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March 2025

Topics in COPD

Early COPD: how to identify it and is it worth treating?

Improving adherence to treatment in COPD: a personalised approach

Inhaler therapy for COPD: an individualised approach to inhaler selection

New developments in COPD

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FOREWORD FROM THE SUPPLEMENT EDITOR

Topics in COPD

Chronic obstructive pulmonary disease (COPD) is a prevalent condition that significantly impacts individuals, families and healthcare systems globally. This disease causes daily symptoms and is often linked with exacerbations or flare-ups, making it a leading cause of preventable hospitalisations and mortality. Addressing COPD requires our collective focus and concerted efforts to ensure accurate and timely diagnosis, as well as improved prevention and management strategies.

In this supplement, titled *Topics in COPD*, our expert and multidisciplinary contributors share insights from the latest research and their clinical practice to provide the necessary knowledge and tools for effective COPD management. Highlights include recommendations regarding the crucial role of spirometry and clinical assessment in achieving a diagnosis; how to select an appropriate inhaler device; a discussion of the issues around adherence to medications, and lack thereof; an update on the latest developments in COPD management; strategies for preventing and managing exacerbations and the importance of comorbidities; and a discussion about how best to manage intractable breathlessness in late-stage disease.

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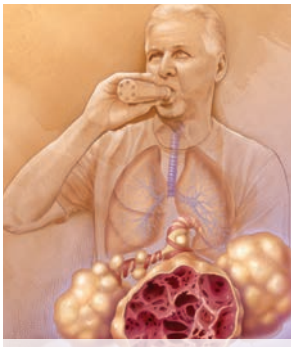
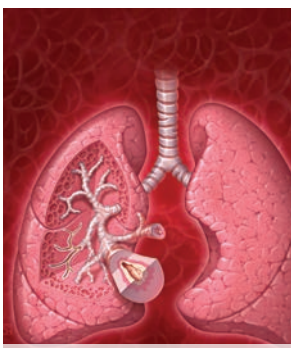
CONTENTS PEER REVIEWED



PAGE 2



PAGE 16

PAGE 22

Early COPD

How to identify it and is it worth treating?

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Case finding of airflow limitation and COPD is an important step to be undertaken by GPs in individuals at risk to help address the increasing burden of this condition in the community.

Chronic obstructive pulmonary disease (COPD) is an important disease globally because of its massive societal, economic and personal burden. It is defined by airflow limitation (usually measured by spirometry) that does not normalise after administration of a short-acting bronchodilator and by typical symptoms of breathlessness on exertion and cough productive of sputum.[1]

An overview of COPD

Two important guidelines on COPD are the Australian COPD-X plan and the international Global Initiative for Chronic Obstructive Lung Disease (GOLD)'s strategy document; these contain practical information that is regularly updated.[1,2] Both documents describe the severity of COPD based on impairment of forced expiratory volume in one second (FEV_1). The GOLD document also incorporates symptoms and exacerbations to assign COPD severity.

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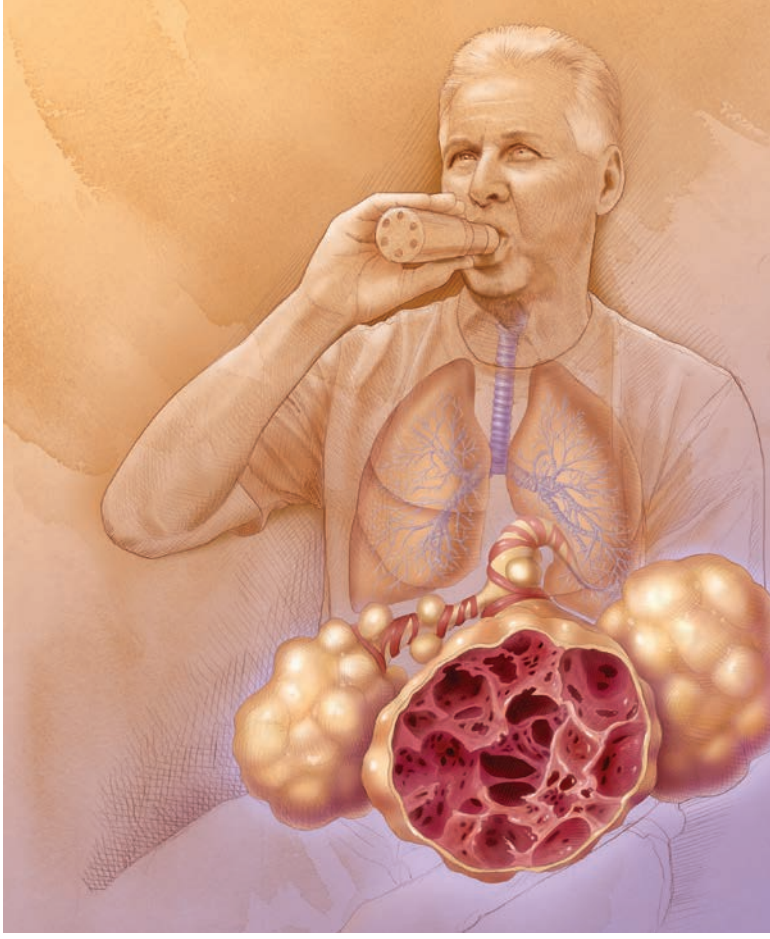

KEY POINTS

- Detecting airflow limitation when the patient has no symptoms and confirming the diagnosis of chronic obstructive pulmonary disease (COPD) by spirometry identifies individuals at risk of future symptoms, increased decline in FEV_1 and complications of the condition.
- Better stratification of future risk by actively diagnosing COPD (case finding) may alter management in those with additional risk factors for COPD progression and cardiovascular risk.
- Performing spirometry in current smokers may increase smoking cessation.
- An asymptomatic patient with a new diagnosis of airflow limitation should be monitored for decline in FEV_1, onset of COPD symptoms and occurrence of exacerbations.
- Confirmation or exclusion of COPD allows appropriate drug prescription and helps avoid diagnostic confusion.
- Management of COPD continues to evolve as understanding of the disease increases, particularly appreciation of its heterogeneity.

COPD was the fifth leading cause of death in 2020 but is now the fourth leading cause of death worldwide and the eighth leading cause of disability.[3] Importantly, it is estimated that tobacco smoking only accounts for 50 to 70% of cases.[4] Therefore, in addition to measures aimed at preventing smoking and helping patients quit smoking, there has been a drive to find strategies to identify people at risk of COPD and to reduce their risk of the condition developing as a result of a sustained excess decline in lung function.[5] Similarly, there is interest in diagnosing COPD

in its earlier stages in the hope that the course of the disease can be altered if the pathophysiological changes are not advanced. There is also a greater appreciation of the heterogeneity in disease expression and considerable effort is being made to better characterise patients with established COPD, with the long-term goal of targeting treatment.

A deeper understanding of COPD and its underlying processes is therefore needed to enable advances in its management.

Spirometry for diagnosis of COPD

The prevalence of airflow limitation in the population varies between countries. The most comprehensive study to date on the prevalence of airway obstruction is the Burden of Obstructive Lung Disease (BOLD) study, which involved 12 sites in 12 different countries and 9425 subjects. The investigators reported the presence of moderate or greater airway obstruction (ratio of FEV_1 to forced vital capacity [FVC] less than 0.70 and FEV_1 less than 80% of predicted on post-bronchodilator spirometry testing) in 6 to 20% of the population over 40 years of age.[6] The reported prevalence is a surprisingly large proportion of the population. The study did not include any developing countries where environmental pollutant exposure and tobacco consumption are high and, therefore, where COPD could be even more prevalent. In Australia, the prevalence of COPD in women and men aged 40 years or older was found to be 7.5%.[7]

Other studies have reported that when the largest at-risk population in western societies – current and former smokers of 10 pack-years or more and 40 years of age and older – is screened, between one in seven and one in three people have COPD.[8-10] The proportion varies depending on the prevalence of COPD in the population being tested. Considering the relation between pack-years and severity of airway obstruction, the likelihood of finding airway obstruction will be even higher if individuals who have smoking histories exceeding 20 pack-years are targeted.

Is spirometry really necessary for diagnosis?

The diagnosis of COPD needs confirmation in individuals who have symptoms. As the symptoms associated with COPD are nonspecific, such as productive cough that could be due to bronchitis without COPD, bronchiectasis or postnasal drip, diagnosis by clinical symptoms and signs alone is highly inaccurate. The implications of misdiagnosis are significant: treating a patient with drugs for an erroneous diagnosis is wasteful of resources, needlessly exposes patients to potential drug side effects and may delay the correct diagnosis and appropriate management. Spirometry remains the mainstay of measuring airway function in primary care. Airway function can be assessed using a variety of other modalities in tertiary care, including the measuring of gas trapping and respiratory mechanics using oscillometry.

Arguably spirometry is mandatory in any patient who presents with worsening breathlessness or wheeze during a respiratory tract infection because such a scenario constitutes an exacerbation, which in itself has significant clinical connotations. An exacerbation of COPD is commonly defined as worsening symptoms (cough, sputum production or breathlessness) for three or more days. Apart from the short-term consequences, exacerbations are associated with increased rate of decline in lung function, further exacerbations, increased risk of death, reduced quality of life and increased health care utilisation.[11]

Airflow limitation

Although the most common cause of COPD is cigarette smoking, it is not the sole cause. Other causes include domestic and occupational inhalants and asthma. Although long-standing asthma can cause airflow limitation that is incompletely reversible by acute bronchodilator inhalation, the pathology of long-standing asthma is very different from that of COPD and the clinical features frequently differ. In COPD, neutrophilic inflammation in the large and small airways, including the respiratory and terminal bronchioles, is characteristic and leads to tissue destruction that also involves the lung parenchyma, resulting in emphysema.[12] Even after smoking cessation, inflammation persists when COPD is established and severe.[13] In asthma, however, inflammation is commonly eosinophilic, although neutrophilic inflammation becomes more common with more long-standing asthma.[14]

The combination of smoking and asthma results in additive effects on decline in lung function.[15] If asthma is severe and smoking exposure has been heavy, the chances of having incompletely reversible airflow limitation are increased, and all such patients should have spirometry performed. The value of making a diagnosis of asthma versus a diagnosis of COPD is open to debate. The criteria on which such diagnostic splitting is based are also a matter of opinion. Whether such diagnostic labelling should alter management or affect outcomes is even more complex and will probably be influenced by greater understanding of different clinical subtypes, or phenotypes, of obstructive airways disease.

Case finding in COPD

The practical aspects of case finding in COPD have been discussed in the article 'COPD: practical aspects of case finding, diagnosing and monitoring', published in a previous issue of *Medicine Today*.[16] COPD should be actively sought in all current or former smokers, and in particular in those who have respiratory symptoms (typically cough, wheeze or breathlessness) as they may have more severe disease than asymptomatic smokers. The German research team who were part of the BOLD study of COPD prevalence, together with primary care physicians, found that a new COPD case would be identified in one of every two individuals if they

TARGET POPULATION FOR COPD CASE FINDING[2]

Case finding should be considered in individuals aged at least 35 years who meet at least one of the following risk factor or symptom criteria:

- current or ex-smoker
- current or previous occupational dust, gas or fume exposure
- coughs several times on most days, with or without mucous production
- gets more easily short of breath than other people of the same age
- feels wheezy or tight in the chest
- suffers from frequent chest infections

screened all smokers older than 40 years of age who also had symptoms of cough or breathlessness.[17]

There is good evidence that screening with spirometry is helpful for successful smoking cessation. In a study performed in a primary care setting in the UK, smoking cessation rates in those aged over 35 years were increased by telling individuals their estimated lung age (the age of the average healthy individual who would have similar spirometry to them), independently of whether the results were normal or abnormal.[18] In a recent Canadian study in which nearly 40,000 people were screened for undiagnosed airways disease (irrespectively of diagnostic labels of asthma or COPD), 508 individuals were found to have undiagnosed asthma or COPD and were randomised to specialist clinic care or referred to their usual general practitioner.[19] Improved FEV_1, less healthcare utilisation and better quality of life were found in the specialist clinic patients. Such evidence may be sufficient justification for mass screening with spirometry in all smokers for some healthcare givers. However, the US Preventive Services Task Force does not recommend mass screening of asymptomatic adults for COPD with spirometry because of the scarcity of comparative studies in terms of the overall cost–benefit ratio.[20] Nevertheless, we believe there is sufficient evidence to support case finding of COPD with spirometry in high-risk populations, including current and ex-smokers older than 35 years of age. The Box lists the target population for COPD case finding.[2]

Successful smoking cessation before there is loss of lung function will have larger potential benefits in preserving lung function. In early COPD, lifestyle changes (optimisation of weight, exercise, dietary changes) should be instituted as early as possible, with or without pharmacological treatment, depending on the presence of symptoms and exacerbations. The diagnosis of COPD should also alert GPs and other physicians to the increased risk of mortality from any cause, importantly cardiovascular disease, respiratory failure, cerebrovascular disease and cancer, which may have implications for patient management in relation to risk modification.[21]

Potential to improve clinical outcomes

The aim of early detection of airflow limitation is to allow early intervention and, as a result, to improve outcomes. The benefits of early diagnosis of COPD and airflow limitation are poorly studied but the natural history of COPD strongly suggests that intervention should be as early as possible. The earlier the intervention, the greater the potential benefits in terms of improved life expectancy and health outcomes; therefore, the earlier patients can quit smoking, the greater the benefits in terms of preserving lung function.[22] Furthermore, loss of small airways occurs early in the disease, yet symptoms usually do not occur until there has been about a 50% loss of FEV_1.[4] Hence, early diagnosis of COPD clearly mandates case-finding: that is, performing spirometry in smokers.

All smokers should be strongly encouraged to quit smoking and, therefore, the presence of COPD should not influence management in terms of smoking cessation. However, there is evidence that smoking cessation is more likely if the subject has airway obstruction. In a smoking cessation program in Poland involving 100,000 people, about 4500 individuals with a history of at least 10 pack-years of smoking were invited to attend a smoking cessation session.[23] More than two-thirds of subjects attended the sessions where spirometry was used as a tool to help quitting. The presence of airway obstruction was associated with higher quit rates at one year (verified by exhaled carbon monoxide level), with the difference being highest in those with severe airflow limitation (16.3% *vs* 12% in those with normal spirometry results).

After airflow limitation is detected with spirometry, it should be interpreted in the context of the individual patient, as for any test result. Patients are concerned about the consequences to them, in terms of current or future impairment and disability, and possible treatment requirements. Although there is a sound evidence base to inform treatment in some instances, given the heterogeneity of COPD, there are many instances where there is little evidence to inform treatment strategy. Examples include people with asthma who have smoked and those with asthma who have not smoked but have fixed airway obstruction. These people are usually excluded from both asthma studies and COPD studies, so the evidence from studies may not be generalisable to these populations. However, management that is based on identifying and treating clinical problems such as frequent exacerbations, breathlessness, obesity and anxiety in patients who have airways disease may result in greater clinical benefits than the more narrow approach of prescribing an inhaler as specific treatment for the airways.[24] This approach seems logical as the quality of life in patients with airways disease is impaired in proportion to the number of identifiable comorbidities.[25]

The management of patients with COPD, symptomatic and asymptomatic, is summarised in the Figure.[26] There have been few early intervention studies involving earlier initiation of inhaled COPD treatment in treatment-naïve participants.[27,28] The results of two recent studies

were negative in terms of altering FEV_1 loss. It is thus clear that a better paradigm of pathophysiology is required to produce effective disease-modifying treatment. This means developing tools beyond our current CT imaging, blood and sputum analyses, and spirometry to find an effective early intervention for COPD, which recent technological advancements can bring.

Can we alter progression of the disease?

Smoking cessation is the only intervention that can alter the progression of COPD. Although the rate of decline in FEV_1 was shown to be reduced in patients with moderate COPD by treatment with a high-dose, combination inhaled corticosteroid/long-acting β2-agonist or a long-acting antimuscarinic agent, the effects were small and of uncertain clinical significance.[19,29] Treatment with short-acting antimuscarinic drugs has no effect on the rate of decline in FEV_1.[30] Nevertheless, there is great heterogeneity in the rate of decline in FEV_1, presence of symptoms, systemic disease and exacerbation rates between patients, with some progressing quickly in terms of COPD severity while others remain stable for many years.

Currently, there are no clinically useful markers to identify patients with COPD who will decline rapidly or to predict those in whom drug treatment reduces the rate of decline. It is known that airway hyperresponsiveness, acute bronchodilator reversibility, respiratory symptoms, reduced FEV_1/FVC ratio, low baseline FEV_1, emphysema, mucus hypersecretion and episodes of lower respiratory tract illness are associated with increased rate of loss of FEV_1. This may influence optimal management (e.g. earlier and more intensive interventions). However, their predictive ability in an individual is likely to be poor and they are not routinely used for this purpose.[31-38]

It is recognised that for a given impairment in FEV_1, there is a wide range of symptom severity and exacerbation risk in COPD. This heterogeneity is reflected in the international GOLD strategy document, in which symptoms are included in the severity assessment.[1] The presence of symptoms as defined by the GOLD severity classification is associated with an increased risk of exacerbation as well as of mortality for the same degree of airflow limitation defined by spirometry.[39]

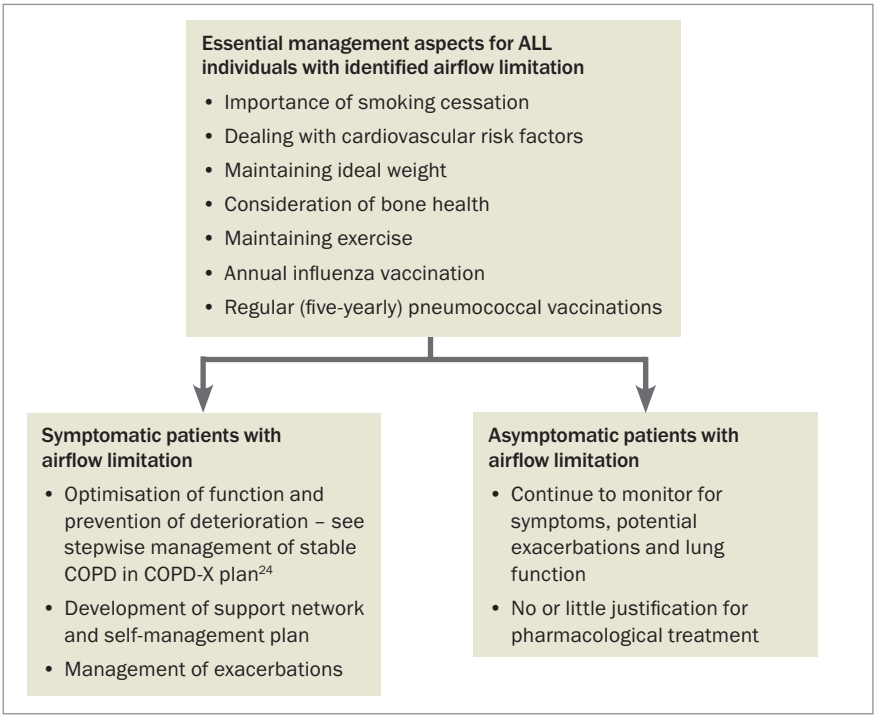

Figure. Management after case finding for COPD in symptomatic and asymptomatic individuals.[26]

Drug treatment with either single or combination inhaled corticosteroids, long-acting β-agonists and/or long-acting antimuscarinic agents improves symptoms and exacerbation risk in patients with moderate COPD (FEV_1, 50 to 80% of predicted), as well as in patients with more severe COPD.[40,41] Inhaled corticosteroid treatment in COPD is generally reserved for patients with coexistent asthma or those experiencing frequent exacerbations (≥two moderate acute exacerbations of COPD or ≥one severe acute exacerbation of COPD requiring hospitalisation) with an eosinophil count $>0.3 \times 10^9$/L despite dual inhaled bronchodilator treatment.[1] Although individuals in the general population with milder disease are less likely to report any symptoms than those with lower FEV_1, there is great variability. Overall, such patients benefit from pharmacological treatment in terms of improved quality of life and reduced exacerbation risk, with the decision ideally based on a risk–benefit assessment in each individual. It is worthwhile noting that patients entering clinical studies are more likely to be symptomatic because their symptoms identified them as having COPD prior to enrolment. The absence of symptoms or previous exacerbations after thorough history-taking in a patient with moderate airflow limitation (moderate COPD) is associated with a very low risk of exacerbations in the following year – around 2%.[40] Mortality risk is also low at 0.6%.[40] Therefore, asymptomatic individuals who have COPD do not necessarily warrant drug treatment, particularly if they have only mild to moderate FEV_1 impairment.

Thus, the most important treatment in a patient newly diagnosed with airflow limitation whose FEV_1 is greater than 50% of predicted and who is asymptomatic is

smoking cessation. Other considerations in such a patient are dealing with cardiovascular risk factors, maintaining ideal weight, considering bone health and maintaining exercise. However, there is no or little justification for pharmacological treatment for COPD because there is little known of the benefits of such treatment in patients with asymptomatic, mild to moderate COPD. This is an area that requires further research.

Future developments in COPD

There is widespread agreement about the need for more research into COPD phenotyping (i.e. clinical, biochemical and inflammatory characterisation) because of the potential for clinical benefit.[42-44] COPD represents a spectrum of disorders that share airflow limitation as their common underlying pathophysiological process but behave differently in many aspects between individuals. Understanding the heterogeneity of COPD better might allow earlier detection as well as development of treatment methods that are targeted specifically at certain phenotypic subgroups.

Current methods in practice to phenotype COPD include CT imaging to establish, for example, the presence of underlying emphysema. Although there is firm evidence to support a correlation between the extent of emphysema determined by CT and by histological examination, using CT imaging for this purpose has the disadvantages of cost and radiation exposure.[45-50] New lung function methods that are more sensitive to small airway dysfunction and might potentially allow improved phenotypic classification include oscillometry and the multiple breath nitrogen washout technique; however, the latter remains predominantly a research tool.[51-53]

Disease phenotyping (outward clinical appearance) and endotyping (underlying pathophysiology) is a current area of research because of the potential to help improve COPD outcomes by allowing targeted or personalised treatment. Certain COPD phenotypes and endotypes might respond differently to different treatments (e.g. differing bronchodilator responsiveness). The current tools have not produced clinically useful markers of COPD susceptibility (because only about 20% of smokers develop COPD) or progression. This unmet need in COPD is arguably the most urgent priority in COPD research.

Ultimately, being able to identify the clinical links between phenotypes and the complex relation with genetic, molecular, cellular and environmental components may translate into the ability to practise individualised medicine rather than a generalised 'one-fits-all' approach to COPD. This could lead to better patient outcomes in terms of morbidity and mortality by delaying progression of disease and improving overall survival.[43,44] Such an approach would be of particular relevance for patients with mild COPD.

Conclusion

It is worthwhile identifying patients with mild COPD and early disease, but this is possible only if case finding occurs in primary care. Detection of airflow limitation when the patient is asymptomatic and confirmation by spirometry of a diagnosis of COPD identifies individuals at risk of future symptoms and complications of the condition. Better stratification of future risk by actively diagnosing COPD may alter the management in individuals who have additional risk factors for COPD progression and a cardiovascular risk. Performing spirometry in current smokers may increase their chances of smoking cessation.

