<br>• correct inhaler technique<br>• chest clearance (if required)<br>• energy conservation techniques<br><br>Enter the antibiotic type and length of course (usually 5–7 days).<br><br>Enter the prednisone regimen. The usual regimen in an exacerbation is 40mg daily for 5 days.<br><br>Advise the patient of a time for clinical review after starting home supply of prednisone and antibiotics (if applicable).<br><br>Enter additional instructions in the steps to manage breathlessness section.<br><br>Give the patient a copy of the plan and save on the patient record. |

These steps are likely to need more than one consultation.

# Appendix 2: COPD assessment test (CAT).

Name:

Date:

CAT™
COPD Assessment Test

## How is your COPD? Take the COPD Assessment Test (CAT)

This questionnaire will help you and your healthcare professional measure the impact COPD (Chronic Obstructive Pulmonary Disease) is having on your wellbeing and daily life. Your answers and test score, can be used by you and your healthcare professional to help improve the management of your COPD and get the greatest benefit from treatment.

For each item below, place a mark (X) in the box that best describes you currently. Be sure to only select one response for each question.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Example:** I am very happy | 0 | X | 2 | 3 | 4 | 5 | I am sad | |
| | | | | | | | | **POINTS** |
| I never cough | 0 | 1 | 2 | 3 | 4 | 5 | I cough all the time | |
| I have no phlegm (mucus) in my chest at all | 0 | 1 | 2 | 3 | 4 | 5 | My chest is full of phlegm (mucus) | |
| My chest does not feel tight at all | 0 | 1 | 2 | 3 | 4 | 5 | My chest feels very tight | |
| When I walk up a hill or one flight of stairs I am not breathless | 0 | 1 | 2 | 3 | 4 | 5 | When I walk up a hill or one flight of stairs I am very breathless | |
| I am not limited doing any activities at home | 0 | 1 | 2 | 3 | 4 | 5 | I am very limited doing activities at home | |
| I am confident leaving my home despite my lung condition | 0 | 1 | 2 | 3 | 4 | 5 | I am not at all confident leaving my home because of my lung condition | |
| I sleep soundly | 0 | 1 | 2 | 3 | 4 | 5 | I don't sleep soundly because of my lung condition | |
| I have lots of energy | 0 | 1 | 2 | 3 | 4 | 5 | I have no energy at all | |
| | | | | | | | **TOTAL SCORE** | |

## What does your COPD Assessment Test (CAT) result mean?

**A score between 0 and 10 suggests a low impact.**
This score should only be interpreted and acted on in partnership with your healthcare professional.

**A score between 11 and 20 suggests a medium impact.**
This score should only be interpreted and acted on in partnership with your healthcare professional.

**A score between 21 and 30 suggests a high impact.**
This score should only be interpreted and acted on in partnership with your healthcare professional.

**A score between 31 and 40 suggests a very high impact.**
This score should only be interpreted and acted on in partnership with your healthcare professional.

For further information about your COPD and what your test result might mean, make an appointment to see your health care professional.*

Modified version for use in New Zealand. This does not replace a full assessment from your Doctor. COPD Assessment Test and CAT logo is a trade mark of the GlaxoSmithKline group of companies. ©2009 GlaxoSmithKline group of companies. All rights reserved. COPD Assessment Test is distributed by GlaxoSmithKline NZ Limited, Auckland.

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*Please note that normal doctor fees will apply.

# Appendix 3: COPD action plan

## About Me

**(tick all that apply)**

- ☐ I am a known $CO_2$ retainer
- ☐ I have an Advance Care Plan
- ☐ I am happy for this plan to be shared with other healthcare providers
- ☐ Long term home oxygen and flow rate ☐ L/min

### Remember

- Keep your action plan up to date
- Make sure your inhalers aren't empty or expired
- Take your medications as prescribed
- Ensure you always carry your reliever
- Regularly check your inhaler technique with your healthcare professional

## My Breathlessness Plan

1. Stop what you are doing
2. Find a resting position
3. Use your fan, or the breeze
4. Begin your preferred breathing technique for 2-3 minutes

**If you are still feeling breathless, follow your Action Plan on the next page**

## Using a spacer

If you use a metered dose inhaler (MDI), a spacer will help get the correct dose of medication into your lungs.

Ask your healthcare professional about a spacer, they can provide them free of charge. If you don't already have one, you need one. Spacers increase your medications effectiveness.

1. Shake the inhaler well (holding it upright)

2. Fit the inhaler into the opening at the end of the spacer

3. Seal lips firmly around the mouth piece, press the inhaler once only

4. Take 4-6 slow breaths in and out through your mouth. Do not remove the spacer from your mouth between breaths

   **OR** take one slow deep breath in and hold this for 10 seconds

5. Repeat steps 1-4 for further doses

## Washing your spacer

Wash your spacer once a week with warm water and dishwashing liquid.

**Do not rinse, drip dry** to ensure that your medicine gets into your lungs and doesn't stick to the sides of the spacer.