It is important to recognise that when a previously asymptomatic patient with newly diagnosed airflow limitation develops respiratory symptoms, this represents an exacerbation of COPD. This exacerbation needs to be managed accordingly, and not be misdiagnosed as a simple lower respiratory tract infection. Confirmation or exclusion of COPD allows appropriate drug prescription and helps avoid diagnostic confusion.

Management of COPD, including its pharmacotherapy, continues to evolve as understanding of the condition increases, particularly the appreciation of the heterogeneity of the disease. Case finding of COPD raises complex arguments about cost effectiveness, clinical benefit and appropriate treatment. There are a great number of clinical questions that still need answering by well-designed clinical studies to provide a stronger evidence base to guide management in early COPD. MT

References

A list of references is included in the online version of this article (https://medicinetoday.com.au/mt/2025/march/supplements/topics-copd-collection).

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References

1. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management and prevention of Chronic Obstructive Lung Disease (updated 2025). GOLD; 2025. Available online at: http://www.goldcopd.org (accessed February 2025).
2. McKenzie DK, Abramson M, Crockett AJ, et al. on behalf of The Australian Lung Foundation. The COPD-X plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease V2.76, 2024. Available online at: http://www.copdx.org.au/ (accessed February 2025).
3. World Health Organization (WHO). Chronic obstructive pulmonary disease (COPD) key facts. WHO; 2024. Available online at: https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd) (accessed March 2025).
4. Murray CJL, Lopez AD. Alternative projections of mortality and disability by cause 1990-2020: Global Burden of Disease Study. Lancet 1997; 349: 1498-1504.
5. Fletcher C, Peto R. The natural history of chronic airflow obstruction. Br Med J 1977; 1: 1645-1648.
6. Buist AS, McBurnie MA, Vollmer WM, et al. International variation in the prevalence of COPD (The BOLD Study): a population-based prevalence study. Lancet 2007; 370: 741-750.
7. Toelle BG. Respiratory symptoms and illness in older Australians: the Burden of Obstructive Lung Disease (BOLD) study. Med J Aust 2013; 198: 144-148.
8. Castillo D, Guayta R, Giner J, et al. COPD case finding by spirometry in high-risk customers of urban community pharmacies: a pilot study. Respir Med 2009; 103: 839-845.
9. Zielinski J, Bednarek M, the Know the Age of Your Lung Study Group. Early detection of COPD in a high-risk population using spirometric screening. Chest 2001; 119: 731-736.
10. Jordan RE, Lam KH, Cheng KK, et al. Case finding for chronic obstructive pulmonary disease: a model for optimising a targeted approach. Thorax 2010; 65: 492-498.
11. Seemungal TA, Hurst JR, Wedzicha JA. Exacerbation rate, health status and mortality in COPD – a review of potential interventions. Int J Chron Obstruct Pulmon Dis 2009; 4: 203-223.
12. Hogg JC. A pathologist's view of airway obstruction in chronic obstructive pulmonary disease. Am J Respir Crit Care Med 2012; 186(5): v-vii.
13. Hogg JC. State of the art. Bronchiolitis in chronic obstructive pulmonary disease. Proc Am Thorac Soc 2006; 3: 489-493.
14. Simpson JL, Scott R, Boyle MJ, Gibson PG. Inflammatory subtypes in asthma: assessment and identification using induced sputum. Respirology 2006; 11: 54-61.
15. James AL, Palmer LJ, Kicic E, et al. Decline in lung function in the Busselton Health Study: the effects of asthma and cigarette smoking. Am J Respir Crit Care Med 2005; 171: 109-114.
16. Walters JAE, Crockett AJ, McDonald VM. COPD: practical aspects of case finding, diagnosing and monitoring. Med Today 2013; 14(2): 32-40.
17. Koegler H, Metzdorf N, Glaab T, Welte T. Preselection of patients at risk for COPD by two simple screening questions. Respir Med 2010; 104: 1012-1019.
18. Parkes G, Greenhalgh T, Griffin M, Dent R. Effect on smoking quit rate of telling patients their lung age: the Step2quit randomised controlled trial. BMJ 2008; 336: 598-600.
19. Aaron SD, Vandemheen KL, Whitmore A, et al. Early diagnosis and treatment of COPD and asthma — a randomized, controlled trial. N Engl J Med 2024; 390: 2061-2073.
20. Lin JS, Webber EM, Thomas RG. Screening for chronic obstructive pulmonary disease: a targeted evidence update for the U.S. Preventive Services Task Force. Rockville (MD): Agency for Healthcare Research and Quality (US); 2022. Available online at: https://www.ncbi.nlm.nih.gov/books/NBK580641/ (accessed March 2025).
21. Calverley PMA, Anderson JA, Celli B, et al. Salmeterol and fluticasone propionate and survival in chronic obstructive pulmonary disease. N Engl J Med 2007; 356: 775-789.
22. Scanlon PD, Connett JE, Waller LA, et al. Smoking cessation and lung function in mild-to-moderate chronic obstructive pulmonary disease. Am J Respir Crit Care Med 2000; 161: 381-390.
23. Bednarek M, Gorecka D, Wielgomas J, et al. Smokers with airway obstruction are more likely to quit smoking. Thorax 2006; 61: 869-873.
24. McDonald VM, Higgins I, Wood LG, Gibson PG. Multidimensional assessment and tailored interventions for COPD: respiratory utopia or common sense? Thorax 2013; 68: 691-694.
25. McDonald VM, Simpson JL, Higgins I, Gibson PG. Multidimensional assessment of older people with asthma and COPD: clinical management and health status. Age Ageing 2011; 40: 42-49.
26. Lung Foundation Australia. Stepwise management of stable COPD. Brisbane: Lung Foundation Australia; 2012. Available online at: http://www.lungfoundation.com.au/wp-content/uploads/2012/01/ALF-Stepwise-Management-of-COPD-A4-April-2013.pdf (accessed January 2014).
27. Thamrin C, Martin A, Badal T, et al. Dual bronchodilator treatment for

prevention of COPD in at-risk smokers. Respirology 2022; 27: 983-986.
28. Han MK, Ye W, Wang D, et al. Bronchodilators in tobacco-exposed persons with symptoms and preserved lung function. N Engl J Med 2022; 387: 1173-1184.
29. Decramer M, Celli B, Kesten S, Lystig T, Mehra S, Tashkin DP. Effect of tiotropium on outcomes in patients with moderate chronic obstructive pulmonary disease (UPLIFT): a prespecified subgroup analysis of a randomised controlled trial. Lancet 2009; 374: 1171-1178.
30. Anthonisen N, Connett J, Kiley J, et al. Effects of smoking intervention and the use of an inhaled anticholinergic bronchodilator on the rate of decline of FEV1. The Lung Health Study. JAMA 1994; 272: 1497-1505.
31. Tashkin DP, Altose MD, Connett JE, Kanner RE, Lee WW, Wise RA. Methacholine reactivity predicts changes in lung function over time in smokers with early chronic obstructive pulmonary disease. The Lung Health Study Research Group. Am J Respir Crit Care Med 1996; 153: 1802-1811.
32. Vestbo J, Edwards LD, Scanlon PD, et al. Changes in forced expiratory volume in 1 second over time in COPD. N Engl J Med 2011; 365: 1184-1192.
33. Kohansal R, Martinez-Camblor P, Agustí A, Buist AS, Mannino DM, Soriano JB. The natural history of chronic airflow obstruction revisited. Am J Respir Crit Care Med 2009; 180: 3-10.
34. Drummond MB, Hansel NN, Connett JE, Scanlon PD, Tashkin DP, Wise RA. Spirometric predictors of lung function decline and mortality in early chronic obstructive pulmonary disease. Am J Respir Crit Care Med 2012; 185: 1301-1306.
35. Yuan R, Hogg JC, Paré PD, et al. Prediction of the rate of decline in FEV1 in smokers using quantitative computed tomography. Thorax 2009; 64: 944-949.
36. Mohamed Hoesein FAA, de Hoop B, Zanen P, et al. CT-quantified emphysema in male heavy smokers: association with lung function decline. Thorax 2011; 66: 782-787.
37. Vestbo J, Prescott E, Lange P. Association of chronic mucus hypersecretion with FEV1 decline and chronic obstructive pulmonary disease morbidity. Copenhagen City Heart Study Group. Am J Respir Crit Care Med 1996; 153: 1530-1535.
38. Kanner RE, Anthonisen NR, Connett JE, The Lung Health Study Research Group. Lower respiratory illnesses promote FEV(1) decline in current smokers but not ex-smokers with mild chronic obstructive pulmonary disease: results from the Lung Health Study. Am J Respir Crit Care Med 2001; 164: 358-364.
39. Lange P, Marott JL, Vestbo J, et al. Prediction of the clinical course of chronic obstructive pulmonary disease using the new GOLD classification: a study of the general population. Am J Respir Crit Care Med 2012; 186: 975-981.
40. Jenkins CR, Jones PW, Calverley PM, et al. Efficacy of salmeterol/fluticasone propionate by GOLD stage of chronic obstructive pulmonary disease: analysis from the randomised, placebo-controlled TORCH study. Respir Res 2009; 10: 59.
41. Decramer M, Celli B, Kesten S, et al. Effect of tiotropium on outcomes in patients with moderate chronic obstructive pulmonary disease (UPLIFT): a prespecified subgroup analysis of a randomised controlled trial. Lancet 2009; 374: 1171-1178.
42. Han MK, Agusti A, Calverley PM, et al. Chronic obstructive pulmonary disease phenotypes: the future of COPD. Am J Respir Crit Care Med 2010; 182: 598-604.
43. Park TS, Lee JS, Seo JB, et al. Phenotyping of chronic obstructive pulmonary disease: heterogeneity and its clinical relevance. Curr Respir Care Rep 2012; 1: 189-198.
44. Parr DG. Patient phenotyping and early disease detection in chronic obstructive pulmonary disease. Proc Am Thorac Soc 2011; 8: 338-349.
45. Coxson HO, Rogers RM, Whittall KP, et al. A quantification of the lung surface area in emphysema using computed tomography. Am J Respir Crit Care Med 1999; 159: 851-856.
46. Gelb AF, Hogg JC, Müller NL, et al. Contribution of emphysema and small airways in COPD. Chest 1996; 109: 353-359.
47. Kinsella M, Müller NL, Abboud RT, Morrison NJ, DyBuncio A. Quantitation of emphysema by computed tomography using a 'density mask' program and correlation with pulmonary function tests. Chest 1990; 97: 315-321.
48. Lee YK, Oh YM, Lee JH, Kim EK, Lee JH, Kim N. Quantitative assessment of emphysema, air trapping, and airway thickening on computed tomography. Lung 2008; 186: 157-165.
49. Müller NL, Staples CA, Miller RR, Abboud RT. 'Density mask'. An objective method to quantitate emphysema using computed tomography. Chest 1988; 94: 782-787.
50. Verbanck S, Schuermans DI, Meysman M, Paiva M, Vincken W. Noninvasive assessment of airway alterations in smokers: the small airways revisited. Am J Respir Crit Care Med 2004; 170: 414-419.
51. Timmins SC, Diba C, Farrow CE, et al. The relationship between airflow obstruction, emphysema extent, and small airways function in COPD. Chest 2012; 142: 312-319.
52. Verbanck S, Schuermans D, Van Muylem A, et al. Conductive and acinar lung-zone contributions to ventilation inhomogeneity in COPD. Am J Respir Crit Care Med 1998; 157: 1573-1577.
53. Verbanck S, Schuermans DI, Meysman M, Paiva M, Vincken W. Noninvasive assessment of airway alterations in smokers: the small airways revisited. Am J Respir Crit Care Med 2004; 170: 414-419.

Improving adherence to treatment in COPD

A personalised approach

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Nonadherence is a multidimensional quandary in patients with chronic obstructive pulmonary disease and encompasses a range of physical, economic, psychological and social factors. When assessing for nonadherence, engaging with patients to understand these factors is essential to formulating tailored, long-term strategies and interventions.

Key points

- **Nonadherence to chronic obstructive pulmonary disease (COPD) medications is common and is associated with poor clinical outcomes.**
- **Nonadherence can result from patient, treatment, health professional or health system factors.**
- **It can be classified into intentional and unintentional nonadherence.**
- **Each form of nonadherence requires a personalised solution.**
- **Structured questionnaires, smart inhalers and patient-centred communication are useful in promoting adherence.**

Suboptimal adherence to treatment is a major contributor to emergency hospitalisation among patients with chronic obstructive pulmonary disease (COPD).[1] Optimal inhaler technique and medication adherence play a crucial role in reducing the risk of death and hospital admissions. Nonadherence to COPD medications is strongly associated with increased respiratory symptoms, mortality, hospitalisation, medical costs and decreased health-related quality of life.[2] The WHO has recognised the importance of enhancing adherence as a strategy to tackle chronic conditions effectively.[3] This article focuses on how GPs can engage with patients to help improve adherence to treatment in COPD.

Adherence

Adherence is defined as 'the extent to which a person's behaviour (in terms of taking medications, following diets or executing lifestyle changes) coincides with medical or health advice' and is a key determinant of health outcomes.[3] Definitions for adherence often refer to the amount of medicine taken or treatment received over a given period, or the extent to which medication use correlates to factors such as recommended timing, intended duration and recommended

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Strategies and interventions to improve adherence[4]

Behavioural strategies
- Adherence monitoring/feedback (obtrusive pill count, medication monitor)
- Alarm/beeper
- Calendar/diary
- Contracting (verbal or written agreement)
- Dose counter
- Large print labels
- Packaging change
- Pillbox/calendar pack
- Reminder chart/medication list
- Reminders (mail, telephone, email)
- Self-medication training
- Simplification of regimen
- Skill building (supervised, group)
- Tailoring (routinisation)
- Follow-up (home visit, scheduled clinic visit, video/teleconferencing)

Educational strategies (by physician, pharmacist, nurse, others)
- Group (inpatient, family, group)
- Individualised (oral, audio-visual, visual, written, telephone, mail)
- Provider-focused strategies
- Education (physician, pharmacist, nurse)
- Medication review

method of use. Adherence to medically prescribed treatment and/or preventive measures ranges from 4.6 to 100% (average, 75.2%) and is dependent on:
- method of assessment
- focus characteristic chosen for assessment (e.g. use of regular oral medications, inhaler technique)
- operational definitions (e.g. defining 80 to 120% utilisation of prescribed doses as good adherence)
- patient population
- time points of assessments
- practice setting
- assessor background.[5]

Adherence to COPD medications has been found to be substantially lower compared with medications for other chronic conditions, such as hypertension, diabetes, hyperlipidaemia and depression.[6]

Nonadherence

Given the range of reported adherence for various settings we should now examine nonadherence. This term is commonly used in clinical practice and scientific literature as shorthand for 'partial adherence', 'suboptimal adherence' or 'poor adherence'.[4] Nonadherence can be further defined as 'primary nonadherence', when the patient fails to initiate the treatment (e.g. no medicine dispensed, rehabilitation not started), and 'secondary nonadherence', when the treatment is not followed as intended (e.g. doses missed, rehabilitation program discontinued early).

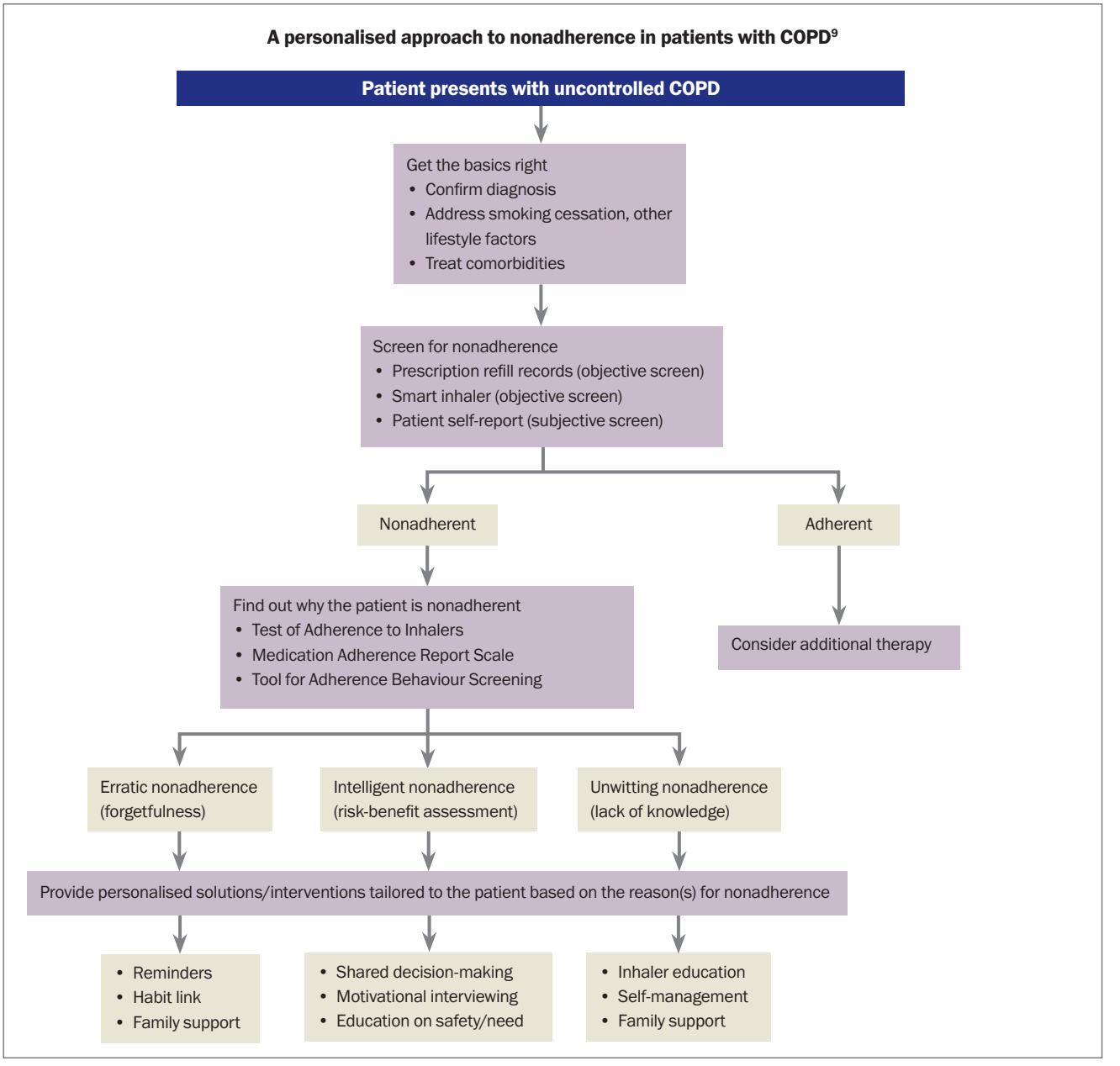
Nonadherent behaviour can be broadly classified as 'unintentional nonadherence' and 'intentional nonadherence'. Unintentional nonadherence can result from simple forgetfulness (defined by the WHO as 'erratic nonadherence') or inability to follow treatment instructions (e.g. incorrect inhaler technique) because of a lack of understanding or physical problems such as poor eyesight or dexterity (defined by the WHO as 'unwitting nonadherence'). Intentional nonadherence (also called 'intelligent nonadherence') arises when the patient rejects either the doctor's diagnosis or the doctor's recommended treatment, based on a 'rational decision'.[3,4] It is likely that these adherence 'phenotypes' could occur alongside each other within the same patient.

Nonadherence in patients with COPD

In a symptomatic condition such as COPD, it is logical to think that patients would be highly adherent to their treatment. However, poor adherence to treatment and disease management programs has been identified as the major factor resulting in emergency hospitalisation in those with COPD.[6] Nonadherence is a multidimensional quandary in COPD, with both intentional and unintentional nonadherence being common, and includes:
- short- and long-term medication nonadherence
- nonadherence to lifestyle changes such as smoking cessation
- nonparticipation in or early withdrawal from respiratory rehabilitation or exercise programs
- failure to meet vaccination requirements
- missing scheduled clinic or home visits
- inadequate monitoring of treatment response.

Generally, adherence to health-enhancing lifestyle behaviours has been found to be even worse than adherence to medications.[4] Three patterns of nonadherence are common in patients with COPD: 'underuse', 'overuse' and 'inappropriate use', especially poor inhaler technique.

Nonadherence is a multifaceted issue influenced by a range of patient-, medication-, healthcare provider- and health system-related factors.[7] Common risk factors for medication nonadherence include polypharmacy (use of two or more medications for at least 60 days per quarter per year), especially inhaler device polypharmacy, cognitive and functional decline, inadequate health professional contact, depressive symptoms, poor social support and absence of assistance with medication administration. Reasons given by patients with COPD for poor adherence to their treatments include:
- forgetfulness
- deciding not to take a dose because of interruptions or changes in routine
- not taking a dose because of side effects or fear of side effects
- running out of medications
- physical difficulty or inconvenience
- lack of time
- social stigma
- feeling of lack of need for treatment
- lack of effect or perceived benefit from treatment
- absence of symptoms.[8]



Strategies for addressing adherence issues in patients with COPD

Adherence is a multifactorial issue in COPD and can be best understood in the context of patients' physical, economic, psychological and social circumstances. Awareness of the factors pertaining to nonadherence from the patient's perspective is essential to formulating tailored long-term strategies to address those issues. A variety of strategies for improving adherence can be used individually or in combination (Box).[4]

Due to lack of information about a patient's nonadherence, practitioners often try to address both unintentional and intentional nonadherence using the same intervention. Educational and motivational strategies are likely to be required to address intentional nonadherence, whereas behavioural and provider-focused strategies, such as medication review focused on regimen simplification, are more likely to be successful in addressing unintentional nonadherence.

A stepwise approach can be used for improving adherence (Flowchart).[9] First, when uncontrolled COPD is signalled, the clinician should check that the basics are right; that is, ensure diagnosis is correct, lifestyle factors have been addressed and comorbidities treated (see the Lung Foundation Australia's COPD-X Concise Guide[10]). Then, nonadherence should be assessed. Detection of nonadherence (e.g. from prescribing or dispensing data or, when available, smart inhalers) and

Table. Tool for Adherence Behaviour Screening (TABS)[11]*

Statement	Never	Rarely	Sometimes	Often	Always
1. I have strict routines for using my regular medications					
2. I keep my medications close to where I need to use them					
3. I ensure I have enough medications so that I don't run out					
4. I strive to follow the instructions of my doctors					
5. I get confused about my medications					
6. I make changes in the recommended management to suit my lifestyle					
7. I vary my recommended management based on how I am feeling					
8. I put up with my medical problems before taking any action					

* The TABS is a patient self-reported adherence measure, which was originally developed for Australian patients using medicines for chronic disease. The TABS measures both intentional and unintentional deviations from recommended management and has been shown to have greater incremental validity than other self-reported adherence measures. It has two subscales: adherence (items 1 to 4) and nonadherence (items 5 to 8), each comprising four items to be answered on a five-point Likert-type scale (never = 1 to always = 5). The response to each of the statements is marked with a tick in the appropriate box.
Scoring instructions: Total score on TABS = Total for 'adherence' – Total for 'nonadherence';
Good adherence = differential of ≥15; Suboptimal adherence = differential of ≤14.

characterisation of the nature of nonadherence using simple questionnaires or open-ended questions are essential before selecting specific intervention strategies. There exist short and well-validated generic questionnaires such as the Medication Adherence Report Scale, Tool for Adherence Behaviour Screening (Table) and the Test of Adherence to Inhalers.[11-13] They provide quantitative and qualitative insights into the extent of and underlying reasons for nonadherence.

If nonadherence is suspected, one or more tailored solutions should be offered. These often involve a medication review to assess the appropriateness of the patient's medications, their ability to use the inhaler and simplification of the regimen if possible (e.g. combination inhaler) or use of identical inhalers or those with very similar mechanisms. GPs may want to consider referral to a credentialed pharmacist for a Home Medicines Review (MBS rebate available) to assist with assessment and implementation of strategies to address nonadherence. If patient education and counselling are limited by the time constraints of GPs, credentialed pharmacist expertise may be used in optimising medicine use and promoting consumer self-management.[14] By integrating pharmacists into COPD management, patient understanding may be improved. This integration may also address drug-related issues, enhance disease control and reduce treatment costs. Importantly, all healthcare professionals involved in inhaler technique training should keep their own inhaler teaching skills up to date.

If erratic nonadherence (forgetfulness) is the primary cause of nonadherence, telephone reminders could be set and dosing times tailored to fit in with the patient's daily routine (routinisation) or linked to daily activities (e.g. brushing teeth) and, if possible, family members or caretakers could be involved. In cases of intelligent nonadherence, patient interviews focusing on the importance of adherence and the potential consequences of nonadherence should be offered; this must be handled in a nonaccusatory manner to maintain rapport.

In cases of polypharmacy, a multicompartment dose administration aid may be recommended, if appropriate. Those with peripheral sensory problems or visual impairments may have difficulty removing capsules from packs or bottles to put into a device, or using devices that require careful observation for dose preparation or delivery. Any adherence aid (e.g. aids for easy actuation of puffers by those with rheumatological or musculoskeletal difficulties) should be chosen in consultation with the patient and should match the patient's abilities as different aids require varying manipulative skills. Phone or text reminders for clinic appointments and prescription refills are common. Mobile health and home monitoring devices with capabilities for real-time monitoring of symptoms and data through bluetooth-enabled gadgets attached to inhalers ('smart inhalers') and feedback on disease management, including treatment adherence, are also becoming widely available.[15]

Regardless of the number and types of interventions, some patients will remain nonadherent in the longer term. They need to be supported and not blamed. Retraining patients in the primary care setting, especially after recovery from exacerbations and hospitalisations, will be highly beneficial. Health professionals should show empathy towards such patients and keep supporting them with periodic review of their adherence and suitable adherence enhancement measures.

Conclusion

Adherence to treatment continues to be a major challenge in patients with COPD. A true partnership among doctors, pharmacists and patients is critical for optimising adherence, and will result in better health outcomes. **RMT**

References

A list of references is included in the online version of this article (https://medicinetoday.com.au/mt/2025/march/supplements/topics-copd-collection).

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Improving adherence to treatment in COPD
A personalised approach

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References

1. Jarab AS, Alqudah SG, Khdour M, et al. Impact of pharmaceutical care on health outcomes in patients with COPD. Int J Clin Pharm 2012; 34: 53-62.
2. van Boven JF, Chavannes NH, van der Molen T, et al. Clinical and economic impact of non-adherence in COPD: a systematic review. Respir Med 2014; 108: 103-113.
3. World Health Organization (WHO). Adherence to long-term therapies: evidence for action. WHO, 2003. Available online at: https://www.who.int/chp/knowledge/publications/adherence_report/en (accessed August 2020).
4. George J, Kong DC, Stewart K. Adherence to disease management programs in patients with COPD. Int J Chron Obstruct Pulmon Dis 2007; 2: 253-262.
5. DiMatteo MR. Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. Med Care 2004; 42: 200-209.
6. Dekhuijzen R, Lavorini F, Usmani OS, et al. Addressing the impact and unmet needs of nonadherence in asthma and chronic obstructive pulmonary disease: where do we go from here? J Allergy Clin Immunol Pract 2018; 6: 785–793.
7. Bourbeau J, Bartlett SJ. Patient adherence in COPD. Thorax 2008; 63: 831-838.
8. George J, Kong DC, Thoman R, Stewart K. Factors associated with medication nonadherence in patients with COPD. Chest 2005; 128: 3198-3204.
9. van Boven JFM, Lavorini F, Dekhuijzen PNR, Blasi F, Price DB, Viegi G. Urging Europe to put non-adherence to inhaled respiratory medication higher on the policy agenda: a report from the First European Congress on Adherence to Therapy. Eur Respir J 2017; 49. pii: 1700076.
10. Yang IA, Hancock K, George J, et al. COPD-X Handbook: Summary clinical practice guidelines for the management of chronic obstructive pulmonary disease (COPD). Milton, Queensland: Lung Foundation Australia; 2024. Available online at: https://lungfoundation.com.au/wp-content/uploads/2024/08/COPD-X_Handbook_Version1.pdf (accessed March 2025).
11. George J, Mackinnon A, Kong DC, Stewart K. Development and validation of the Beliefs and Behaviour Questionnaire (BBQ). Patient Educ Couns 2006; 64: 50-60.
12. Mahler C, Hermann K, Horne R, et al. Assessing reported adherence to pharmacological treatment recommendations. Translation and evaluation of the Medication Adherence Report Scale (MARS) in Germany. J Eval Clin Pract 2010; 16: 574-579.
13. Plaza V, Fernandez-Rodriguez C, Melero C, et al. Validation of the 'Test of the Adherence to Inhalers' (TAI) for asthma and COPD patients. J Aerosol Med Pulm Drug Deliv 2016; 29: 142-152.
14. Sarwar MR, McDonald VM, Abramson MJ, et al. Credentialed pharmacist-led home medicines reviews targeting treatable traits and their impact on health outcomes in people with chronic obstructive pulmonary disease: a pre- and post-intervention study. Int J Clin Pharm 2025; 47: 157-165.
15. Hew M, Reddel HK. Integrated adherence monitoring for inhaler medications. JAMA 2019; 321: 1045-1046.

Inhaler therapy for COPD

An individualised approach to inhaler selection

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Inhaled therapy for chronic obstructive pulmonary disease can help reduce exacerbation frequency, admission to hospital and risk of death. Appropriate inhaler choice for the patient's capabilities, education and frequent assessment of inhaler technique can help improve adherence to therapy.

Key points

- **Adherence and inhaler satisfaction copredict improved health outcomes for patients with chronic obstructive pulmonary disease (COPD).**
- **The best inhaler device for a patient with COPD is one they can use; patient- and device-related factors should be considered when choosing an inhaler device.**
- **Assessment of a patient's co-ordination and inspiratory flow patterns should guide selection of inhaler devices.**
- **Adherence and device technique should be assessed regularly and before changing a patient's therapy.**
- **Patients should use only one type of device for all of their inhaled therapies, where possible.**

Chronic obstructive pulmonary disease (COPD) affects around one in seven adults over the age of 40 years in Australia and rises to 29% among people aged 75 years and older.[1,2] This common respiratory condition is the leading cause of potentially preventable hospital admissions.[3] Optimal management of COPD requires nonpharmacological and pharmacological strategies to optimise function through symptom relief and to reduce the risk of exacerbations. All patients with COPD can benefit from smoking cessation, pulmonary rehabilitation and vaccination.[1] Effective management of COPD should involve a multidisciplinary team including GPs, pharmacists, allied health professionals and practice or respiratory nurses.[4] This collaborative approach can help enhance quality of life and reduce disability for patients living with COPD.[1]

Although pharmacological therapy has not been shown to slow decline in lung function over time, inhaled therapy can reduce exacerbation frequency and improve symptoms and exercise tolerance.[1] This article outlines the inhaler devices available in Australia and discusses their benefits and drawbacks with respect to co-ordination of actuation and the patient's capabilities and preferences.

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Table. PBS-listed pharmacological treatments for COPD

Medication class	Active ingredient	Inhaler device
Short-acting beta-2-agonist (SABA)	Salbutamol	pMDI (with counter)
		Autohaler
	Terbutaline	Turbuhaler
Short-acting muscarinic antagonist (SAMA)	Ipratropium	pMDI
Long-acting muscarinic antagonist (LAMA)	Aclidinium	Genuair
	Glycopyrronium	Breezhaler
	Tiotropium	HandiHaler, LupinHaler, Respimat, Zonda
	Umeclidinium	Ellipta
Long-acting beta-2-agonist (LABA)	Indacaterol	Breezhaler
LAMA/LABA	Aclidinium/formoterol	Genuair
	Glycopyrronium/indacaterol	Breezhaler
	Tiotropium/olodaterol	Respimat
	Umeclidinium/vilanterol	Ellipta
Inhaled corticosteroid (ICS)/LABA	Budesonide/formoterol	Rapihaler, Turbuhaler, Spiromax, Easyhaler
	Fluticasone furoate/vilanterol	Ellipta
	Fluticasone propionate/salmeterol	pMDI, Accuhaler, Easyhaler
ICS/LAMA/LABA	Beclometasone/glycopyrronium/formoterol	pMDI
	Budesonide/glycopyrronium/formoterol	pMDI
	Fluticasone furoate/umeclidinium/vilanterol	Ellipta

Abbreviations: COPD = chronic obstructive pulmonary disease; pMDI = pressurised metered-dose inhaler.

Medication management

The mainstay of pharmacological treatment of COPD is inhaled bronchodilators and corticosteroids (Table). The Lung Foundation Australia recommends a stepwise approach to the pharmacological management of patients with stable COPD based on increasing severity of symptoms, lung function and history of exacerbations (Figure 1).[5] Inhaler device technique should be assessed and optimised at every opportunity.[1] Inhaler device polypharmacy should be minimised by using single-inhaler dual and triple therapy, where possible.

Adherence

Adherence to inhaled medication regimens is associated with reduced risk of death and admissions to hospital due to exacerbations in COPD.[6] Inhaler devices vary widely with regard to technique, patient suitability and patient preference; therefore, choosing the right device for the individual patient is crucial to ensuring correct technique and improving the likelihood of good adherence to therapy.[7] A large multinational survey showed that patients' overall satisfaction with their inhaler was significantly associated with treatment adherence, resulting in fewer exacerbations and fewer hospitalisations due to exacerbations.[8] Exploring a patient's concerns and capabilities is important when initiating or switching devices.[7] Pharmacists can play a pivotal role in optimising adherence and persistence, and providing education on safe and effective use of medications for COPD when dispensing and conducting collaborative medication reviews.

Inhaler selection

Inhaled therapy is the primary route of administration for the treatment of patients with COPD. It comprises bronchodilators, antimuscarinic agents and corticosteroids delivered via various inhaler devices. A growing number of inhaler devices are available in Australia and can be grouped as:

- pressurised metered-dose inhalers (pMDIs)
- breath-actuated (BA)-pMDIs
- soft mist inhalers (SMIs)
- dry powder inhalers (DPIs).

Simultaneous use of different inhaler types, particularly a mixture of pMDI and DPI devices, is predictive of increased errors in inhalation and poor adherence to therapy.[9] Therefore, where possible, patients should use a single inhaler device to deliver multiple pharmacotherapies.

Aerosol science

A number of device-related factors influence aerosol deposition in the airways and include the following.

Particle size

Inhaler devices need to generate drug particles of an appropriate size to penetrate beyond the oropharyngeal area and deposit in the lungs. The aerodynamic diameter is the most important particle-related factor that affects aerosol deposition.[10] Particles greater than 5 micrometre are most likely to deposit by impaction in the oropharynx

and be swallowed; particles between 1 and 5 micrometre will deposit in the large and conducting airways; and particles less than 1 micrometre are likely to reach the peripheral airways and alveoli or be exhaled.[10,11] Aerosols with high fine particle fraction have a high probability of penetrating beyond the upper airways and depositing in the lungs.[10] In the peripheral airways, particles deposit predominantly by sedimentation, highlighting the importance of breath-hold after inhalation with some inhaler devices.[11]

Aerosol velocity and duration

pMDIs generate a high velocity cloud over a short period of time, creating difficulties in synchronising inhaler actuation with inspiration. High aerosol velocity from pMDIs also increases the probability of deposition by impaction in the oropharynx and large conducting airways.[11] Only about 10 to 20% of the delivered dose from a pMDI is deposited in the lungs.[12] Use of spacers with pMDIs reduces aerosol particle velocity, increasing lung deposition. Aerosol velocity from an SMI (such as Respimat) is three to 10 times slower than for pMDIs.[13] The mean spray duration is 1.5 seconds, compared with 0.15 to 0.36 seconds for pMDIs.[14]

Inspiratory flow rate and volume

The patient's inspiratory volume and flow rate are important patient-related factors influencing aerosol deposition in the airways. Each inhaler device has its own unique optimal peak inspiratory flow rate (PIFR).[15] For pMDIs, BA-pMDIs and SMIs, inspiratory flow rate should be about 30 L/min to minimise deposition in the upper airways and enhance delivery to the lungs.[10]

Exhalation before inhalation

Exhalation to functional residual capacity or residual volume increases PIFR and inhaled volume, which may augment drug dispersion and facilitate fine particle generation from a DPI.[16] This is also a commonly missed step before actuation with pMDIs.[17]

Internal resistance of inhaler

The internal resistance of DPIs varies by device, requiring different inspiratory effort to produce sufficient flow rate.[18] Lower resistance devices require patients to produce a higher PIFR at a given pressure gradient than higher resistance devices.[19]

Duration of breath-hold

Breath-holding increases lung deposition through the process of sedimentation.[11] Although the breath-hold capacity of patients with COPD is often limited, it is important that patients are advised to hold their breath for five seconds, or as long as possible, after inhalation.[20] Breath-holding time may be more critical with fine particle pMDIs.[9]

Metered dose and soft mist inhalers

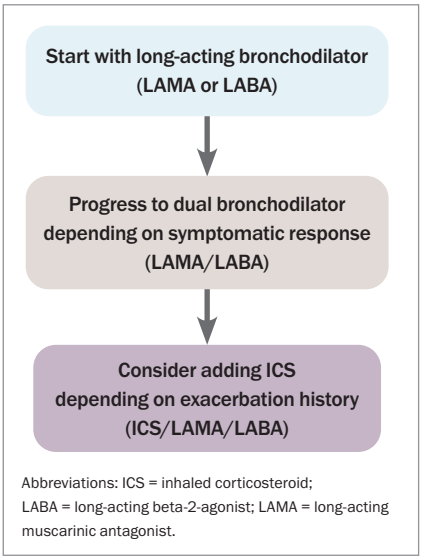
pMDIs are aerosol-based devices that require a slow and steady inhalation over four to five seconds to reduce oropharyngeal deposition and optimise delivery to the lungs.[10] pMDIs come as either a solution or suspension system and all contain propellants. Co-ordination of actuation with inhalation is required with pMDIs.

Simultaneous use of different inhaler types ... is predictive of increased errors in inhalation and poor adherence to therapy. Therefore, where possible, patients should use a single inhaler device to deliver multiple pharmacotherapies

SMIs, for example Respimat, generate an aerosol mist from an aqueous solution and do not contain propellants.[13] Respimat has a significantly slower plume velocity and longer spray duration compared with pMDIs.[13] Therefore, SMIs require less patient co-ordination than pMDIs.[19]

Spacers

Co-ordination errors are the most common error with pMDIs.[10,21,22] Many patients cannot use a pMDI correctly, even with education and training. Spacers can be used to overcome the difficulty of co-ordinating inhalation and actuation while inhaling slowly and deeply.[11] If a slow inhalation over four to five seconds is not achievable, tidal breathing with four breaths in and out normally through the spacer is an alternative method. In addition, spacers reduce oropharyngeal deposition, facilitate vaporisation of particles to an optimal size and increase deposition of the active ingredient in the lungs.[9,23] When using a spacer, it is important for patients to shake the pMDI before use and start inhalation promptly, as aerosolised particles remain suspended in the spacer for less than 10 seconds.[9] It is also important that the pMDI is shaken before a second dose via a spacer.



Abbreviations: ICS = inhaled corticosteroid; LABA = long-acting beta-2-agonist; LAMA = long-acting muscarinic antagonist.

Figure 1. Stepwise management of a patient with stable chronic obstructive pulmonary disease.

Dry powder inhalers

DPIs are breath-actuated devices that deliver the medication in powder form from a capsule, reservoir or sealed blister strip. DPIs require exhalation to functional residual capacity before inhalation with a forceful, deep inhalation over two to three seconds.[10]

The European Respiratory Society/International Society for Aerosols in Medicine taskforce recommends choosing an inhaler based on two factors:[10]

- level of inspiratory flow
- co-ordination of inhalation/actuation (Figure 2).[24]

When considering prescribing a DPI, evaluating the patients' PIFR is important.

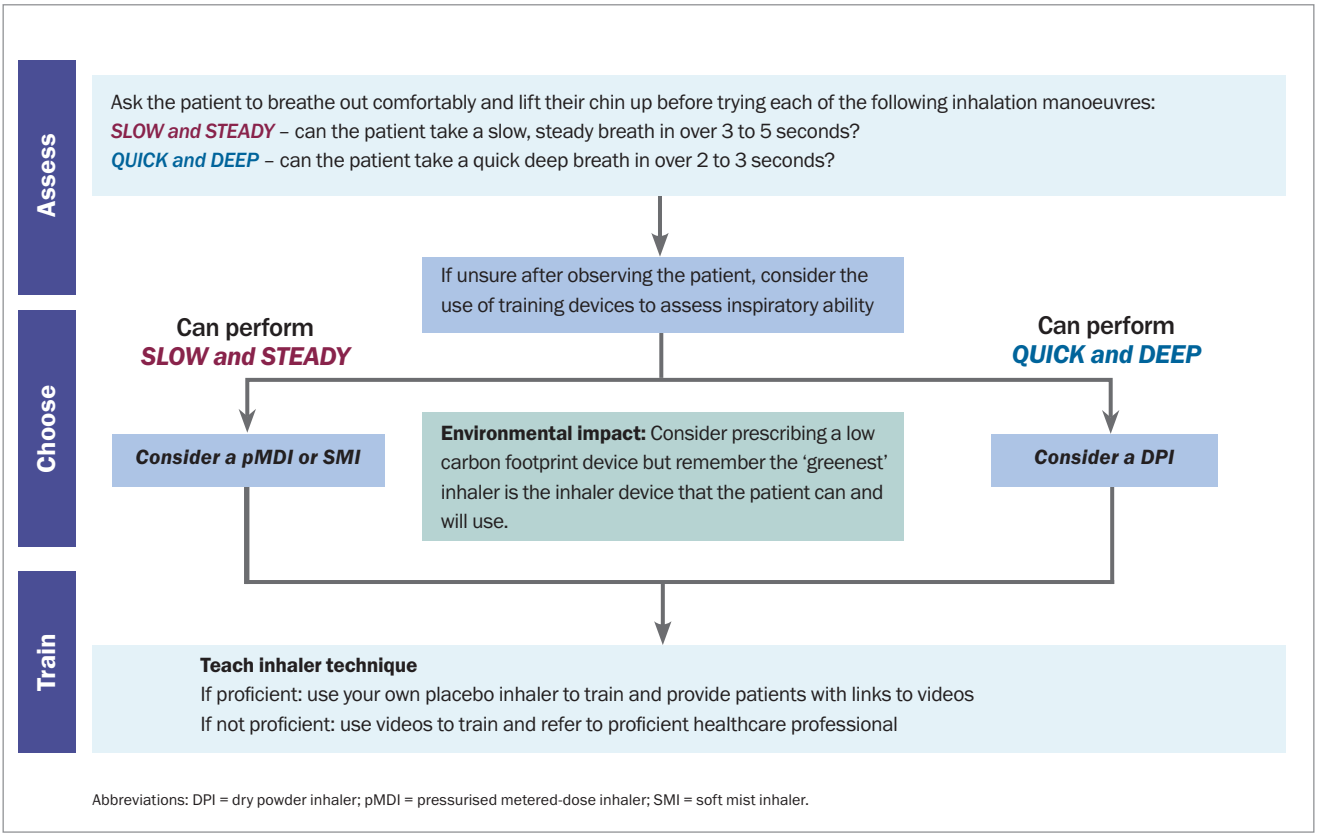


Figure 2. Inhaler choice decision aid.
Adapted with permission from Pritchard J, Usmani O. The greenest inhaler: a patient-centric approach. EMJ Respir 2022; 10: 2-7.[24]

Patients with COPD may have severe airflow limitation, accompanied by decreased inspiratory capacity, hyperinflation and compromised respiratory muscles, which may reduce inspiratory flow rates and diminish lower airway deposition from DPIs. Suboptimal PIFR in patients with COPD may limit their ability to effectively use DPIs and deliver the medication throughout the lungs, particularly during acute exacerbations.[11,19,24,25] However, most patients with COPD are able to generate inspiratory flows necessary for effective DPI use.[26]

Insufficient inspiratory flow rate is one of the most common errors with DPIs.[10,21,22,27] A PIFR value of 60 L/min is generally accepted to be optimal for most DPIs.[28] PIFR values greater than 60 L/min can be associated with excessively turbulent flow and therefore poor lung deposition.[15] A quick and forceful inhalation is required with DPIs to deagglomerate the active ingredient powder from carrier powder (usually lactose) and aerosolise the particles.[10] Airflow achieved early in the inspiratory profile disaggregates drug from carrier powder and determines particle size distribution of the aerosol.[29]

The minimal inspiratory flow rate required for low-resistance DPI devices (e.g. Breezhaler) is above 90 L/min, 50 to 60 L/min for medium-resistance DPIs (e.g. Turbuhaler, Genuair, Spiromax) and below 50 L/min for high-resistance DPIs (e.g. Handihaler).[30]

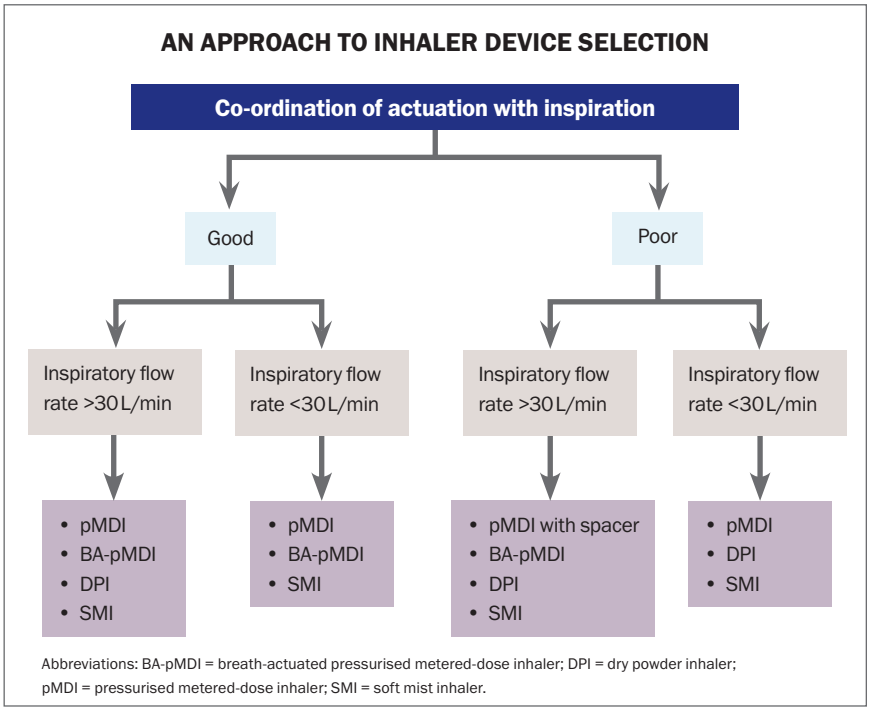
Although the optimal flow rate differs between each DPI device due to differences in inhaler design and internal resistance, the principle remains the same for all – a rapid and forceful inhalation is required. It is important that the inspiratory flow rate at the start of the inhalation is forceful, rather than gradually increasing.[31]

A decision algorithm based on inspiratory flow rate and ability to co-ordinate inhalation actuation is shown in the Flowchart.[32] An In-Check Dial is a handheld device with an adjustable dial to mimic the internal resistance of different inhalers and can be used to measure and identify suboptimal PIFR and optimise inhaler device selection.[15]

Inhaler technique

Optimal inhaler technique is critical to effective COPD management. When used correctly, all inhalers are effective and can achieve the same therapeutic effect, although different doses may be required.[33] Mastering an inhaler device involves correct preparation and handling before inhalation, and optimal inhalation technique. There are seven basics steps to using an inhaler device, pertinent to all devices (Box).[34] Errors in any step may lead to inadequate drug delivery to the lungs.