**Produced by Asthma and Respiratory Foundation NZ**
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# Asthma + Respiratory
FOUNDATION NZ

# COPD
(Chronic Obstructive Pulmonary Disease)
## Action Plan

This COPD Action Plan belongs to:

Better Breathing, Better Living



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# YOUR COPD ACTION PLAN

Name: Healthcare practice:

Date of plan: Healthcare practice phone:

## Know your COPD symptoms

## Know when and how to take your medicine

### Normal for me

**When I am well my 'normal' is**

- I have a usual amount of cough /phlegm.
- I can do my usual activities.
- Exercise / activity
- Oxygen Saturations % breathing room air

[name] puffs every morning
puffs every night

[name] puffs every morning
puffs every night

Reliever: puffs when you need it to relieve your symptoms

### I'm unwell

**These signs suggest my COPD is worse:**

- I am more breathless
- I need my reliever medicine more often
- I am more tired / lethargic
- I am losing my appetite
- I may have signs of a fever (hot/cold flushes, temperature)

**What should I do?**

- Breathing control techniques
- Energy conservation techniques
- Chest clearance
- Take reliever inhaler regularly (for example every 4 hours)
- Make an appointment to see my Primary Health Care team within 3 days

**Start prednisone:**

*Prednisone* *mg* *for* *days*

**If I have all of the following symptoms it is a sign of a chest infection:**

- There is an increase in the amount of phlegm
- My phlegm has changed to a darker colour
- I am more breathless than usual

**Start antibiotics for signs of a chest infection:**

*[name]* *times per day* *for* *days*

### I'm very unwell

**I am becoming more unwell if:**

- I am getting worse despite the extra medicines

OR

- I am no better 48 hours after taking prednisone

**What should I do?**

- Breathing control techniques
- Energy conservation techniques
- Chest clearance
- Phone my Primary Health Care team to make an urgent appointment today or go to After Hours Medical Centre

**Important:** You need to see a doctor today

**Other instructions:**

### Emergency

**I'm *extremely* unwell**

- I am very breathless
- I am not getting any relief from my reliever medicine
- I am scared
- I maybe unusually confused or drowsy
- I may have chest pain

**What should I do?**

- **Dial 111** for an ambulance or press your medical alarm button
- Take extra reliever as needed until the ambulance arrives
- Breathing control techniques

*Plan prepared by:*

*Next review date:*

*Signature:*

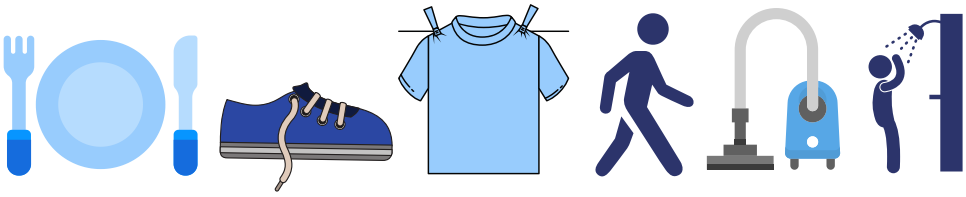
# Appendix 4: Breathlessness strategies for COPD

Asthma + Respiratory FOUNDATION NZ

## BREATHLESSNESS
### STRATEGIES FOR COPD

***Breathlessness is a major symptom in COPD. It can often seem to come on for no apparent reason or with very little exertion. This can cause people to feel frightened, out of control and anxious***

### COMMON ACTIVITIES THAT CAN CAUSE BREATHLESSNESS



*Many activities can cause breathlessness such as, walking, bending down, showering, getting dressed, going to the toilet, vacuuming, hanging out washing, and lifting things.*

*Eating can be challenging as it can require effort to prepare food and then it is difficult to eat food due to breathlessness. Eating a large portion can also cause breathlessness.*

### MANAGING BREATHLESSNESS

*These strategies can help manage chronic breathlessness in stable lung disease. If your breathlessness becomes out of control and unmanageable rapidly, please seek medical attention.*

**1 CONSERVE YOUR ENERGY & PACE YOURSELF**

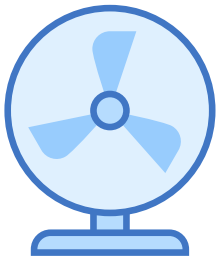
People who are breathless often rush to get tasks done. This is not a useful strategy. Learning to pace yourself helps keep control of your breathing so that you can manage independently for longer.

- ***Plan your day:*** *Don't try to fit too much in—allow plenty of time to carry out tasks. Cut bigger tasks down into smaller manageable parts and Allow for plenty of rest periods between each task.*
- ***Prioritise tasks:*** *Which tasks can wait until you feel less breathless?*
- ***Adapt tasks:*** *Can you sit down to complete the task? Is there a simpler way to complete the task?*
- ***Delegate:*** *Can someone help you with the task?*

**2 USE A FAN**

A fan can help control breathlessness. Hand-held fans are a great option because they are cheap, quiet and easily portable. A free-standing fan, a desktop fan or the breeze through an open door or window can also help.

***To use the fan: Hold the fan about 15 centimetres from your face so you can feel the air on your top lip. Slowly move the fan from side to side so that the breeze covers the bottom half of your face***



## MANAGING BREATHLESSNESS

### 3 FIND A RESTING POSITION

Find your resting position – this is a position which helps you relax and breathe better. You may already unconsciously use these.