Up to 94% of patients do not use their inhaler device correctly, resulting in inadequate dosing, suboptimal disease control, worsening of quality of life and increased hospital admissions and mortality.[35] A recent



Abbreviations: BA-pMDI = breath-actuated pressurised metered-dose inhaler; DPI = dry powder inhaler; pMDI = pressurised metered-dose inhaler; SMI = soft mist inhaler.

Seven steps to correct inhaler technique

1. Prepare the inhaler device, check dose counter (when present), shake inhaler if applicable
2. Prepare or load the dose
3. Breathe out, fully and gently, away from the mouthpiece
4. Place inhaler mouthpiece in the mouth, tilt the chin up and seal the lips around the mouthpiece
5. Breathe in
   - pMDI and SMI: slow and steady
   - DPI: quick and deep
6. Remove inhaler from the mouth and hold the breath for up to 10 seconds
7. Close inhaler/replace cap and wait for a few seconds then repeat as necessary

Adapted from Scullion J and Fletcher M, 2018.[34]

analysis of inhaler technique in 364 patients with COPD showed that two-thirds of patients made one or more crucial errors, particularly among those using several different devices.[36] The most common errors with DPIs include failure to exhale before actuation, failure to breath-hold after inhalation, incorrect positioning of the inhaler, incorrect rotation sequence and failure to execute a forceful and deep inhalation.[35] Common errors with pMDIs include insufficient inspiratory force (not slow and deep enough), failure to actuate before inhalation and breath-hold after inhalation and incorrect second-dose preparation, timing or inhalation.[21] Older age, cognitive impairment, multiple inhaler devices and lack of previous training are all risk factors for poor inhaler use and adherence.[37]

As many as 25% of patients have never received verbal inhaler technique instruction.[35] All health professionals involved in the care of patients with COPD should check a patient's inhaler technique at every opportunity. Numerous studies show that inhaler technique interventions in community pharmacies can be effective.[38-41] Pharmacists conducting comprehensive medication reviews (Home Medicine Reviews) have an opportunity to check inhaler device technique in the privacy of the patient's home. Providing written instructions highlighting incorrect steps helps patients maintain correct technique for longer.[38] Inhaler technique can decline in as little as one to two months after mastering correct technique; therefore, follow-up over time is essential to maintain correct technique.[42,43] Videos on inhaler device technique are available on the Lung Foundation Australia website (https://lungfoundation.com.au/patients-carers/after-your-diagnosis-title/inhaler-devices/).

Environmental impact

Inhalers contribute significantly to greenhouse gas emissions, primarily due to the potent global warming potential of hydrofluorocarbon propellants in pMDIs.[44] DPIs and SMIs are propellant-free and have as much as a 100-fold to 200-fold lower carbon footprint than pMDIs.[45]

The greenest solution for the environmental impact of pMDIs is through optimising inhaler use and ensuring symptoms in patients with COPD are well controlled. The greenest inhaler is one that the patient will use, and will use correctly.[24]

Conclusion

Choosing the right inhaler for the right patient is crucial to optimal management for patients living with COPD. Choice of an inhaler can be based on many patient and prescriber factors; two important patient-related factors are the patient's inspiratory flow rate and their ability to co-ordinate inhalation and actuation. The patient's inhaler preferences should also be considered. Inhaler device technique should be diligently reviewed and optimised at each formal review and at other opportune times. Multidisciplinary collaboration can improve the management of patients with COPD in primary care. **RMT**

References

A list of references is included in the online version of this article (https://medicinetoday.com.au/mt/2025/march/supplements/topics-copd-collection).

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Inhaler therapy for COPD

An individualised approach to inhaler selection

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References

1. Dabscheck E, George J, Hermann K, et al. COPD-X Australian guidelines for the diagnosis and management of chronic obstructive pulmonary disease: 2022 update. Med J Aust 2022; 217: 415-423.
2. Toelle BG, Xuan W, Bird TE, et al. Respiratory symptoms and illness in older Australians: The Burden of Obstructive Lung Disease (BOLD) study. Med J Aust 2013; 198: 144-148.
3. Australian Institute of Health and Welfare (AIHW). Disparities in potentially preventable hospitalisations across Australia, 2012-13 to 2017-18. AIHW; Canberra, 2020. Available online at: https://www.aihw.gov.au/reports/primary-health-care/disparities-in-potentially-preventable-hospitalisa/contents/about (accessed February 2025).
4. Therapeutic Guidelines. eTG Complete. Therapeutic Guidelines: Respiratory. West Melbourne; Therapeutic Guidelines Limited, 2021.
5. Lung Foundation Australia. Stepwise management of stable COPD. Available online at: https://lungfoundation.com.au/resources/stepwise-management-of-stable-COPD/ (accessed February 2025).
6. Vestbo J, Annderson JA, Calverley PM, et al. Adherence to inhaled therapy, mortality and hospital admission in COPD. Thorax 2009; 64: 939-943.
7. Dekhuijzen R, Lavorini F, Usmani OS, van Boven JFM. Addressing the impact and unmet needs of nonadherence in asthma and chronic obstructive pulmonary disease: where do we go from here? J Allergy Clin Immunol Pract 2018; 6: 785-793.
8. Chrystyn H, Small M, Milligan G, Higgins V, Gil EG, Estruch J. Impact of patients' satisfaction with their inhalers on treatment compliance and health status in COPD. Respir Med 2014; 108: 358-365.
9. Levy ML, Dekhuijzen PNR, Barnes PJ, et al. Inhaler technique: facts and fantasies. A view from the Aerosol Drug Management Improvement Team (ADMIT). NPJ Prim Care Respir Med 2016; 26: 16017.
10. Laube BL, Janssens HM, de Jongh FHC, et al. What the pulmonary specialist should know about the new inhalation therapies. Eur Respir J 2011; 37: 1308-1331.
11. Capstick TG, Clifton IJ. Inhaler technique and training in people with chronic obstructive pulmonary disease and asthma. Expert Rev Respir Med 2012; 6: 91-103.
12. Newman SP, Pavia D, Moren F, Sheahan NF, Clarke SW. Deposition of pressurised aerosols in the human respiratory tract. Thorax 1981; 36: 52-55.
13. Wachtel H, Kattenbeck S, Dunne S, Disse B. The Respimat® development story: patient-centered innovation. Pulm Ther 2017; 3: 19-30.
14. Hochrainer D, Holz H, Kreher C, Scaffidi L, Spallek M, Wachtel H. Comparison of the aerosol velocity and spray duration of Respimat Soft Mist Inhaler and pressurized metered dose inhalers. J Aerosol Med 2005; 18: 273-282.
15. Ghosh S, Pleasants RA, Ohar JA, Donohue JF, Bradley Drummond M. Prevalence and factors associated with suboptimal peak inspiratory flow rates in COPD. Int J Chron Obstruct Pulmon Dis 2019; 14: 585-595.
16. Kondo T, Hibino M, Tanigaki T, Ohe M, Kato S. Exhalation immediately before inhalation optimizes dry powder inhaler use. J Asthma 2015; 52: 935-939.
17. Bonds RS, Asawa A, Ghazi AI. Misuse of medical devices: a persistent problem in self-management of asthma and allergic disease. Ann Allergy Asthma Immunol 2015; 114: 74-76.
18. Ciciliani A, Langguth P, Wachtel H. In vitro dose comparison of Respimat® inhaler with dry powder inhalers for COPD maintenance therapy. Int J Chron Obstruct Pulmon Dis 2017; 12: 1565-1577.
19. Ghosh S, Ohar JA, Bradley Drummond M. Peak inspiratory flow rate in chronic obstructive pulmonary disease: implications for dry powder inhalers. J Aerosol Med Pulm Drug Deliv 2017; 30: 381-387.
20. Horváth A, Balásházy I, Tomisa G, Farkas A. Significance of breath-hold time in dry powder aerosol drug therapy of COPD patients. Eur J Pharm Sci 2017; 104: 145-149.
21. Price DB, Román-Rodríguez M, McQueen RB, et al. Inhaler errors in the CRITIKAL Study: type, frequency, and association with asthma outcomes. J Allergy Clin Immunol Pract 2017; 5: 1071-1081.
22. Bosnic-Anticevich S, Cvetkovski B, Azzi EA, Srour P, Tan R, Kritikos V. Identifying critical errors: addressing inhaler technique in the context of asthma management. Pulm Ther 2018; 4: 1-12.
23. Newman SP. Spacer devices for metered dose inhalers. Clin Pharmacokinet 2004; 43: 349-360.
24. Pritchard J, Usmani O. The greenest inhaler: a patient-centric approach. EMJ Respir 2022; 10: 2-7.
25. Dekhuijzen PN, Lavorini F, Usmani OS. Patients' perspectives and preferences in the choice of inhalers: the case for Respimat(®) or HandiHaler(®). Patient Prefer Adherence 2016; 10: 1561-1572.
26. Clark AR, Weers JG, Dhand R. The confusing world of dry powder inhalers: it is all about inspiratory pressures, not inspiratory flow rates. J Aerosol Med Pulm Drug Deliv 2020; 33: 1-11.
27. Sulaiman I, Cushen B, Greene G, et al. Objective assessment of adherence to inhalers by patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med 2017; 195: 1333-1343.
28. Mahler DA. Peak inspiratory flow rate as a criterion for dry powder inhaler use in chronic obstructive pulmonary disease. Ann Am Thorac Soc 2017; 14: 1103-1107.

29. Dalby R, Spallek M, Voshaar T. A review of the development of Respimat® Soft MistTM Inhaler. Int J Pharm 2004; 283: 1-9.
30. Lavorini F, Fontana GA, Usmani OS. New inhaler devices-the good, the bad and the ugly. Respiration 2014; 88: 3-15.
31. Chrystyn H. Is inhalation rate important for a dry powder inhaler? Using the In-Check Dial to identify these rates. Respir Med 2003; 97: 181-187.
32. Chapman KR, Voshaar TH, Virchow JC. Inhaler choice in primary practice. Eur Respir Rev 2005; 14: 117-122.
33. Dolovich MB, Ahrens RC, Hess DR, et al. Device selection and outcomes of aerosol therapy: evidence-based guidelines: American College of Chest Physicians/American College of Asthma, Allergy, and Immunology. Chest 2005; 127: 335-371.
34. Scullion J, Fletcher M. UK Inhaler Group: inhaler standards and competency document. 2018. Available online at: https://www.ukinhalergroup.co.uk/uploads/c4F3tq04/InhalerStandards2018.pdf (accessed February 2025).
35. Lavorini F, Magnan A, Dubus JC, et al. Effect of incorrect use of dry powder inhalers on management of patients with asthma and COPD. Respir Med 2008; 102: 593-604.
36. Sulku J, Bröms K, Högman M, et al. Critical inhaler technique errors in Swedish patients with COPD: a cross-sectional study analysing video-recorded demonstrations. NPJ Prim Care Respir Med 2021; 31: 5.
37. Usmani OS, Lavorini F, Marshall J, et al. Critical inhaler errors in asthma and COPD: a systematic review of impact on health outcomes. Respir Res 2018; 19: 10.
38. Basheti IA, Armour CL, Bosnic-Anticevich SZ, Reddel HK. Evaluation of a novel educational strategy including inhaler-based reminder labels, to improve asthma inhaler technique. Patient Educ Couns 2008; 72: 26-33.
39. Tommelein E, Mehuys E, Van Hees T, et al. Effectiveness of pharmaceutical care for patients with chronic obstructive pulmonary disease (PHARMACOP): a randomized controlled trial. Br J Clin Pharmacol 2014; 77: 756-766.
40. Gray NJ, Long NC, Mensah N. Report of the evaluation of the greater Manchester Community pharmacy inhaler technique service (2014). Available online at: https://cpe.org.uk/wp-content/uploads/2015/01/19684-Executive-Summary-2014.pdf (accessed February 2025).
41. Mehuys E, Van Bortel L, de Bolle L, et al. Effectiveness of pharmacist intervention for asthma control improvement. Eur Respir J 2008; 31: 790-799.
42. Ovchinikikova L, Smith L, Bosnic-Anticevich S. Inhaler technique maintenance: gaining an understanding from the patient's perspective. J Asthma 2011; 48: 616-624.
43. Bosnic-Anticevich SZ, Sinha H, So S, Reddel HK. Metered-dose inhaler technique: the effect of two educational interventions delivered in community pharmacy over time. J Asthma 2010; 47: 251-256.
44. Montgomery BD, Blakey JD. Respiratory inhalers and the environment. Aust J Gen Pract 2022; 51: 929-934.
45. Woodcock A, Beeh KM, Sagara H, et al. The environmental impact of inhaled therapy: making informed treatment choices. Eur Respir J 2022; 60: 2102106.

PEER REVIEWED FEATURE

New developments in COPD

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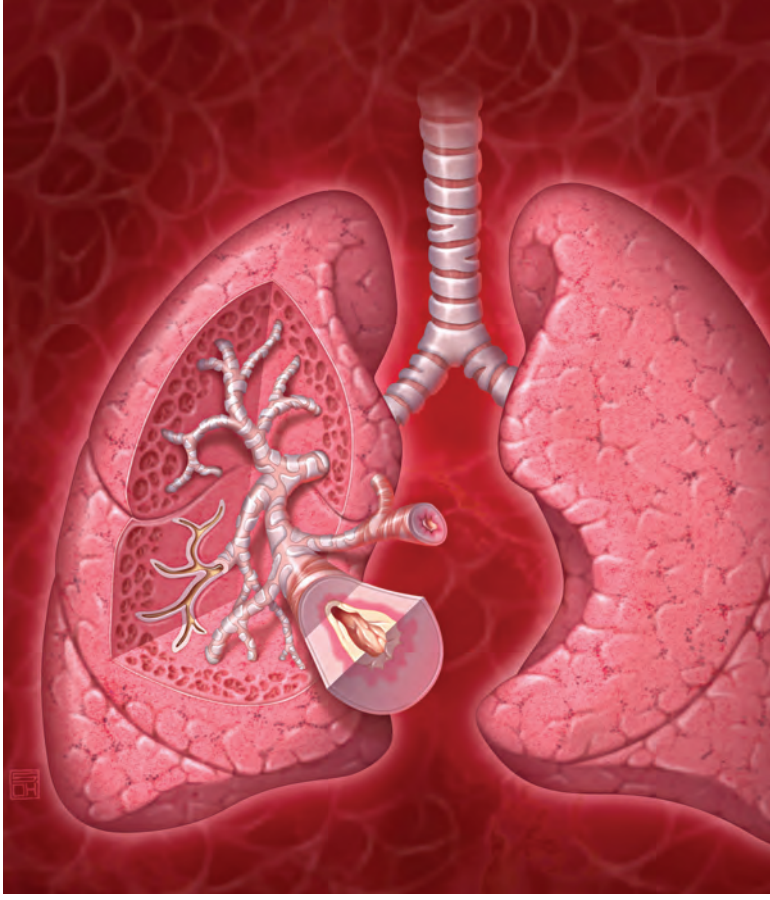
COPD is a heterogeneous disease that presents many management challenges. This review provides an update on promising advances from research.



Chronic obstructive pulmonary disease (COPD) is characterised by fixed airway obstruction on spirometry, persistent respiratory symptoms including dyspnoea, chronic cough, wheeze or sputum production and a history of exposure to noxious stimuli, generally cigarette smoke.[1] COPD was the third leading cause of death in Australians aged 65 to 74 years in 2022. It affects about 7% of Australians aged over 75 years and, in 2023, was the fifth leading cause of disease burden in Australia.[2] Presentations due to COPD have a substantial impact on health service use, contributing to 1% of general practice encounters, and are the second leading cause of avoidable hospital admissions.[3,4]

The COPD-X guidelines are a useful resource for investigation, diagnosis and management of COPD.[5] COPD should be considered in people aged over 35 years with a history of smoking or exposure to dust, gases or fumes. The diagnosis must be confirmed on spirometry with a forced expiratory volume in 1 second (FEV_1) to forced vital capacity ratio of below 0.70.[1] There is no evidence that COPD treatments have any benefit

KEY POINTS

- Patients with chronic obstructive pulmonary disease (COPD) should be encouraged to maintain regular physical exercise, and referral to pulmonary rehabilitation is recommended.
- Inhaled corticosteroids should be reserved for patients with moderate to severe COPD to reduce exacerbations; and patients with a blood eosinophil count of 0.3×10^9/L or greater are most likely to benefit.
- Inhaled corticosteroids may be withdrawn safely in patients with COPD who do not have frequent exacerbations and have a blood eosinophil count of less than 0.3×10^9/L (excluding patients with an asthma overlap syndrome).
- Highly selected patients may be suitable for endobronchial valve placement or lung volume reduction surgery. Referral to a respiratory specialist and an expert centre is recommended.

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in patients without COPD diagnosed on spirometry. Smoking cessation is paramount to prevent further deterioration in lung function and symptoms. Other nonpharmacological interventions including annual influenza vaccination, COVID-19 vaccination and referral to pulmonary rehabilitation are strongly recommended. For COPD patients with persistent symptoms or frequent exacerbations, a stepwise approach to inhaler therapy can be initiated (Figure).[6]

It has been identified that eosinophilic inflammation may play a role in COPD, and therefore may present a potential target for treatment options. Selected patients with severe COPD and persistent breathlessness despite optimal medical treatment may be suitable for advanced therapies including endobronchial valve placement or lung-volume reduction surgery. Frailty has been identified as a clinical syndrome and has significant impacts in patients with COPD. This article examines these three topics in further detail.

The role of eosinophils in COPD

Eosinophils are innate immune cells that are believed to play a role in host defences in allergic disease. Historically, eosinophilic inflammation in airways disease has been considered to be suggestive of asthma, with neutrophilic inflammation predominantly seen in COPD. However, over recent years there has been increasing interest in the role of eosinophilic inflammation in COPD including its impact on morbidity and the potential role for treatment targeting this form of inflammation.

A normal blood eosinophil count is less than 0.5×10^9/L. A blood eosinophil count of 0.3×10^9/L or greater, which may still be within the normal range, is associated with an increased risk of acute exacerbations of COPD.[7,8] In 37 to 68% of people with COPD, blood eosinophil count was shown to be consistently 0.3×10^9/L or greater and to correlate with elevated levels of eosinophils in sputum.[9,10] In a small retrospective cohort study undertaken in Canada involving 167 patients hospitalised with an acute exacerbation of COPD, an elevated blood eosinophil count at initial admission was associated with an increase in readmissions for exacerbations (odds ratio [OR], 3.59; 95% confidence interval [CI], 1.65-7.82; p = 0.01) and an increase in all-cause readmissions over a 12-month period (OR, 2.32; 95% CI, 1.10-4.92; p = 0.03). Patients with blood eosinophilia also had a shorter time to first exacerbation.[11]

Eosinophils have been proposed to be a useful biomarker in COPD for prognostic purposes and to guide treatment with inhaled and oral corticosteroids. It has been suggested that patients with COPD and elevated blood eosinophil counts (defined as $\geq 0.3 \times 10^9$/L) may benefit from inhaled corticosteroid therapy to reduce the risk of exacerbations; however, this has not been assessed prospectively in a randomised controlled trial.[12,13]

Withdrawal of inhaled corticosteroids (ICS) is safe in some patients with COPD, as shown by a randomised, double-blind, multicentre controlled trial involving 1053 patients with COPD who were receiving long-term triple therapy. Withdrawal of ICS to de-escalate to dual bronchodilator therapy with a long-acting muscarinic antagonist (LAMA) and long-acting beta agonist (LABA) in patients without evidence of eosinophilic inflammation was safe, with no difference in exacerbation rate over a six-month period compared with participants who remained on triple therapy.[12] However, in patients with an elevated blood eosinophil count ($\geq 0.3 \times 10^9$/L), ICS withdrawal was associated with an increased risk of exacerbations and a small decrease in lung function.

Data suggest that treatment with oral corticosteroids for acute exacerbations of COPD may also be directed by baseline blood eosinophil count. Retrospective analysis of three randomised controlled trials comparing prednisolone to placebo showed a higher rate of treatment failure in patients with an elevated blood eosinophil count of 0.3×10^9/L or greater who did not receive prednisolone, whereas in patients with a blood eosinophil count of less than 0.3×10^9/L there was no difference in treatment failure in the prednisolone group compared with the placebo group.[14] However, in at least one of these trials, patients with a history of asthma were not specifically excluded. Asthma-COPD overlap is an increasingly recognised condition and corticosteroid treatment for acute exacerbations remains a key management strategy in patients with this condition. A 2024 UK trial randomised 308 patients in primary care presenting with an exacerbation of COPD to eosinophil-guided prednisolone or standard care. Patients in the intervention arm only received prednisolone if their blood eosinophil count was above 2%. This trial found that eosinophil-guided prednisolone use was noninferior to standard care.[15]

The current evidence on the role of eosinophils in COPD is intriguing; however, the data are retrospective and mostly based on post-hoc analyses. There are no current clear cut-offs for blood eosinophil count to guide management, and further prospective trials are required to determine the association and guide treatment recommendations.

Biologic therapy in COPD

The introduction of targeted biologic therapy in eosinophilic asthma has had a significant impact among patients with symptomatic severe asthma. Benralizumab and mepolizumab are humanised monoclonal antibodies that are administered subcutaneously and block interleukin-5, thereby reducing peripheral circulating eosinophils in blood and tissue.[16,17] Mepolizumab significantly reduces exacerbation rates and symptoms and improves quality of life in patients with severe eosinophilic asthma.[18]

STEPWISE MANAGEMENT OF STABLE COPD

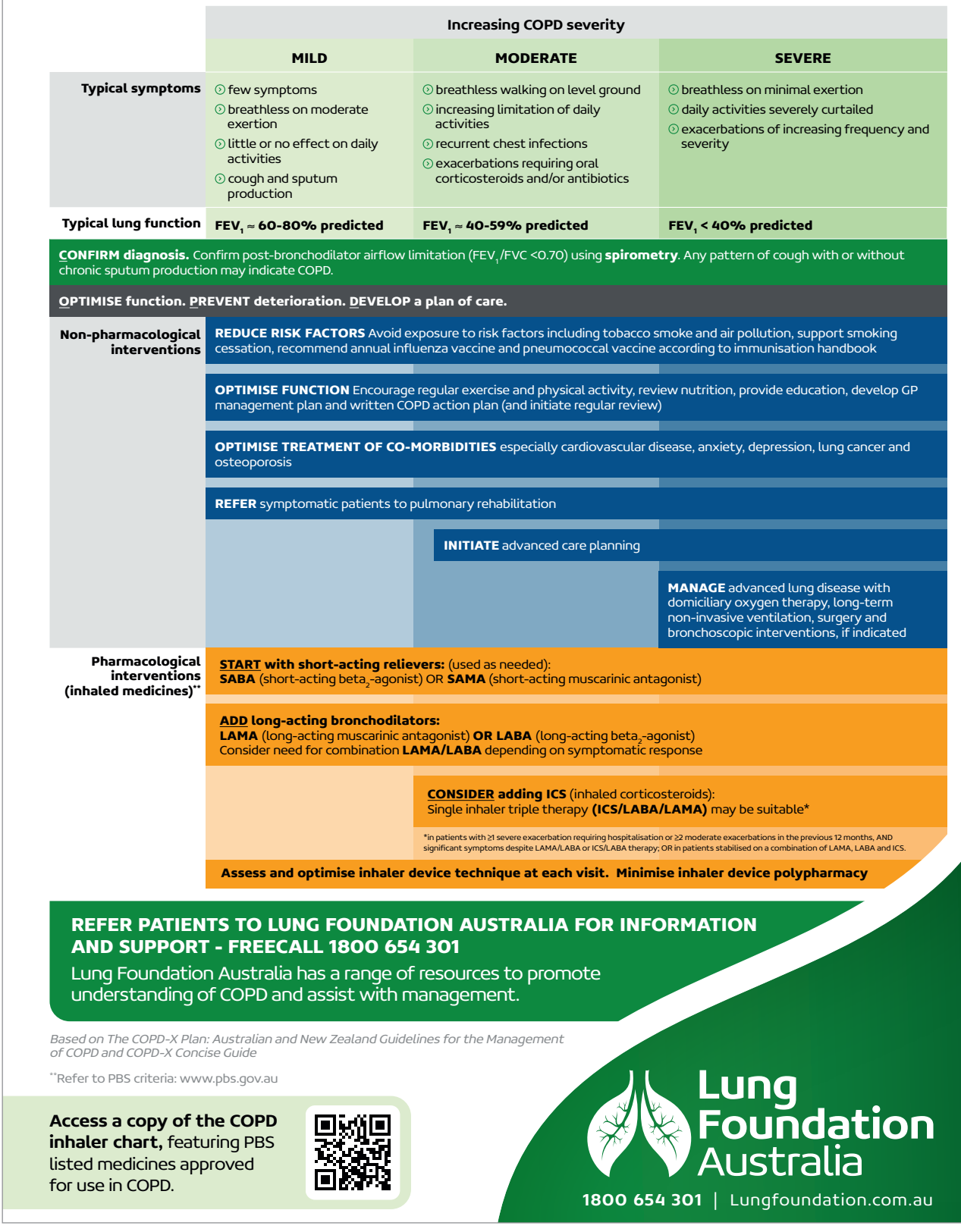

Figure. Stepwise management of stable chronic obstructive pulmonary disease (COPD). Information on inhalers is also provided by Lung Foundation Australia (https://lungfoundation.com.au/resources/copd-inhaler-device-chart-poster/).

Reproduced with permission from Lung Foundation Australia.[6]

The data with regard to COPD are still emerging. A systematic review of randomised controlled trials comparing anti-IL5 therapy with placebo (three trials with mepolizumab and three trials with benrolizumab) suggested that anti-IL5 therapy was likely to reduce exacerbations in people with COPD and higher eosinophil levels, but did not improve health-related quality life.[19]

Dupilumab, a monoclonal antibody targeting IL-4 and IL-13, is used to prevent exacerbations in moderate to severe asthma. A 2023 randomised controlled trial showed that dupilumab reduced exacerbations in patients with COPD, chronic cough and sputum, and an eosinophil count above 0.3×10^9/L.[20] In 2024, a second randomised control trial of dupilumab in a similar population also showed a reduction in exacerbations and improvement in lung function.[21] Although monoclonal antibody therapy may be beneficial in a specific subgroup of patients with COPD and eosinophilia, these therapies are not currently listed on the PBS for use in COPD in Australia.

Endobronchial valves

Insertion of endobronchial valves may be an option for carefully selected patients with severe COPD with an FEV_1 of less than 50% predicted, hyperinflation with a total lung capacity of more than 100% predicted and residual volume of more than 175%.[22] Valves are inserted via bronchoscopy and occlude emphysematous lobes to block inspiratory airflow while allowing expiratory airflow, with the aim of reducing gas trapping by creating areas of atelectasis and shunting airflow elsewhere.[23]

Retrospective analysis of the large early endobronchial valve trials showed that patients with intact pleural fissures were most likely to benefit.[24] Several subsequent randomised controlled studies only recruited COPD patients with intact pleural fissures and showed a significant improvement in FEV_1, six-minute walk distance (6MWD) and quality of life in carefully selected patients.[25-29] However, it is important to recognise that there are potential major complications with endobronchial valve placement including pneumothorax (in 1.4 to 26% of patients) and COPD exacerbation (in 4 to 20% of patients).[30]

Endobronchial valves are not yet recommended as routine care. However, in highly selected patients with significant breathlessness despite optimised medical care and pulmonary rehabilitation, endobronchial valves may be a potential treatment option and patients should be assessed in a centre of expertise.[31]

Lung volume reduction surgery

Lung volume reduction surgery (LVRS) involves resection of emphysematous lung to decrease hyperinflation with the proposed benefits of improving diaphragmatic function, reducing respiratory muscle fatigue and intrathoracic pressure and improving cardiac ventricular filling.[32-35]

Patients with severe COPD who may benefit from LVRS include those aged under 75 years with persistent dyspnoea despite optimal medical treatment and pulmonary rehabilitation, who have heterogeneous emphysema (with varying emphysema tissue destruction between pulmonary lobes) and a 6MWD of greater than 140 metres.[36]

The National Emphysema Treatment Trial (NETT) was a large multicentre study involving 1218 patients with severe emphysema who were randomly allocated to either lung volume reduction surgery or standard medical care following completion of a pulmonary rehabilitation program.[36] Patients in the surgical group had a significant improvement in exercise capacity, FEV_1 and quality of life scores. There was an increased 90-day mortality in the surgical group (7.9% compared with 1.3%); however, there was no overall difference in mortality at the end of follow up (mean follow up, 29 months). A recent systematic review and meta-analysis – heavily influenced by NETT data – concluded that LVRS reduces gas trapping and significantly improves FEV_1 and quality of life with an early increase in mortality but no difference in overall mortality.[30] Postoperative complications included prolonged air leak.

LVRS may be a suitable treatment option for highly selected patients with severe COPD. Patients should undergo pulmonary rehabilitation before considering surgery and should be assessed in an expert centre with a multidisciplinary panel including a respiratory physician, thoracic surgeon, radiologist and interventional pulmonologist.[31] A meta-analysis pooling all modalities of lung volume reduction (surgical and endobronchial) showed benefits in lung function, health related quality of life and 6MWD but reported that the odds ration for a severe adverse event including death was six times higher in the intervention group.[30]

Frailty and COPD

Frailty is a clinical syndrome in which there is a decline in physiological and functional reserve associated with increasing age, resulting in a reduced ability to cope with daily and acute stressors.[37,38] Frailty affects 7 to 13% of the older population aged above 65 years with the prevalence increasing with advancing age.[39-41] The syndrome is characterised by the presence of three or more of the following characteristics: loss of weight, slow walking speed, low physical activity, reduced grip strength and reduced endurance.[39] The phenotype is useful for identifying people at risk of poor health outcomes and is an independent predictor of increased risk of falls, hospitalisation and mortality among the elderly population.[39]

People with COPD are twice as likely to be frail as people without the condition, with the prevalence of frailty ranging between 19 and 57%.[38,41-44] Frailty in people with COPD has significant impacts, including increased risk of acute exacerbations and of readmission due to a new exacerbation episode

during the 90 days after hospitalisation for an acute exacerbation of COPD.[41,43] Furthermore, frailty in COPD is associated with worsening impairment of lung function, poorer exercise tolerance (including a reduced 6MWD), increased levels of depression and anxiety and low socioeconomic status.[41,42,44] People with COPD and frailty are more likely to have multiple comorbidities, in particular cardiovascular disease.[41]

Exercise has been shown to improve frailty, and the addition of nutritional intervention is associated with further benefits.[45,46] Although exercise appears to be an essential component in addressing frailty, the optimal exercise program has not yet been determined. Despite the benefits of pulmonary rehabilitation in patients with COPD being widely known, to date there have been no randomised controlled trials assessing the impact of pulmonary rehabilitation on frailty markers in COPD. A single centre prospective cohort study undertaken in the UK involving 816 patients with COPD and frailty showed that pulmonary rehabilitation improved exercise capacity, dyspnoea, hand grip strength, anxiety and depression. However, patients with frailty were also significantly less likely to complete pulmonary rehabilitation owing to either progression of their frailty or hospitalisation. Among the frail patients who persevered, 60% improved their frailty status to either prefrail or robust after completion of pulmonary rehabilitation.[44]

Increasing recognition of frailty among older adults and the population with COPD has highlighted the complex interplay between physiological, psychological and social factors. Although further data on effective exercise and nutritional interventions are needed, individuals at high risk of frailty may benefit from early identification and prompt referral to pulmonary rehabilitation.

COPD Clinical Standards

In May 2023, the Australian Commission on Safety and Quality in Health Care convened a multidisciplinary committee to write Clinical Care Standards for COPD. The committee members included respiratory physicians, general practitioners, emergency medicine physicians, respiratory nurses, physiotherapists, clinical pharmacists and people living with COPD.

The purpose of a clinical care standard is to detail the care that patients with COPD should be offered by clinicians and by healthcare services. The stated goal of the COPD Clinical Care Standards is to reduce preventable hospitalisations and improve overall outcomes for people with COPD. The Clinical Care Standards provide 10 quality statements that cover the gamut of COPD care from diagnosis to nonpharmacological and pharmacological management of stable COPD to management of exacerbations in end of life care. Accompanying these standards are 'indicators for local monitoring', which are intended to be used by healthcare services to measure how the healthcare provided compares with recommendations in the COPD Clinical Care Standards. Together these two documents aim to standardise COPD care and ensure patients are receiving holistic evidence-based treatment. The Clinical Care Standards for COPD were launched in October 2024.

Conclusion

Despite falling smoking rates in Australia, the burden of disease due to COPD remains substantial and has significant impacts on health care resources and utility. Although preventive health measures such as smoking cessation are vital, early identification and diagnosis of COPD is important to maintain lung function and prevent progression of symptoms. Both nonpharmacological and pharmacological interventions are recommended to reduce symptoms, prevent exacerbations and maintain lung function. Smoking cessation (beyond the scope of this article) is vital to prevent disease progression. Maintenance of physical activity and prevention of frailty is imperative in older adults with COPD and may improve their health outcomes. Further prospective studies assessing the impact of eosinophilic inflammation and targeted antieosinophilic treatments may be of benefit. In carefully selected patients with severe and persistent breathlessness in advanced COPD, advanced therapies including endobronchial valves or lung volume reduction surgery may be accessible. We recommend the COPD-X Guidelines as a useful resource to assist in identification, diagnosis and management of patients with COPD. MT

References

A list of references is included in the online version of this article (https://medicinetoday.com.au/mt/2025/march/supplements/topics-copd-collection).

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New developments in COPD

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References

1. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease 2019 report. Available online at: https://goldcopd.org/wp-content/uploads/2018/11/GOLD-2019-v1.7-FINAL-14Nov2018-WMS.pdf (accessed February 2025).
2. Australian Institute of Health and Welfare (AIHW). Chronic obstructive pulmonary disease. Updated 17 June 2024. Available online at: (accessed February 2025).
3. Britt H, Miller GC, Henderson J, et al. General practice activity in Australia 2015-16. General Practice Series No. 40. Sydney: Sydney University Press; 2016.
4. Page A, Ambrose S, Glover J, Hetzel D. Atlas of avoidable hospitalisations in Australia: ambulatory care-sensitive conditions. Adelaide: Public Health Information Development Unit, University of Adelaide; 2007.
5. Yang IA, Brown JL, George J, et al. The COPD-X Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease. Version 2.76, June 2024. Available online at https://copdx.org.au (accessed February 2025).
6. Stepwise management of stable chronic obstructive pulmonary disease. Milton, Qld: Lung Foundation Australia; 2023. Available online at: https://lungfoundation.com.au/wp-content/uploads/2023/03/COPD_Stepwise_Digital.pdf (accessed February 2025).
7. Zeiger RS, Tran TN, Butler RK, et al. Relationship of blood eosinophil count to exacerbations in chronic obstructive pulmonary disease. J Allergy Clin Immunol Pract 2018; 6: 944-954.e5. Epub 2017 Nov 15.
8. Yun JH, Lamb A, Chase R, et al. COPDGene and ECLIPSE Investigators. Blood eosinophil count thresholds and exacerbations in patients with chronic obstructive pulmonary disease. J Allergy Clin Immunol 2018; 141: 2037-2047.
9. Singh D, Kolsum U, Brightling CE, Locantore N, Agusti A, Tal-Singer R. Eosinophilic inflammation in COPD: prevalence and clinical characteristics. Eur Respir J 2014; 44: 1697-1700.
10. Kim VL, Coombs NA, Staples KJ, et al. AERIS Study Group. Impact and associations of eosinophilic inflammation in COPD: analysis of the AERIS cohort. Eur Respir J 2017; 50: pii: 1700853.
11. Couillard S, Larivee P, Courteau J, Vanasse A. Eosinophils in COPD exacerbations are associated with increased readmissions. Chest 2017; 151: 366-373.
12. Chapman KR, Hurst JR, Frent S-M, et al. Long-term triple therapy de-escalation to indacterol/glycopyrronium in patients with chronic obstructive pulmonary disease (SUNSET): a randomized, double-blind, triple-dummy clinical trial. Am J Respir Crit Care Med 2018; 198: 329-339.
13. Pascoe S, Locantore N, Dransfield MT, Barnes NC, Pavord ID. Blood eosinophil counts, exacerbations, and response to the addition of inhaled fluticasone furoate to vilanterol in patients with chronic obstructive pulmonary disease: a secondary analysis of data from two parallel randomised controlled trials. Lancet Respir Med 2015; 3: 435-442.
14. Bafadhel M, Davies L, Calverley PMA, Aaron SD, Brightling CE, Pavord ID. Blood eosinophil guided prednisolone therapy for exacerbations of COPD: a further analysis. Eur Respir J 2014; 44: 789-791.
15. Ramakrishnan R, Jeffers H, Langford-Wiley B, et al. Blood eosinophil-guided oral prednisolone for COPD exacerbations in primary care in the UK (STARR2): a non-inferiority, multicentre, double-blind, placebo-controlled, randomised controlled trial. Lancet 2024; 1: 67-77.
16. Hart TK, Cook RM, Zia-Amirhosseini P, et al. Preclinical efficacy and safety of mepolizumab (SB-240563), a humanized monoclonal antibody to IL-5, in cynomolgus monkeys. J Allergy Clin Immunol 2001; 108: 250-257.
17. Varricchi G, Bagnasco D, Borriello F, Heffler E, Canonica G. Interleukin-5 pathway inhibition in the treatment of eosinophilic respiratory disorders: evidence and unmet needs. Curr Opin Allergy Clin Immunol 2016; 16: 186-200.
18. Pavord ID, Korn S, Howarth P, et al. Mepolizumab for severe eosinophilic asthma (DREAM): a multicentre, double-blind, placebo-controlled trial. Lancet 2012; 380: 651-659.
19. Donovan T, Milan SJ, Wang R, Banchoff E, Bradley P, Crossingham I. Anti-IL-5 therapies for chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2020; 12: CD013432.
20. Bhatt SP, Rabe KF, Hanania NA, et al; BOREAS Investigators. Dupilumab for COPD with type 2 inflammation indicated by eosinophil counts. N Engl J Med 2023; 389: 205-214.
21. Bhatt SP, Rabe KF, Hanania NA, et al. Dupilumab for COPD with blood eosinophil evidence of type 2 inflammation. N Engl J Med 2024; 390: 2274-2283.
22. Slebos DJ, Shah PL, Herth FJ, Valipour A. Endobronchial valves for endoscopic lung volume reduction: best practice recommendations from expert panel on endoscopic lung volume reduction. Respiration 2017; 93: 138-150.
23. Toma TP, Hopkinson NS, Hillier J, et al. Bronchoscopic volume reduction with valve implants in patients with severe emphysema. Lancet 2003; 361: 931-933.
24. Sciurba FC, Ernst A, Herth FJF, et al; VENT Study Research Group. A randomized study of endobronchial valves for advanced emphysema. N Engl J Med 2010; 363: 1233-1244.
25. Davey C, Zoumot Z, Jordan S, et al. Bronchoscopic lung volume reduction with endobronchial valves for patients with heterogeneous emphysema and intact interlobar fissures (the BeLieVeR-HIFi study): a randomised controlled trial. Lancet 2015; 386: 1066-1073.
26. Klooster K, ten Hacken NHT, Hartman JE, Kerstjens HAM, van Rikxoort EM, Slebos DJ. Endobronchial valves for emphysema without interlobar collateral ventilation. N Engl J Med 2015; 373: 2325-2335.
27. Valipour A, Slebos DJ, Herth F, et al; IMPACT Study Team. Endobronchial valve therapy in patients with homogeneous emphysema. Results from the IMPACT Study. Am J Respir Crit Care Med 2016; 194: 1073-1082.
28. Criner GJ, Sue R, Wright S, et al; LIBERATE Study Group. A multicenter randomized controlled trial of zephyr endobronchial valve treatment in heterogeneous emphysema (LIBERATE). Am J Respir Crit Care Med 2018; 198: 1151-1164.
29. Kemp SV, Slebos DJ, Kirk A, et al; TRANSFORM Study Team. A multicenter randomized controlled trial of zephyr endobronchial valve treatment in

heterogeneous emphysema (TRANSFORM). Am J Respir Crit Care Med 2017; 196: 1535-1543.
30. van Geffen WH, Slebos D-J, Herth FJ, Kemp SV, Weder W, Shah PL. Surgical and endoscopic interventions that reduce lung volume for emphysema: a systematic review and meta-analysis. Lancet Respir Med 2019; 7: 313-324.
31. Herth FJF, Slebos DJ, Rabe KF, Shah PL. Endoscopic lung volume reduction: an expert panel recommendation - update 2017. Respiration 2017; 94: 380-388.
32. Lando Y, Boiselle PM, Shade D, et al. Effect of lung volume reduction surgery on diaphragm length in severe chronic obstructive pulmonary disease. Am J Respir Crit Care Med 1999; 159: 796.
33. Gorman RB, McKenzie DK, Butler JE, Tolman JF, Gandevia SC. Diaphragm length and neural drive after lung volume reduction surgery. Am J Respir Crit Care Med 2005; 172: 1259-1266.
34. Bloch KE, Li Y, Zhang J, et al. Effect of surgical lung volume reduction on breathing patterns in severe pulmonary emphysema. Am J Respir Crit Care Med 1997; 156 (2 Pt 1): 553-560.
35. Jorgensen K, Houltz E, Westfelt U, Nilsson F, Schersten H, Ricksten S. Effects of lung volume reduction surgery on left ventricular diastolic filling and dimensions in patients with severe emphysema. Chest 2003; 124: 1863-1870.
36. Fishman A, Martinez F, Naunheim K; National Emphysema Treatment Trial Research Group. A randomized trial comparing lung-volume-reduction surgery with medical therapy for severe emphysema. N Engl J Med 2003; 348: 2059-2073.
37. Xue QL. The frailty syndrome: definition and natural history. Clin Geriatr Med 2011; 27: 1-15.
38. Park SK, Richardson CR, Holleman RG, Larson JL. Frailty in people with COPD, using the National Health and Nutrition Evaluation Survey dataset (2003-2006). Heart Lung 2013; 42: 163-170.
39. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol 2001; 56A: 146-156.
40. Widagdo I, Pratt N, Russell M, Roughead E. How common is frailty in older Australians? Australas J Ageing 2015; 34: 247-251.
41. Gale NS, Albarrati AM, Munnery MM, et al. Frailty: a global measure of the multisystem impact of COPD. Chron Respir Dis 2018; 15: 347-355.
42. Marengoni A, Vetrano DL, Manes-Gravina E, Bernabei R, Onder G, Palmer K. The relationship between COPD and frailty: a systematic review and meta-analysis of observational studies. Chest 2018; 154: 21-40.
43. Bernabeu-Mora R, Garcia-Guillamon G, Valera-Novella E, Gimenez-Gimenez LM, Escolar-Reina P, Medina-Mirapeix F. Frailty is a predictive factor of readmission within 90 days of hospitalization for acute exacerbations of chronic obstructive pulmonary disease: a longitudinal study. Ther Adv Respir Dis 2017; 11: 383-392.
44. Maddocks M, Kon SS, Canavan JL, et al. Physical frailty and pulmonary rehabilitation in COPD: a prospective cohort study. Thorax 2016; 71: 988-995.
45. de Labra C, Guimaraes-Pinheiro C, Maseda A, Lorenzo T, Millan-Calenti JC. Effects of physical exercise interventions in frail older adults: a systematic review of randomized controlled trials. BMC Geriatr 2015; 15: 154.
46. Dedeyne L, Deschodt M, Verschueren S, Tournoy J, Gielen E. Effects of multi-domain interventions in (pre)frail elderly on frailty, functional, and cognitive status: a systematic review. Clin Interv Aging 2017; 12: 873-896.

COPD exacerbations
A hearty opportunity

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Chronic obstructive pulmonary disease (COPD) exacerbations are common. Simultaneous cardiovascular involvement is frequent and affects prognosis adversely. COPD exacerbations are opportunities to optimise lung health, and to enhance cardiovascular diagnosis and treatment.