Lean forward with arms resting on your knees or the sides of a chair. Position knees slightly apart

Lean forward over a table or surface resting on your arms up on some pillows or similar

Lean forward with arms resting on a surface such as supermarket trolley, or back of a chair. Alternately, rest standing with your back against a wall.

### 4 BREATHING CONTROL TECHNIQUES

There are several different breathing techniques that can be used to manage breathlessness. Practice them to find what suits you.

**BREATHING CONTROL**

1) Place one hand on your tummy.
2) Relax upper chest & shoulders.
3) Breathe in gently through your nose (feel your tummy move out).
4) Breathe out through your nose and/or mouth and your tummy will move in.

**PURSED LIPS**

This can be used with all activities and at rest.
1) Breathe in gently through your nose.
2) Breathe out with your lips pursed as if you are whistling or blowing through a straw

**BLOW AS YOU GO**

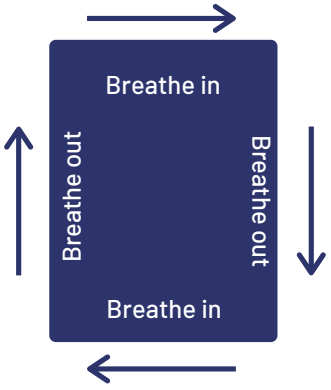
Use this when doing something that makes you breathless, such as hanging out washing.
1) Breathe in before you make the effort.
2) Breathe out while making the effort.

**PACED BREATHING**

Useful when you're active (climbing stairs or walking).
1) Pace your steps to your breathing.
2) Breathe in.
3) Breathe out as you go up a stair.

**BREATHE AROUND THE RECTANGLE**

1) Focus on a rectangle shape eg door frame or window
2) Breathe in along the short side
3) Breathe out along the long side



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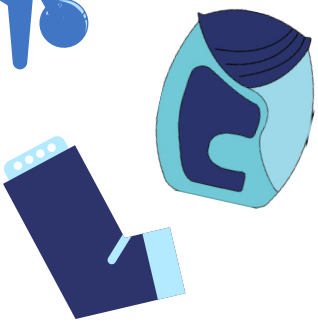
## MANAGING BREATHLESSNESS

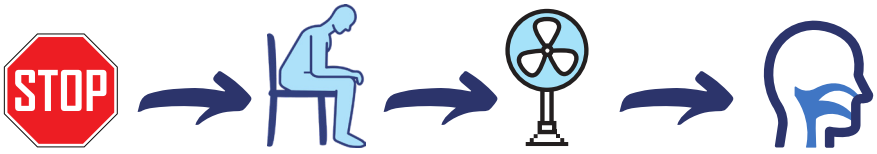
**5** **DISTRACTION AND RELAXATION**
Focus on things that bring you pleasure or calmness. Mindfulness and meditation can be useful.

**6** **EXERCISE**
Regular activity is important to maintain fitness and strength, but should be done in moderation. Ask to be referred to your local pulmonary rehabilitation program.



**7** **MEDICATION**
Use your prescribed medication as directed. If you have difficulty managing your breathlessness, talk to your doctor or nurse practitioner as there may be other medications that may help.

## WHEN FEELING BREATHLESS...




**Stop what you are doing** → **Find a resting position** → **Use your fan or the breeze** → **Choose your preferred breathing technique, & continue for 2-3 minutes**

AFTER 2-3 MINUTES EVALUATE YOUR BREATHLESSNESS

Are you feeling less breathless and more in control?
*Yes: Continue with your activity*
*OR*
*No: Take reliever medication through a spacer, then resume breathing technique for another 2-3 minutes*

**If you still feel no better, then assess whether you need to seek medical help**

# Appendix 5: Breathlessness strategies: quick reference guide

# Appendix 6: Useful documents and resources

An updated list of resources will be maintained at Asthma and Respiratory Foundation of New Zealand: www.nzrespiratoryguidelines.co.nz (COPD Action Plan, Breathlessness Strategies, Breathlessness Quick Reference, Guide Summary, Inhaler Devices Identification Chart).

- The Lung Foundation (Australia) website has many resources for patients with COPD: https://lungfoundation.com.au/patients-carers/living-with-a-lung-disease/copd/treatment/.
- Airway clearance techniques: https://bronchiectasis.com.au/resources/videos/the-active-cycle-of-breathing-technique.
- Smoke free services: https://www.smokefree.org.nz/.
- Māori model of care: https://www.health.govt.nz/our-work/populations/maori-health/maori-health-models.
- Advance Care planning: www.advancecareplanning.org.nz.
- Supporting Breathlessness: https://supporting-breathlessness.org.uk/.
- Regional Pulmonary Rehabilitation Classes list: https://www.asthmafoundation.org.nz/about-us/support-groups.
- 'How-to use' inhaler videos, Health Navigator NZ: https://www.healthnavigator.org.nz/videos/i/inhaler-use/.

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**URL:**
www.nzma.org.nz/journal-articles/new-zealand-copd-guidelines-quick-reference-guide

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