Key points

- **Cardiovascular disease (CVD) is the leading cause of death in patients with chronic obstructive pulmonary disease (COPD); yet, cardiac issues are underdiagnosed in these patients.**
- **Bronchitis or an infection in a current or ex-smoker might be an exacerbation of undiagnosed COPD and also serve as an unstandardised cardiac stress test.**
- **COPD exacerbations are opportunities to address the gap in care that these patients receive and improve both pulmonary and cardiac outcomes.**
- **Coronary artery disease is very common in people with COPD, a population with numerous cardiovascular risk factors, which emphasises the need for comprehensive care.**

Chronic obstructive pulmonary disease (COPD) affects around one in seven adults over the age of 40 years in Australia and the prevalence of COPD is expected to rise as the population ages.[1]

Exacerbations of COPD are impactful. Exacerbations are frightening for patients and signal adverse consequences, including accelerated lung function decline and mortality. They are a leading cause of preventable Australian hospitalisations.[2] They are also a timely opportunity for the astute clinician to intervene and change the course of lung and heart disease.

COPD and cardiovascular disease (CVD) are intimately linked. Large, well-conducted pharmaceutical studies have shown that CVD is the most common cause of death in patients with mild and moderate COPD.[3]

Cardiac involvement is important in COPD exacerbations. For example, elevations in levels of cardiac biomarkers are detectable in up to 75% of patients who are hospitalised with exacerbations and lead to a greater likelihood of readmission and mortality.[4] When rigorously examined with CT scanning, severe but treatable CVD is present in most people hospitalised with exacerbations of

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COPD.[5] Deaths among patients with severe COPD are more frequently attributed to COPD than to CVD, but because cardiac involvement is often underdiagnosed, cardiovascular intervention could also improve outcomes in this population. Importantly, cardiovascular undertreatment is widespread in people with COPD and this represents a large gap for care optimisation.[6-10] This article focuses on a practical approach to CVD assessment during and after COPD exacerbation.

The COPD-X Plan

Guidelines for COPD management, including exacerbations, are available from the COPD-X plan (www.copdx.org.au), the Australian and New Zealand guidelines for COPD management. The standard approach to managing exacerbations is outlined in Figure 1. Although cardiovascular assessment is mentioned in the COPD-X guidelines, no specific approach has been outlined because prospective studies are scant.

Cardiovascular risk factors cluster in people with COPD, so it is reasonable to maintain a low threshold to performing case-finding cardiac investigations, but also to consider performing CVD risk factor assessment.

A suggested approach to suspected CVD in patients with COPD

There are two key steps in our suggested approach to potential CVD in patients with COPD: first, be aware of the possibility of CVD in patients with COPD; and second, diagnose and treat CVD or cardiovascular risk factors (Figure 2).

COPD exacerbations and CVD

The pretest probability of CVD in patients with COPD is typically high, as this population is enriched with cardiovascular risk factors. Individuals with COPD are generally older, less physically active and are current or ex-smokers. By definition, they have airflow limitation, which is an independent cardiovascular risk factor – for every 10% decrease in forced expiratory volume in one second, cardiovascular mortality increases by 28%.[11] Overall, populations with COPD are at a two- to threefold increased risk of CVD compared with controls.[12]

During exacerbations, many factors can be active separately or together to produce cardiovascular events. Two-thirds of exacerbations are associated with infection (a proinflammatory state). Hypoxia, tachycardia, arrythmias, sudden elevations in pulmonary pressure, arterial stiffness and pulmonary hyperinflation can all contribute to cardiovascular events.[4]

COPD exacerbations have been likened to an unstandardised, unscheduled cardiac stress test.[6] Cardiovascular event rates, including mortality, spike during exacerbation, and incidence rates remain elevated in the subsequent months.[13]

How might CVD present in a person with COPD?

CVD during COPD exacerbations may present in the following different ways.[4,5]

- CVD may mimic a COPD exacerbation. This can masquerade as a 'refractory' COPD exacerbation – one that does not respond as expected to standard airway-directed management.
- CVD may diminish the ability of a patient to 'tolerate' the exacerbation, and a relatively minor airway disturbance may present with disproportionate or atypical symptoms. A case vignette of a real patient that highlights this is outlined in the Box.
- CVD may complicate COPD exacerbations – a phenomenon exemplified by type 2 (demand) myocardial infarction with elevated troponin levels[4] – and may also present with new arrythmias (typically atrial fibrillation) and new heart failure.
- Importantly, CVD in people with COPD may also remain subclinical.

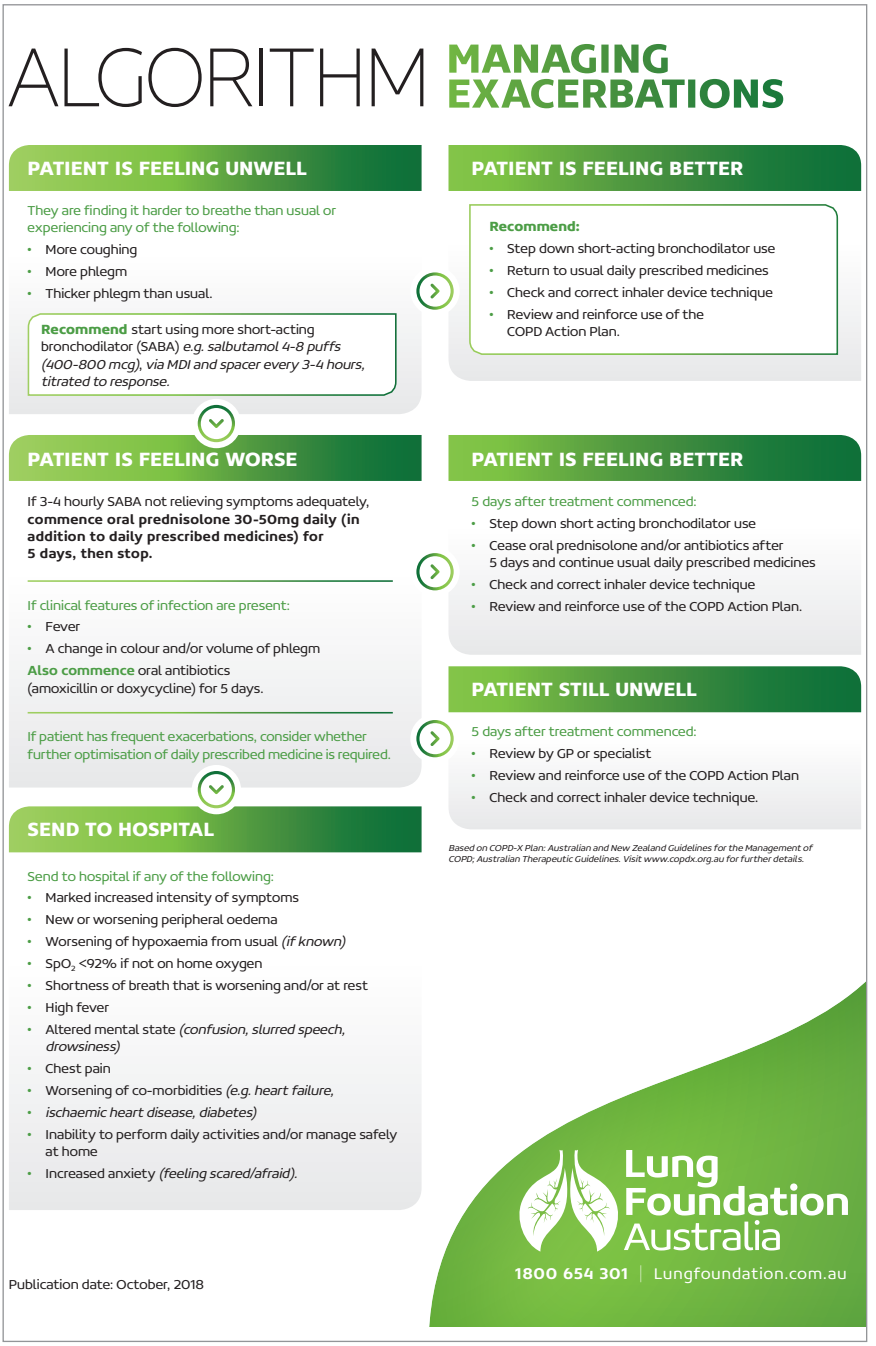

Figure 1. COPD-X guidelines for COPD exacerbation management.

Abbreviation: COPD = chronic obstructive pulmonary disease.

Diagnosis of CVD

Diagnosing CVD during COPD exacerbations relies on clinical acumen and a high index of suspicion. This is because manifestations of COPD and CVD can overlap and hints may be subtle.

For instance, it may be tempting to attribute symptoms including breathlessness, atypical chest pain and tightness to COPD exacerbations; however, CVD can present similarly. Careful assessment is suggested because it may yield clues to concurrent CVD.

- Is there chest pain or tightness and is it exertional? Could the chest pain be angina?
- Is there a background history of cardiac disease that now may be worsened?
- Are there palpitations?
- Is orthopnoea prominent?
- Is breathlessness out of proportion to spirometric airflow limitation?
- Does this patient avoid nonacute or preventive care, and thus may there be a greater opportunity for cardiovascular diagnosis and risk factor reduction?

The examination can often be helpful. For example:

- radial artery palpation may lead to a suspicion of atrial fibrillation, which complicates many exacerbations
- jugular venous pulsation elevation may hint at right heart involvement
- peripheral oedema may hint at cardiac failure
- bilateral basal crackles on auscultation could be a sign of heart failure.

Put another way, it is useful to have a low threshold to think that a supposedly straightforward COPD exacerbation might also have cardiovascular involvement.

The acute treatment of COPD exacerbations should follow COPD-X recommendations (Figure 1). Excessive beta-agonist use can lead to lactic acidosis, Takotsubo cardiomyopathy and even myocardial infarction; therefore, limiting administration to the maximum dose recommended in the COPD-X plan is suggested.[4,6] This equates to four to eight puffs of salbutamol (400 to 800 mcg) via a metered dose inhaler or spacer every three to four hours. When supplemental oxygen is used, ensuring that oxygen saturations are maintained at 88 to 92% can prevent adverse respiratory and cardiac consequences.[14]

After recovery, COPD should be managed according to the COPD-X guidelines for stable COPD (https://lungfoundation.com.au/resources/stepwise-management-of-stable-copd).

Large studies of inhaled triple therapy combinations (long-acting muscarinic antagonist, long-acting beta agonist, corticosteroid) in patients with COPD showed reductions in all-cause mortality driven by reductions in cardiovascular death; however, the data are not strong enough to recommend escalation to triple therapy solely to prevent cardiovascular mortality.[15,16] Smoking cessation, encouraging a healthy lifestyle that includes exercise and considering pulmonary rehabilitation should be the cornerstones of management.

Beyond cardiovascular case finding, COPD exacerbations can be viewed as an opportunity to review cardiovascular risk. Dutch primary care guidelines recommend that cardiovascular risk assessment should be performed in all patients with COPD.[17] In a retrospective study of the impact of the new Dutch guidelines on cardiovascular risk management in patients with COPD, 90% of patients with COPD were found to be at a high or very high risk of a fatal cardiovascular event (>5% risk over 10 years).[17]

CVD in patients with COPD: a treatment gap

Australian data indicate that 55% of patients hospitalised with COPD exacerbations have coronary atherosclerosis at a level at which guidelines recommend treatment.[5] This is concordant with global data. A US study found that nearly 90% of people with COPD had coronary artery disease on CT coronary angiography.[18] Coronary artery disease is highly prevalent in people with COPD and it may be prudent to investigate individuals who manifest 'type 2 myocardial infarction' or 'troponin leaks' for coronary artery disease (see case vignette in Box).

Despite an elevated cardiovascular risk, studies have consistently shown that treatments for major cardiovascular conditions including coronary disease, myocardial infarction and heart failure are routinely underprescribed in populations with COPD. Over half of all patients do not receive optimal treatment for these conditions, irrespective of the indication for treatment.[5,7,8] A review of treatments may therefore identify a gap that can provide genuine therapeutic benefit.

Some therapeutic reluctance has traditionally been present owing to concerns regarding beta-blocker use in COPD; however, beta-blockers are generally safe in patients with COPD, as are aspirin, statins, ACE inhibitors and neprilysin inhibitors.[6]

When diagnostic or therapeutic uncertainty exists (e.g. if asthma overlap is suspected, which might contraindicate beta-blocker use), specialist respiratory or cardiac referral could be considered.

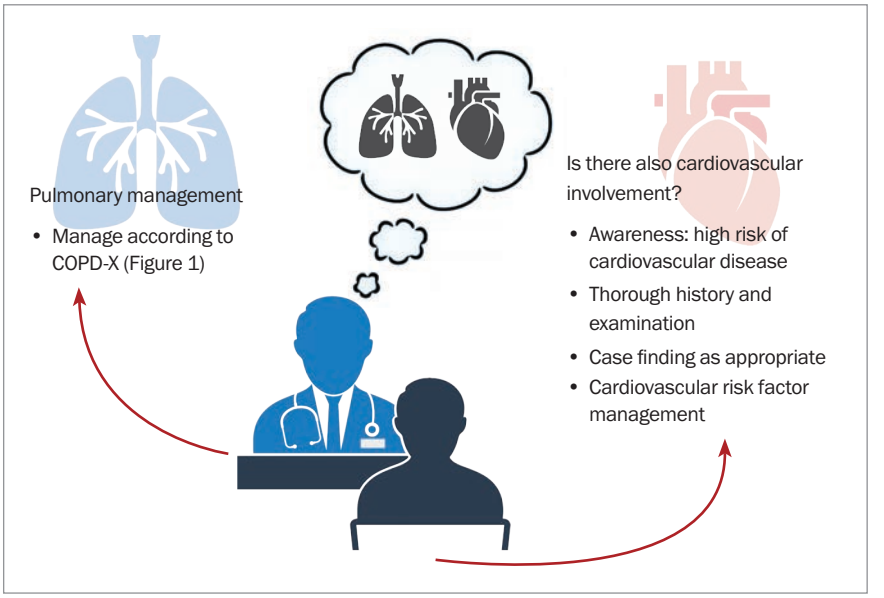

Figure 2. A suggested approach to suspected cardiovascular disease in people with COPD exacerbations.

Abbreviation: COPD = chronic obstructive pulmonary disease.

Case vignette: a female smoker with frequent dyspnoea

Dorothy Green* is a 73-year-old female smoker who was referred after frequent emergency department presentations for episodes of dyspnoea with green sputum accompanied by wheezing and chest tightness. Two further atypical features were noted. First, her symptoms and exacerbation frequency had not responded to long-acting muscarinic antagonist treatment. Second, diagnosis of chronic obstructive pulmonary disease was made on spirometry demonstrating only mild airflow limitation; however, there was chest tightness on walking about 200 m. A stress echocardiogram showed left anterior descending territory myocardial thinning and hypokinesis. After angiography and stenting, Dorothy's hospital presentation frequency greatly diminished and she was able to return to activities she enjoyed.

* Not the patient's real name.

Conclusion

COPD exacerbations are opportunities to not only improve respiratory health but also detect CVD and optimise cardiovascular health in patients with often significant cardiovascular risk. Astute practitioners can address diagnostic and treatment gaps in both lung and heart health to make a meaningful difference. **RMT**

References

A list of references is included in the online version of this article (https://medicinetoday.com.au/mt/2025/march/supplements/topics-copd-collection).

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COPD exacerbations

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References

1. Yang I, Dabscheck E, George J, et al. The COPD-X Plan: Australian and New Zealand Guidelines for the management of chronic obstructive pulmonary disease. Version 2.76, September 2024. Available online at: https://copdx.org.au (accessed February 2025).
2. Australian Institute of Health and Welfare. Admitted patient care 2017-18: Australian hospital statistics. Health service series no. 90; AIHW Cat. no. HSE 225. Canberra: AIHW; 2019. Available online at: https://www.aihw.gov.au/getmedia/df0abd15-5dd8-4a56-94fa-c9ab68690e18/aihw-hse-225.pdf.aspx?inline=true (accessed March 2021).
3. McGarvey LP, Magder S, Burkhart D, et al. Cause-specific mortality adjudication in the UPLIFT COPD trial: findings and recommendations. Respir Med 2012; 106: 515-521.
4. MacDonald MI, Shafuddin E, King PT, Chang CL, Bardin PG, Hancox RJ. Cardiac dysfunction during exacerbations of chronic obstructive pulmonary disease. Lancet Respir Med 2016; 4: 138-148.
5. Leong P, MacDonald MI, King P, et al. Treatable cardiac disease in hospitalised COPD exacerbations. ERJ Open Res 2021; 7: 00756-2020.
6. Leong P, Macdonald MI, Ko BS, Bardin PG. Coexisting chronic obstructive pulmonary disease and cardiovascular disease in clinical practice: a diagnostic and therapeutic challenge. Med J Aust 2019; 210: 417-423.
7. Rasmussen DB, Bodtger U, Lamberts M, et al. Beta-blocker, aspirin, and statin usage after first-time myocardial infarction in patients with chronic obstructive pulmonary disease: a nationwide analysis from 1995 to 2015 in Denmark. Eur Heart J Qual Care Clin Outcomes 2020; 6: 23-31.
8. Reed RM, Eberlein M, Girgis RE, et al. Coronary artery disease is under-diagnosed and under-treated in advanced lung disease. Am J Med 2012; 125: 1228.e13-1228.e22.
9. Neef PA, McDonald CF, Burrell LM, Irving LB, Johnson DF, Steinfort DP. Beta-blockers are under-prescribed in patients with chronic obstructive pulmonary disease and co-morbid cardiac disease. Intern Med J 2016; 46: 1336-1340.
10. Rothnie KJ, Smeeth L, Herrett E, et al. Closing the mortality gap after a myocardial infarction in people with and without chronic obstructive pulmonary disease. Heart 2015; 101: 1103-1110.
11. Sin DD. Chronic obstructive pulmonary disease as a risk factor for cardiovascular morbidity and mortality. Proc Am Thoracic Soc 2005; 2: 8-11.
12. Chen W, Thomas J, Sadatsafavi M, FitzGerald JM. Risk of cardiovascular comorbidity in patients with chronic obstructive pulmonary disease: a systematic review and meta-analysis. Lancet Respir Med 2015; 3: 631-639.
13. Wang M, Lin EP-Y, Huang L-C, Li C-Y, Shyr Y, Lai C-H. Mortality of cardiovascular events in COPD patients with preceding hospitalized acute exacerbation. Chest 2020; 158: 973-985.
14. Barnett A, Beasley R, Buchan C, et al. Thoracic Society of Australia and New Zealand Position statement on acute oxygen use in adults: 'swimming between the flags'. Respirology 2022; 27: 262-276.
15. Lipson DA, Barnhart F, Brealey N, et al. Once-daily single-inhaler triple versus dual therapy in patients with COPD. N Engl J Med 2018; 378: 1671-1680.
16. Rabe KF, Martinez FJ, Ferguson GT, et al. Triple inhaled therapy at two glucocorticoid doses in moderate-to-very-severe COPD. N Engl J Med 2020; 383: 35-48.
17. Nies LM, Looijmans-van den Akker I, Rozendaal L, Baar B, Vos RC, Hart HE. The impact of the new Dutch guideline on cardiovascular risk management in patients with COPD: a retrospective study. BJGP Open 2021; 5(1): bjgpopen20X101139.
18. Macleod MA, Knott KD, Allinson JP, et al. Prevalence and clinical correlates of radiologically detected coronary artery disease in COPD: a cross-sectional observational study. Am J Respir Crit Care Med 2024 Dec 16; e-pub (https://doi.org/10.1164/rccm.202404-0838oc).

COPD
Reducing hospitalisations this winter

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Effective and appropriate management of patients with chronic obstructive pulmonary disease (COPD) includes immunising against influenza and pneumococcus, encouraging smoking cessation, regular exercise and a healthy diet, and treating exacerbations early. These measures can help prevent hospitalisations due to COPD exacerbations.

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Chronic obstructive pulmonary disease (COPD) is currently the third leading cause of death in Australia in those aged 65 to 74 years, with many deaths occurring as a result of an exacerbation.[1] COPD is a common clinical problem encountered in general practice, with about one million Australians being significantly affected by long-term lung conditions characterised by shortness of breath, such as chronic bronchitis and emphysema.[2] Exacerbations of COPD can significantly impair a patient's quality of life, contribute to progressive decline in lung function and are frequently under-recognised by both the patient and medical staff. A considerable increase in the number of COPD exacerbations and hospital admissions is seen during the winter months, and deaths from COPD tend to be highest in the late winter months (July to August).[3]

This article reviews current recommendations for the care of patients with COPD and the management of exacerbations in the general practice setting, with the aim of reducing the number of exacerbations and hospitalisations this winter. Advanced treatments, including surgical and endoscopic treatments for COPD, are beyond

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KEY POINTS

- Review management of patients with chronic obstructive pulmonary disease (COPD) before winter, ensuring an appropriate management plan is in place, including pharmacological and nonpharmacological therapies.
- Pulmonary rehabilitation is an effective intervention in COPD and can improve quality of life, fitness and self-confidence, and reduce hospitalisations.
- Check that patients' vaccinations, including influenza and pneumococcal vaccinations, are up to date. Consider a COVID-19 booster and respiratory syncytial virus vaccination.
- Assess and manage comorbidities.
- Patients should be encouraged to have a self-management plan for COPD.
- Patients should be reviewed early and regularly after an exacerbation, whether they are treated at home or in hospital; readmission risk is highest within three months of discharge.
- The involvement of outreach and community home services in the management of patients with COPD should be considered.
- Early treatment of patients with exacerbations of COPD may reduce hospitalisations.

the scope of this review and are not discussed in detail.

What is COPD in 2025?

Our understanding of COPD has evolved dramatically over the past two decades, with the past 15 years in particular seeing an exponential increase in research in COPD. Successful new options for treatment have been developed and new evidence has informed the use of older drugs in certain types of patients with COPD. There has been a shift from an airflow limitation (forced expiratory volume in one second [FEV_1]) and 'one size fits all' approach to diagnosis and management towards recognition of COPD as a very complex and heterogeneous condition. This recognition is leading to increased individualisation of COPD management.[4]

International guidelines from the Global Initiative for Chronic Obstructive Lung Disease (GOLD) recommend that COPD be considered as a whole condition, not only airflow obstruction.[5] Severity of airflow limitation (based on postbronchodilator FEV_1) remains a core feature, but symptoms experienced by the patient and history of moderate or severe exacerbations should now be included in the assessment. Dyspnoea is a better prognostic indicator of mortality in COPD than FEV_1, and previous history of exacerbations is the best surrogate marker of the risk of future exacerbations.

Previously, limited options for pharmacological treatment made it unnecessary to clinically identify different types of patients. However, the number of treatments now available for COPD treatment has increased considerably over the past decades. Phenotyping can help clinicians identify patients who share clinical characteristics and outcomes and, more importantly, similar responses to existing treatments. It has become increasingly evident that not all patients respond equally to all drugs, and the need to identify 'responders' is crucial.

There is no consensus on the definition and number of different COPD phenotypes, which may be anywhere from two to 328 million (estimated worldwide number of patients with COPD in 2010).[6] Some clinically relevant COPD phenotypes include:[6]

- 'frequent exacerbators' with two or more exacerbations per year, who may benefit from anti-inflammatory treatment added to bronchodilators
- 'overlap COPD-asthma' who have an enhanced response to inhaled corticosteroids
- 'infrequent exacerbators' whose treatment may be based on long-acting bronchodilators, either alone or in combination
- high rates of 'comorbidities', particularly cardiovascular disease and metabolic syndrome, who may benefit from aggressive risk-factor management.

Treatable traits is a proposed treatment approach for management of patients with airways diseases. Patients are assessed by detailed clinical assessment and identification of airways risk factors, including smoking, asthma, occupational exposures, allergy, family history and early life respiratory disease; spirometry; blood eosinophil levels and assessment of comorbidities.[7] A chest x-ray is not useful to establish a diagnosis of COPD but is of value in excluding alternative diagnoses and assessing for significant comorbidities, such as additional respiratory (pulmonary fibrosis, pleural disease, bronchiectasis), cardiac (cardiomegaly) and skeletal (kyphoscoliosis) diseases.[5]

Traits are grouped into three domains: pulmonary, extrapulmonary and behaviours/risks. Treatment of each individual trait has been found in a systemic review to lead to improved health-related quality of life, and small-to-moderate improvements in reductions in hospitalisations and one-year mortality (Box 1).[8]

Who is at risk of COPD?

Smoking remains the major risk factor for COPD. However, even among heavy smokers, fewer than 50% develop clinically significant COPD, and some genuinely light smokers or nonsmokers develop chronic airflow limitation.[5] Genetics, lung growth and development, asthma and other environmental exposures are some of the factors that can lead to development of COPD in later life. COPD is considered to result from an accelerated decline in FEV_1 over time, but in some patients it may be related to reaching early adulthood with a low FEV_1 due to impaired lung development during neonatal, childhood or adolescent periods (Figure 1).[9]

COPD should be considered in any patient who has dyspnoea, chronic cough or sputum production, and a history of exposure to risk factors for the disease, mainly smoking (usually more than 10 to 15 pack-years). The measurement of FEV_1 by spirometry remains the diagnostic test for COPD and should be performed in all patients with suspected COPD. COPD is defined as a postbronchodilator FEV_1 to forced vital capacity (FVC) ratio of below 0.7.[7] If the airflow obstruction is fully reversible, the patient should be treated as for asthma.[7]

Underdiagnosis of COPD remains prevalent. However, patients with a history of smoking and symptoms suggestive of COPD need thorough assessment; the problem may be COPD alone, but often symptoms are due

1. Some clinically relevant features of patients with COPD to consider in management[8]

Pulmonary
- Airflow limitation
- History of moderate-to-severe exacerbations
- Dyspnoea
- Lung microbiome and chronic airway 'colonisation'
- Airway and blood eosinophil count
- Imaging findings (emphysema, bronchiectasis, lung cancer)

Extrapulmonary (comorbidities)
- Cardiovascular disease
- Skeletal muscle dysfunction
- Metabolic syndrome
- Osteoporosis
- Depression
- Anxiety
- Lung cancer

Risks and behaviours
- Smoking
- Occupational and environmental exposures
- Physical activity levels
- Inhaler technique
- Treatment adherence

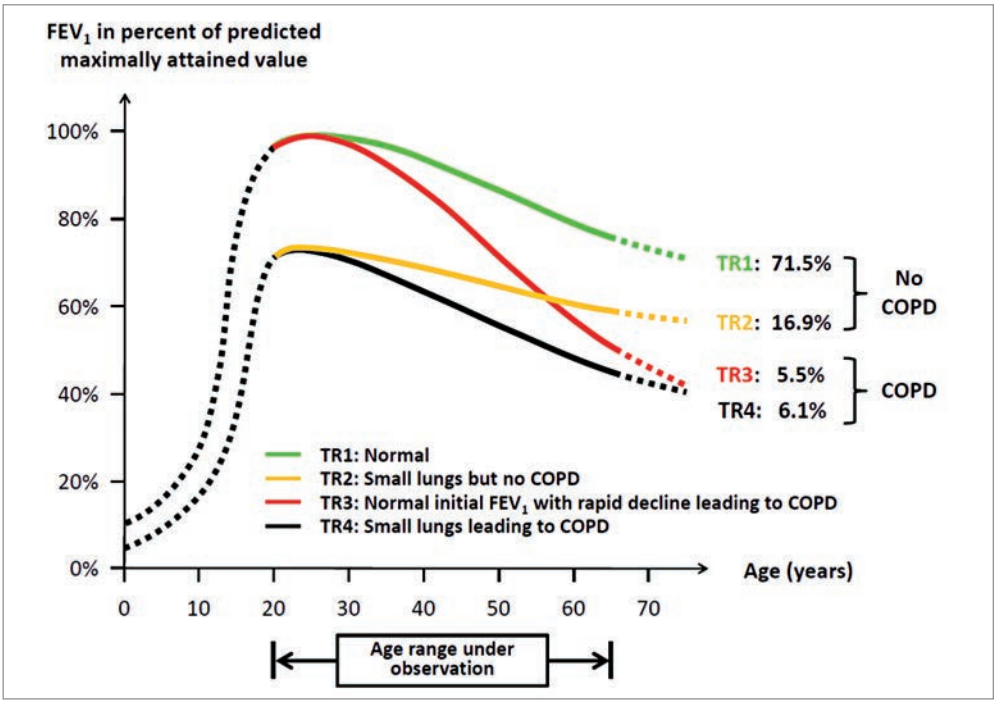


Figure 1. Forced expiratory volume in one second (FEV_1) progression over time. There is great heterogeneity in the rate of FEV_1 decline due to the complex interactions of genes with environmental exposures and risk factors over an individual's lifetime. TR = trajectories defined according to baseline levels of FEV_1 and the presence/absence of GOLD grade ≥2 COPD.

Reproduced with permission from Lange, et al. N Engl J Med 2015; 373: 111-122.[9]

to a combination of cardiovascular disease, deconditioning and other issues, as well as airways disease.

There is a continuum of COPD from mild to severe disease; severity is not solely related to reduction in FEV_1, but to symptoms, frequency of exacerbations, presence of complications and extrapulmonary effects. One classification, from the COPD-X guidelines, is shown in Table 1.[7]

Lung cancer screening by low-dose computed tomography (LDCT) will be available in Australia from July 2025. Eligibility criteria are: age between 50 and 70 years, asymptomatic for lung cancer, have an at least 30 pack-year smoking history and are either currently smoking or ceased in the past 10 years.[10] Emphysema is a hallmark of COPD and is detectable on LDCT, as are other features that may indicate COPD, such as airway wall thickening and mucus plugging.[5] Findings of these abnormalities will provide an opportunity for detailed COPD assessment in this high-risk patient group.

Who is at risk of a COPD exacerbation?

All patients with COPD may develop exacerbations, and even those with underlying mild disease may experience a severe exacerbation, particularly in the winter months. Those with severe COPD are more likely to have a serious outcome even with a mild exacerbation. The single best predictor of exacerbations is previous exacerbations, across all levels of COPD severity. However, exacerbations also become more frequent as COPD severity worsens.

The lung 'microbiome' is likely to be one of the factors involved in exacerbation risk; the more pathogens present in the lower airways, the worse the COPD outcome. Patients with COPD may have lower airways colonised by bacteria including *Haemophilus influenzae*, *Streptococcus pneumoniae* and *Moraxella catarrhalis*. *Pseudomonas aeruginosa* and *Staphylococcus aureus* may colonise airways of patients with severe airflow obstruction, and appear associated with more frequent exacerbations and worse outcomes. Identification of these patients may highlight a higher exacerbation risk (and also direct antibiotic management when needed). Other differential diagnoses of increased respiration symptoms include left ventricular failure, pulmonary embolus and pneumonia.

Exacerbations are often triggered by respiratory tract infections, either viral or bacterial. In a retrospective study in Australian hospitals, the most common viruses isolated in patients presenting with COPD exacerbations were influenza virus, rhinovirus and respiratory syncytial virus A/B.[11]

Optimising baseline COPD management

Ensuring that each patient's usual COPD management is effective and appropriate will help in reducing both exacerbations and the impact of exacerbations. The Australian and New Zealand COPD guidelines are regularly updated. The current version is available online through the Lung Foundation Australia website (https://copdx.org.au).[7] These guidelines are known as the COPD-X plan, from:

C – confirm diagnosis
O – optimise function
P – prevent deterioration
D – develop a self-management plan and manage
X – exacerbations.

An approach to the management of patients with COPD based on these guidelines is discussed in this article.

Referral of patients

Referral of patients to a respiratory physician should be considered if their COPD is

Table 1. Classification of severity of COPD*

	Mild	Moderate	Severe
Typical symptoms	Few symptoms	Increasing dyspnoea	Dyspnoea on minimal exertion
	Breathlessness on moderate exertion	Breathlessness walking on level ground	Daily activities severely curtailed
	Little or no effect on daily activities	Cough and sputum production	Chronic cough
		Infections requiring corticosteroids	
Typical lung function	FEV_1 about 60 to 80% predicted	FEV_1 about 40 to 59% predicted	FEV_1 <40% predicted

Abbreviation: FEV_1 = forced expiratory volume in one second.
* Reproduced with permission from www.copdx.org.au.[7]

moderate to severe, the diagnosis is unclear or complications such as cor pulmonale are present (Box 2).[7]

Treatment

Management strategies in patients with COPD focus on relief of symptoms, prevention of disease progression, and prevention and treatment of exacerbations and complications, with the aims of improving exercise tolerance and health status and reducing mortality. The extents to which these goals can be realised vary with each patient, and some treatments will produce benefits in more than one area. Treatments include both pharmacological and nonpharmacological therapies.

COPD is linked to a range of comorbid diseases, including cardiovascular diseases, metabolic syndrome, gastro-oesophageal reflux, osteoporosis, depression and anxiety, likely in relation to shared risk factors. COPD is also associated with an increased risk of lung cancer, due to the common risk factor of smoking.[5,12] COPD can also have significant extrapulmonary effects, including weight loss and abnormal skeletal muscle dysfunction. Multimorbidity influences mortality and hospitalisations, independent of airflow obstruction, and should be routinely assessed and treated.

The predominant cause of death in patients with COPD changes with increasing COPD severity. In patients with mild to moderate COPD, deaths are mostly due to cancer and cardiovascular diseases. As COPD severity increases, deaths due to respiratory diseases are increasingly common.[13] Many predictors of mortality in COPD have been identified, including reduction in FEV_1, dyspnoea, body mass index (BMI), exercise capacity and frequency of exacerbations. However, prediction of survival in an individual patient with COPD is recognised to remain very challenging, compared with other diseases such as cancer or severe heart failure.

Pharmacological therapy

There has been an increase in the types and numbers of inhaler devices and medications available for COPD maintenance therapy. However, the classes of inhaled medications have not changed:

- short-acting beta2-agonists (SABA)
- long-acting beta2-agonists (LABA)
- short-acting muscarinic antagonists (SAMA)
- long-acting muscarinic antagonists (LAMA)
- inhaled corticosteroids (ICS).

Meta-analyses to date have not shown any statistically significant differences among LAMAs in preventing moderate-to-severe exacerbations of COPD.[7] Comparisons within other classes appear limited at present.

When considering treatment for an individual patient, factors to consider include the patient's symptoms, COPD severity and comorbidities, and the type of inhaler device to use. Combining two medications of the same class, such as a LABA/LAMA or LABA/ICS combination and an additional LABA is not advised; the risk of side effects is increased for no added symptomatic improvement.

2. COPD-X: an approach to shared GP and specialist management of COPD[7]

Areas managed in primary care

- Smoking cessation
- Monitoring and management of comorbidities
- Assessment and optimisation of nutritional status
- Regular review of management, treatment adherence and inhaler technique
- Regular physical activity and consider referral for pulmonary rehabilitation
- Identification and management of exacerbations
- Assessment of social supports
- Consideration of advance care planning

Areas managed by specialist respiratory physician

- Suspected moderate or severe COPD
- Diagnostic uncertainty and exclusion of asthma
- Unusual symptoms such as haemoptysis
- Young patients (<40 years) or suspected alpha-1 antitrypsin deficiency
- Onset of cor pulmonale
- Rapid decline in FEV_1, for early intervention
- For assessment for long-term oxygen therapy (benefit has been shown in hypoxaemic COPD with stable daytime PaO_2 of 55 mmHg or lower)
- Symptoms disproportionate to lung function deficits
- Dysfunctional breathing
- Frequent exacerbations
- Bullous lung disease
- For assessment for possible surgical intervention (lung volume techniques, lung transplantation)
- Other multiple comorbidities such that multidisciplinary care required (including assessment of social supports and assistance in advance care planning)

Inhaler technique is often suboptimal, including in those who are long-term inhaler users. Use of multiple inhaler device types is associated with an increase in errors and may be associated with a poorer outcome in patients with COPD. Therefore, frequent review of inhaler technique and rationalisation of device type is beneficial.[14,15]

SABA and SAMA

Short-acting bronchodilators, such as the SABA salbutamol or the SAMA ipratropium bromide, can be used as as-needed therapy for patients with only occasional dyspnoea. SABAs can be given for immediate relief of symptoms in patients already using a long-acting bronchodilator for maintenance therapy. Side effects are generally minor; however, a meta-analysis of randomised controlled trials, and a later cohort study, found an increased risk of adverse cardiovascular events with ipratropium bromide.[16] This has not been seen with tiotropium.[17,18]

LAMA, LABA and LAMA/LABA combinations

Most patients will need more than occasional use of short-acting bronchodilators and can be commenced on long-acting bronchodilators, either a LAMA or LABA or combination LAMA/LABA. A meta-analysis comparing LABAs with LAMAs assessed 16 randomised double-blinded controlled trials of patients with moderate-to-very-severe COPD.[19] It found that LAMAs were associated with a lower risk of acute exacerbations and lower incidence of adverse events, compared with LABAs. No significant differences between LAMAs and LABAs were found in terms of changes in lung function, symptoms or health status. LAMAs may be preferable to LABAs in patients with stable COPD, especially those at risk of frequent exacerbations.[19]

In patients with persistent dyspnoea on one bronchodilator treatment, a second bronchodilator should be added.[5] Several LAMA/LABA fixed-dose combinations delivered in a single inhaler are available in Australia, via a range of devices. A network meta-analysis of LAMA/LABA combinations compared with the individual monotherapies found that the fixed-dose combinations provided benefits in lung function and quality of life, with no increase in adverse outcomes.[20] Combination therapy reduced moderate-to-severe exacerbations compared with a LABA alone but not compared with a LAMA alone. Effects on severe exacerbations were similar with both combination and monotherapies. Other network meta-analyses have also found benefits for LAMA/LABA fixed-dose combinations, compared with their monocomponents.[21] PBS eligibility for these medications should be reviewed.

Inhaled corticosteroids

The potential benefits of ICS must be balanced against the potential risks including local oropharyngeal adverse effects and pneumonia. A meta-analysis of 43 studies of COPD showed an increased risk of pneumonia with ICS use, but this was balanced against the benefit of reduced exacerbations.[22] Their main impact is to reduce the risk of exacerbations; in contrast to long-acting bronchodilators, their effects on symptoms and lung function are small and often insufficient to use as a guide to treatment efficacy. Lower doses of ICS should be used in patients with COPD whenever possible. Treatment of people with COPD, especially with high-dose ICS, has been associated with a higher risk of bone fractures and osteoporosis, and there is some evidence of an association with a higher risk of mycobacterial infection and blood glucose levels.[7]

Treatment with ICS is directed at patients deemed to be at risk of exacerbations because of a past history of exacerbations and/or poor lung function.[23] There is emerging evidence that blood eosinophil counts may be a useful biomarker of ICS response in patients with COPD.[24] Those with blood eosinophil counts less than 100 cells/mcL appear less likely to benefit from ICS, and those with a count of more than 300 cells/mcL are more likely to benefit. ICS alone are not indicated as sole inhaler therapy for COPD. The risk of pneumonia is higher in patients of older age, with a lower BMI, with greater general fragility and who are receiving higher ICS doses, and possibly in those with blood eosinophil counts less than 100 cells/mcL.[24]

A reasonable approach based on current evidence is to consider the addition of ICS to long-term maintenance bronchodilator LAMA/LABA therapy in patients with COPD and a history of multiple or severe exacerbations and poor lung function (FEV_1 <50% predicted), particularly if blood eosinophil counts are more than 300 cells/mcL, and in those with coexistent COPD and asthma. 'Triple therapy' with ICS/LAMA/LABA can be a single inhaler or an additional inhaler. Different formulations of single inhaler triple therapy have similar efficacy in exacerbation reduction.[25,26]

In general, the use of drugs in COPD does not involve back-titration. The exception is when oral corticosteroids have been given for an exacerbation. Additionally, in light of recent trials, in patients with COPD with no evidence of asthma and with infrequent exacerbations, ICS withdrawal can be considered.[7] Close monitoring is advised after withdrawal, and withdrawal should be considered cautiously in those with elevated blood eosinophil counts and/or poor lung function.

Other and emerging therapies

Long-term use of systemic corticosteroids is not recommended in patients with COPD due to an unfavourable risk-benefit ratio.[7] However, short-term use to treat exacerbations is supported by good-quality evidence, with reduction in the severity of exacerbations, shortened recovery times and reduced hospital admissions and readmissions being noted.[7]

Several recent trials of biologic therapies targeting interleukin-5, interleukin-5 receptors or interleukin-4 and -13 receptors to reduce eosinophil activity and type 2 inflammation have shown promise in select patient groups. Patients with COPD, eosinophilia and frequent exacerbations despite triple inhaler therapy may show a reduction in exacerbation rates and improvement in FEV_1.[27,28] Dupilumab, a monoclonal antibody blocking interleukin-4 and interleukin-13 receptor signalling, has recently been TGA approved for use in adults as add-on maintenance treatment for uncontrolled COPD characterised by raised blood eosinophils on a stable combination of an ICS, a LABA, and

3. Brief strategies to help patients who are willing to quit smoking – the five As[32]

Ask – Systematically identify all tobacco users at every visit
Advise – Strongly urge all tobacco users to quit
Assess – Determine willingness to make a quit attempt
Assist – Aid the patient in quitting
Arrange – Schedule follow-up contact

a LAMA, or on a combination of a LABA and a LAMA if ICS is not appropriate. Specialist review of patients is advised.

Several trials have suggested that in patients with moderate-to-severe COPD and frequent exacerbations, long-term treatment with oral macrolides may reduce the frequency of exacerbations. However, owing to the potential significant adverse effects including cardiac toxicity, ototoxicity, diarrhoea and antibiotic resistance it is recommended that specialist advice be sought if this therapy is being considered.[29] There is no evidence base to support long-term use of other antibiotics.

Theophylline has a modest bronchodilator effect, but is not currently recommended in Australia due to its narrow therapeutic index, its potential for significant side effects and the lack of demonstration of a reduction in exacerbation rates in patients who are on adequate inhaled therapy.[30] Phosphodiesterase type-4 inhibitors are potential candidates for the treatment of COPD, but this class of medications is currently not available in Australia.

Nonpharmacological therapies

Smoking cessation

Smoking cessation remains the single most effective intervention to slow the progression of COPD. Short-term benefits on lung function and quality of life are also seen. GPs should aim to identify all current, or relapsed, smokers at every consultation as each brief counselling intervention increases the chance of successful cessation by 5 to 10%.[31] No single cessation plan works for all; a discussion is needed with each patient to find the best technique. As few smokers are successful in their first attempt at quitting, persistence by everyone is important. Smoking cessation is usually a long-term process rather than a single event, with episodes of relapse before long-term success is achieved. The five As can be used as a framework for helping patients to quit smoking (Box 3 and Box 4).[32]

Nicotine dependence is most effectively treated with a combination of nicotine replacement therapy (NRT), behavioural support and pharmacotherapy. NRT (available as a patch, gum, lozenge, sublingual tablet and inhaler) is widely available, and more than one form of NRT can be used concurrently with increased success rates and no safety risks. Those who are not willing to quit can be advised to progressively substitute their cigarette intake with NRT. This use of NRT can double the odds of smoking cessation.[32] Some patients may be eligible for PBS NRT; this can be checked via the PBS.[32]

Varenicline is a nicotinic receptor partial agonist that more than doubles the chances of quitting compared with placebo. Adverse effects include unusual mood change, depression, behaviour disturbance and suicidal thoughts. A Cochrane review found that varenicline helped about 50% more people to quit than nicotine patches and 'other' forms of NRT (tablets, sprays, lozenges and inhalers), and about 70% more people than nicotine gum.[33] Combining two types of NRT was as effective as using varenicline, and helped more people to quit than single types of NRT.

Bupropion, a non-nicotine oral therapy, significantly increases cessation rates compared with placebo. It has been shown to be effective for smokers with depression, cardiac disease and respiratory diseases, including COPD. A Cochrane review found evidence that smokers with COPD who received a combination of high-intensity behavioural support and medication were more than twice as likely to quit as people who received behavioural support alone. It found no clear evidence that one particular form of behavioural support or medication is better than another.[34]

Immunisations

Influenza immunisation can reduce the incidence of serious illness and death in patients with COPD, and a significant reduction in the number of exacerbations has been seen in immunised patients.[5,7] All patients with COPD should be offered annual influenza vaccination. Development of an immune response takes at least two weeks. One multicentre study suggested that influenza vaccine efficacy decreases in older adults as frailty increases.[35] Despite this, a recent meta-analysis suggested that older adults receiving influenza vaccination may have a lower risk of influenza and lower respiratory tract infections than those not vaccinated.[36] Repeat vaccination later in the influenza season may also be considered in the elderly and in those with underlying severe airways disease. People with COPD, particularly the elderly, may have a decreased risk of ischaemic heart disease when they have received influenza vaccination over many years.[5]

Previously, a history of anaphylaxis or a serious allergic reaction to eggs was a

4. Patient resources for quitting smoking

Quitline: Tel: 13 78 48 (nationwide)
www.quit.org.au

The National Tobacco Campaign:
www.health.gov.au/our-work/national-tobacco-campaign

How to quit smoking and vaping (Australian Government Department of Health and Aged Care)
www.health.gov.au/topics/smoking-vaping-and-tobacco/how-to-quit?

ACOSH (Australian Council on Smoking and Health)
https://acosh.org

Tobacco in Australia: Facts and Issues
Melbourne: Cancer Council Victoria; 2024 (updated online March 2025).
www.tobaccoinaustralia.org.au
A comprehensive review of the major issues in smoking and health in Australia; available online, free of charge.

The Australian Lung Foundation (ALF) and LungNet: Tel: 1800 654 301
www.lungfoundation.com.au
The LungNet is a network of affiliated Patient Support Groups Australia-wide and provides information and referral assistance.

contraindication to influenza vaccination. However, based on prospective and retrospective studies of influenza vaccination in those with and without egg allergy (including egg anaphylaxis), people with egg allergy can safely receive influenza vaccines that contain less than 1 mcg of ovalbumin per dose. Vaccination may be administered in community vaccination clinics (which may or may not have direct medical practitioner supervision) as a single dose followed by the recommended waiting period of 15 minutes (in Australia) or 20 minutes (in New Zealand). A longer waiting period of 30 minutes can be considered in those with past egg anaphylaxis or significant patient or healthcare provider anxiety. The immediate availability of medical practitioner care is recommended and staff should be familiar with the recognition and treatment of anaphylaxis.[37] Influenza vaccine should not be given to patients with a history of anaphylaxis to influenza vaccine, current febrile illness or history of Guillain-Barré syndrome.

Pneumococcal immunisation is recommended for all patients with COPD. People with COPD vaccinated with injectable polyvalent pneumococcal vaccines are less likely to experience an exacerbation of COPD or episode of community-acquired pneumonia, with numbers needed to treat of 8 and 21, respectively.[38] Immunisation with 13-valent pneumococcal conjugate vaccine (13vPCV) is highly effective in preventing community-acquired pneumococcal pneumonia in older adults.[39] 23-valent pneumococcal conjugate vaccine (23vPPV) is less effective in elderly or immunosuppressed patients.[7] For those with newly diagnosed COPD, not previously vaccinated again pneumococcus, current recommendation is for 13vPCV followed by first dose of 23vPPV 12 months later, then a second dose of 23vPPV at least five years later.[40] In the current National Immunisation Program, non-First Nations patients under the age of 70 years with COPD and chronic emphysema are not included in the risk conditions for funded pneumococcal vaccination. Thus, they are not eligible for reimbursement.

Respiratory syncytial virus (RSV) can cause severe infection in the elderly and in those with significant underlying illnesses. An effective RSV vaccine has been available in Australia since 2024. Among the groups in whom it is recommended are First Nations people aged 60 years and over, people aged 60 years and over with medical conditions that increase their risk of severe RSV disease, such as COPD, and in people aged 75 years and over.[41] However, it is not funded for these groups and must be purchased privately.

Patients with COPD are at increased risk of pertussis.[5,42] In the National Immunisation Program adults aged 65 years are recommended to consider having a pertussis-containing vaccine if their last dose was more than 10 years ago. This is due to waning immunity over time and increased pertussis morbidity in older people; however, COPD is not included in the risk conditions for funded vaccination. Patients should also consider herpes zoster vaccination; shingles is associated with significant morbidity.

Physical activity and reducing sedentary behaviour

On average, people with COPD participate in 57% of the total duration of physical activity undertaken by healthy controls.[43] Reductions in physical activity commence early in COPD and, over time, levels of physical activity substantially decline across all severities of COPD. This decline is accompanied by a deterioration in lung function and health status.[44] Levels of physical activity are reduced further during hospitalisation for a COPD exacerbation. Return to previous levels of activity often does not occur.

Low levels of physical activity are associated with increased mortality and exacerbations in people with COPD.[45] People with COPD should be encouraged to be physically active and participate in activities of daily living that require the use of muscle strength, such as lifting or gardening as well as doing physical activities they enjoy, such as bowls, golf or swimming.[7]

There is growing recognition that people with COPD spend many of their waking hours in sedentary behaviours, defined as those behaviours that are undertaken in a sitting or reclined posture and have low energy requirements, such as watching television, reading and sitting at a computer. People with COPD with the greatest sedentary time during daily life are characterised by more frequent exacerbations, lower exercise capacity, long-term oxygen use, lower motivation for exercise and the presence of physical comorbidities including obesity and arthritis. Compared with the goal of increasing moderate- or high-intensity physical activity, the goal of reducing sedentary time by increasing light-intensity physical activity is likely to be more feasible in some patients with COPD. Of note, in people with COPD, greater participation in light-intensity physical activity has been reported to reduce the risk of respiratory-related hospitalisations.[46] Table 2 provides some strategies aimed at avoiding prolonged sedentary time.[7]

Pulmonary rehabilitation

The benefits of pulmonary rehabilitation in improving dyspnoea, quality of life, exercise capacity, anxiety and depression, fatigue and emotional function are well established. Evidence also suggests that pulmonary rehabilitation is safe and highly effective in reducing hospital admissions and mortality and improving health-related quality of life in COPD patients after exacerbations.[7]

Pulmonary rehabilitation programs consist of general assessment of the patient and specific assessment of exercise capacity and quality of life, followed by an exercise program and education sessions. Pulmonary rehabilitation programs are available at many community centres and hospitals, and usually welcome referrals from GPs.

Nutrition

Both obesity and low BMI are associated with increased morbidity in patients with COPD. Obesity increases the work of breathing and is associated with sleep apnoea, hypoventilation and cor pulmonale, and metabolic complications. Malnutrition is an independent predictor of mortality and use of healthcare services in patients with COPD. Energy intake is often reduced due to dyspnoea, medications and lung hyperinflation whereas expenditure is increased due to the

metabolic demands of breathing, infections and systemic inflammation. Low BMI and low fat-free mass are inversely associated with respiratory and peripheral muscle function, exercise capacity and health status. Importantly, those with poor nutrition are most likely to benefit from nutrition therapy before an undernutrition state is established.[47] Nutritional supplementation in malnourished patients can improve walking distance and respiratory muscle strength. High-calorie nutritional supplements should be considered in patients with COPD and a low BMI, particularly those who are malnourished and/or have severe disease.

Self-management and action plans

COPD self-management programs may lead to improved health-related quality of life, with reduced exacerbations being a positive outcome of some studies. Other studies have not shown benefit. Trials to date have used a wide range of study designs and interventions, thus no recommendations as to the essential elements of a COPD self-management program can be made.[7]

Interventions targeting mental health, an active lifestyle, relaxation therapy, use of written action plans, correct medication use and facilitated access to services have been found to reduce exacerbations and visits to the emergency department. Action plans should be completed by the clinician and patient together, with the aim of assisting the patient to identify symptoms of an exacerbation and know what actions they should take. A sample action plan is shown in Figure 2.

Anxiety and depression are common in patients with COPD and are associated with reduced quality of life, poor self-management and medical symptoms. There is also some evidence that mood disorders are independent risk factors for exacerbations and hospitalisations. Elderly patients with COPD prescribed benzodiazepines may be at increased risk of exacerbations; caution with use of these medications, or avoidance, is warranted in all patients with COPD due to their potential for depression of respiratory drive. Behavioural therapy and selective serotonin receptor inhibitors may be better management options, along with referral to clinical psychologists and psychiatrists.

In patients with debilitating breathlessness despite optimal COPD management, referral for specialist advice, consideration of judicious use of low-dose opiates and palliative care involvement can be considered. Use of a handheld fan can also be of considerable help.

Table 2. Strategies that may assist in reminding people to reduce sedentary time*

Sedentary activity	Strategy
TV viewing	During each advertisement break, stand up and go for a short walk around your house
Reading	At the end of each chapter or after a few pages of the newspaper, stand up and go for a short walk
Travelling on public transport	Stand up while waiting for a bus or train
Daily tasks	When ironing, put items away in multiple small trips rather than putting everything away once you have finished
Using a computer	Consider setting an alarm (e.g. on your phone) to remind you to stand up every 30 minutes
Using a phone	Consider standing up to use your phone; go for a short walk around your house after you have finished using your phone

* Reproduced with permission from www.copdx.org.au.[7]

Additional therapies

Use of long-term continuous (15 or more hours/day) domiciliary oxygen therapy in patients with severe COPD and chronic hypoxaemia prolongs survival. Long-term domiciliary noninvasive ventilation can be considered in select patient with severe stable COPD and chronic hypercapnia. Specialist advice should be sought.[7]

Outreach teams

Many regions now have specialist multidisciplinary outreach teams to assist in the co-ordination of home care. For example, in Victoria, the Hospital Admission Risk Program aims to reduce avoidable hospital admissions and emergency department presentations.

Services provided by these teams may include outreach services with rapid response such as a mobile assessment and treatment service (assessment by medical practitioner and outreach nurse) and home visit assessment service. Other home services, such as physiotherapy and pharmacy, may also be accessible. The evidence is not yet available for the overall patient and economic benefits of home care, but a systematic review of seven studies found no significant differences in readmission rates or mortality, and 'Hospital at Home' schemes were preferred by patients and carers.[48] Some patients may need initial hospital assessment, and may then be able to return to their own homes with increased social support and a supervised medical care package.

Prompt treatment of exacerbations

Early identification of a COPD exacerbation and early primary care management may reduce the need for hospitalisation. Initial management includes use of short-acting bronchodilators, oral corticosteroids and/or antibiotics. Indications for hospitalisation of patients with a COPD exacerbation are shown in Box 5.[7]

Follow up after hospitalisation

All patients discharged from hospital after an exacerbation of COPD should have an early (preferably within one week) follow-up consultation with their GP. The risk of readmission is highest within three months of discharge, and more than half of patients are readmitted within 12 months. All the preventive strategies

My COPD Action Plan

Name _____ Date of plan _____

Lung Foundation Australia

Normal for me

My symptoms	My plan
My 'normal' is • I have a usual amount of cough/phlegm • I can do my usual activities.	Medication/s for COPD Puffs every AM: Puffs every PM:
	Medication/s for COPD Puffs every AM: Puffs every PM:
	Oxygen prescription I need to use home oxygen on _____ setting or L/min for _____ hours/day
	Reliever inhaler: Puffs when I need it to relieve my symptoms

I'm unwell

My symptoms	My plan			
My symptoms are worsening if I am: • Coughing more than usual • More breathless • Needing my reliever medication more often • More tired / lethargic • Having difficulty with usual activities.	**If I get** more out of breath **I will** use my reliever inhaler more. Medication: _____ Take _____ puffs every _____ hours.	**If I get** more out of breath despite taking my reliever medications **I will** start my rescue pack – prednisolone. Medication: _____ _____ times per day _____ mg Daily for _____ days	**If I get** more phlegm and/or change in colour (dark yellow, green or brown) **I will** start my rescue pack - antibiotics. Medication: _____ _____ times per day For _____ days	**My flare ups** Date prednisolone started / Date antibiotics started (days or weeks)

If I have had to use my plan twice, it's time to organise an appointment with my doctor or nurse for a review.

Very unwell

My symptoms	My plan
I am becoming more unwell if: • I am getting worse despite the extra medications (including increased reliever, prednisolone and/or antibiotics).	• Speak to my doctor today as I am no better.

If no urgent GP appointments are available, present to your local hospital emergency department.

Emergency

My symptoms	My plan
I'm *extremely* unwell if: • I am experiencing sudden shortness of breath • I am not responding to my reliever • I am feeling scared • I am unusually confused or drowsy • I am having chest pain.	• **Dial 000** for an ambulance or press my medical alarm button • Continue to use my reliever as needed until the ambulance arrives • Try my breathing control techniques.

Plan prepared by _____

Doctor / Nurse Practitioner (circle)

Name: _____

Clinic phone: _____

Next review date: _____

☐ Reminder created

Signature: _____

For more information about managing exacerbations, visit the dedicated clinical path resource.

Please turn page over

Managing breathlessness

When feeling breathless

1. Stop what you are doing
2. Find a resting position
3. Use your fan or the breeze
4. 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

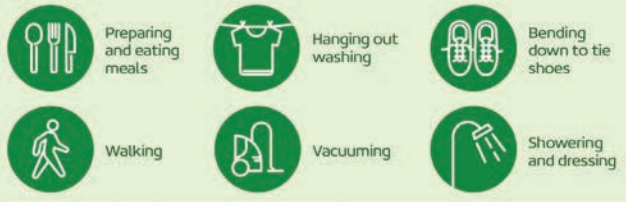
OR

No: Take your prescribed reliever inhaler medication through a spacer, then resume breathing technique for another 2-3 minutes

If you remain breathless, refer to your written Action Plan on the front (turn over).

Common activities that can cause breathlessness when you live with COPD

Breathlessness is a common 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.



Self-management

Self-managing your condition helps to give you control. To learn more about these tools and how they can assist you in self-managing your condition, visit the Lung Foundation Australia website.

Self-management tool	
Inhaler techniques	Correct inhaler technique helps you get the most benefit from your inhaled medications. Ask your doctor, nurse or pharmacist to check your technique.
Relaxed breathing and control	Bending over or leaning forward while resting your arms on a stable surface can assist with getting control of your breathing.
Chest clearance	Airway clearance techniques are breathing exercises that can help you cough up phlegm. Ask a physiotherapist skilled in airway clearance techniques for instructions on how to start.
Hand-held fans	A cool draft of air from a hand-held fan can help you feel less breathless and more in control.
COPD medications chart	It is important you understand your medicines, their role, how they work, and when and how to take them.
Pulmonary rehabilitation (PR)	PR is an exercise and education program that helps you to exercise safely and manage your breathlessness.
Vaccination	Vaccinations for influenza, pneumococcal pneumonia and COVID-19 can reduce the risk of a flare up. Ask your doctor to check if your vaccinations are up to date.

Lung Foundation Australia

Access information and support today

lungfoundation.com.au

enquiries@lungfoundation.com.au

1800 654 301

Access the My COPD Checklist and discuss with your doctor or nurse

Figure 2. COPD action plan.

Reproduced with permission from Lung Foundation Australia (https://lungfoundation.com.au). (https://lungfoundation.com.au/resources/copd-action-plan/)

5. Indications for hospitalisation of patients with COPD*

- Patient has marked increase in intensity of symptoms
- Patient has acute exacerbation characterised by increased dyspnoea, cough or sputum production, plus one or more of the following:
  - inadequate response to ambulatory management
  - inability to walk between rooms when previously mobile
  - inability to eat or sleep because of dyspnoea
  - cannot manage at home even with home-care resources
  - high-risk comorbid condition: pulmonary (e.g. pneumonia) or nonpulmonary
  - altered mental status suggestive of hypercapnia
  - worsening hypoxaemia or cor pulmonale

* Reproduced with permission from www.copdx.org.au.[7]

6. COPD review checklist*

- Assess the patient's coping ability and strategies
- Measure FEV_1 and performance status
- Reassess inhaled and oral medications
- Review management of comorbidities such as left ventricular failure and obstructive sleep apnoea
- Reassess medication adherence and inhaler techniques
- Review vaccination status (influenza and pneumococcal)
- Assess need for long-term oxygen therapy (will require referral to respiratory physician)
- Consider referral for pulmonary rehabilitation
- Assess risk of osteoporosis and management of existing disease
- Counsel and/or refer for smoking cessation
- Assess nutritional status
- Assess for anxiety, panic disorder and depression
- Consider advanced care directives and end-of-life issues

* Reproduced with permission from www.copdx.org.au.[7]

for COPD exacerbations discussed above should be revisited during this consultation, including revising the patient's COPD self-management or action plan. Pulmonary rehabilitation has been shown to reduce readmissions if provided within one week.[49]

Consider advance care planning in all patients with COPD, especially those with moderate-severe disease and/or prior hospitalisation. Post-hospital admission is an opportune time to discuss advance care directives with patients and, if appropriate, their family and carers. End-of-life issues are relevant for patients with severe and moderate COPD. Most patients with end-stage COPD wish to participate in end-of-life management decisions and would prefer to do so in a non-acute setting. For some patients, palliative care team involvement can be helpful.

Conclusion

To help reduce the number of hospitalisations due to COPD exacerbations in the colder winter months, GPs should ensure that their patient's usual COPD management is effective and appropriate. They can also encourage their patients to be vaccinated against influenza and pneumococcus, avoid exposure to cigarette smoking, participate in pulmonary rehabilitation, exercise regularly and have a healthy diet and good nutritional state. Educating patients with COPD to pay particular attention to their respiratory symptoms, follow their self-management plan, seek early treatment for any decline in their condition and avoid exposure to other people with coughs and colds will also help reduce their risk of a severe exacerbation.

A checklist of the strategies recommended when reviewing patients with COPD is given in Box 6.[7] **RMT**

References

A list of references is included in the online version of this article (https://medicinetoday.com.au/mt/2025/march/supplements/topics-copd-collection).

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COPD
Reducing hospitalisations this winter

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References

1. Australian Institute of Health and Welfare (AIHW). Chronic respiratory conditions. Canberra: AIHW; 2022. Available online at: www.aihw.gov.au/reports-data/health-conditions-disability-deaths/chronic-respiratory-conditions/overview (accessed March 2025 : around AIHW.
2. Access Economics. Economic impact of COPD and cost effective solutions. Report for the Australian Lung Foundation. Sydney: Access Economics Pty Ltd; October 2008.
3. Australian Institute of Health and Welfare (AIHW). Mortality from asthma and COPD in Australia. Cat. no. ACM 30. Canberra: AIHW; 2014.
4. Agusti A. The path to personalised medicine in COPD. Thorax 2014; 69: 857-864.
5. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management and prevention of COPD: 2025 report. Available online at: https://goldcopd.org/2025-gold-report (accessed March 2025).
6. Miravitlles M, Soler-Cataluña JJ, Calle M, Soriano JB. Treatment of COPD by clinical phenotypes: putting old evidence into clinical practice. Eur Respir J 2013; 41: 1252-1256.
7. Yang IA, George J, McDonald CF, et al. The COPD-X Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease 2024. Version 2.76, September 2024. Published online 16 November 2024 https://copdx.org.au/copd-x-plan/ (accessed March 2025).
8. Sarwar MR, McDonald VM, Abramson MJ, et al. Effectiveness of interventions targeting treatable traits for the management of obstructive airway diseases: a systematic review and meta-analysis. J Allergy Clin Imunol Pract 2022; 10: 2333-2345e21.
9. Lange P, Cell B, Agusti A, et al. Lung-function trajectories leading to chronic obstructive pulmonary disease. N Engl J Med 2015; 373: 111-122.
10. Australian Government Department of Health and Aged Care. National Lung Cancer Screening Program [website]. Last updated 13 January 2025. Available online at: https://www.health.gov.au/our-work/nlcsp (accessed March 2025).
11. Biancardi E, Fennell M, Rawlinson W, Thomas PS. Viruses are frequently present as the infecting agent in acute exacerbations of chronic obstructive pulmonary disease in patients presenting to hospital. Intern Med J 2016; 46: 1160-1165.
12. Vespasiani-Gentilucci U, Pedone C, Muley-Vilamu M, Antonelli-Incalzi R. The pharmacological treatment of chronic comorbidities in COPD: mind the gap! Pulm Pharmacol Ther 2018; 51: 48.
13. Berry CE, Wise RA. Mortality in COPD: causes, risk factors and prevention. COPD 2010; 7: 375-382.
14. Bosnic-Anticevich S, Chrystyn H, Costello RW, et al. The use of multiple respiratory inhalers requiring different inhalation techniques has an adverse effect on COPD outcomes. Int J Chron Obstruct Pulm Dis 2017; 12: 59-71.
15. Chrystyn H, Van Der Palen J, Sharma J, et al. Device errors in asthma and COPD: systematic literature review and meta-analysis. NPJ Prim Care Respir Med 2017; 27: 22
16. Singh S, Loke YK, Furberg CD. Inhaled anticholinergics and risk of major adverse cardiovascular events in patients with chronic obstructive pulmonary disease: a systematic review and meta-analysis. JAMA 2008; 300: 1439-1450.
17. Michele TM, Pinheiro S, Iyasu S. The safety of tiotropium – the FDA's conclusions. N Engl J Med 2010; 363: 1097-1099.
18. Ogale SS, Lee TA, Au DH, Boudreau DM, Sullivan SD. Cardiovascular events associated with ipratropium bromide in COPD. Chest 2010; 137: 13-19.
19. Chen WC, Huang CH, Sheu CC, et al. Long-acting beta2-agonists versus long-acting muscarinic antagonists in patients with stable COPD: a systematic review and meta-analysis of randomized controlled trials. Respirology 2017; 22: 1313-1319.
20. Oba Y, Sarva ST, Dias S. Efficacy and safety of long-acting beta-agonist/long-acting muscarinic antagonist combinations in COPD: a network meta-analysis. Thorax 2016; 71: 15-25.
21. Calzetta L, Rogliani P, Ora J, Puxeddu E, Cazzola M, Matera MG. LABA/LAMA combination in COPD: a meta-analysis on the duration of treatment. Eur Respir Rev 2017; 26: 160043.
22. Kew KM, Seniukovich A. Inhaled steroids and risk of pneumonia for chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2014; (3): CD010115.
23. Agusti A, Fabbri LM, Singh D, et al. Inhaled corticosteroids in COPD: friend or foe? Eur Respir J 2018; 52: 1801219.
24. Pavord I, Agusti A. Blood eosinophil count: a biomarker of an important treatable trait in patients with airway disease. Eur Respir J 2016; 47: 1299-1303.
25. Bourdin A, Molinari N, Ferguson GT, et al. Efficacy and safety of budesonide/glycopyrronium/formoterol fumarate versus other triple combinations in COPD: a systematic literature review and network meta-analysis. Adv Ther 2021; 7: 375-382.
26. Lee HW, Kim HJ, Jang EJ, Lee CH. Comparisons of efficacy and safety between triple (inhaled corticosteroid/long-acting muscarinic antagonist/long-acting beta-agonist) therapies in chronic obstructive pulmonary disease: systematic review and Bayesian network meta-analysis. Respiration 2021; 100: 631-643.
27. Pavord ID, Chanez P, Criner GJ, et al. Mepolizumab for eosinophilic chronic obstructive pulmonary disease. N Engl J Med 2017; 377: 1613-1629.
28. Bhatt SP, Rabe K, Haninia NA, et al. Dupilumab for COPD with blood eosinophil evidence of type 2 inflammation. N Engl J Med 2024; 390: 2274-2283.
29. Herath SC, Poole P. Prophylactic antibiotic therapy for chronic obstructive pulmonary disease (COPD). Cochrane Database Syst Rev 2013; (11): CD009764.
30. Devereux G, Cotton S, Fielding S, et al. Effect of theophylline as adjunct to inhaled corticosteroids on exacerbations in patients with COPD: a randomized clinical trial. JAMA 2018; 320: 1548-1559.
31. Wilson DH, Wakefield MA, Steven ID, Rohrsheim RA, Esterman AJ, Graham NM. 'Sick of smoking': evaluation of a targeted minimal smoking cessation intervention in general practice. Med J Aust 1990; 152: 518-521.
32. Royal Australian College of General Practitioners (RACGP). Supporting smoking cessation: a guide for health professionals. Melbourne: RACGP; 2024. Available online at: https://www.racgp.org.au/clinical-resources/clinical-guidelines/key-racgp-guidelines/view-all-racgp-guidelines/supporting-smoking-cessation (accessed March 2025).
33. Cahill K, Stevens S, Perera R, Lancaster T. Pharmacological interventions for

smoking cessation: an overview and network meta-analysis. Cochrane Database Syst Rev 2013; (5): CD009329.
34. Van Eerd EA, Van Der Meer RM, Van Schayck OC, Kotz D. Smoking cessation for people with chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2016; (8): CD010744.
35. Andrew MK, Shinde V, Ye L, et al. The importance of frailty in the assessment of influenza vaccine effectiveness against influenza-related hospitalization in elderly people. J Infect Dis 2017; 216: 405-414.
36. Demicheli V, Jefferson T, Di Pietrantonj C, et al. Vaccines for preventing influenza in the elderly. Cochrane Database Syst Rev 2018; (2): CD004876.
37. Australasian Society of Clinical Immunology and Allergy (ASCIA). ASCIA guidelines – vaccination of the egg-allergic individual. Sydney: ASCIA; 2022. Available online at: https://www.allergy.org.au/hp/papers/vaccination-of-the-egg-allergic-individual (accessed March 2025).
38. Walters JA, Tang JN, Poole P, Wood-Baker R. Pneumococcal vaccines for preventing pneumonia in chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2017; (1): CD001390.
39. Bonten MJ, Huijts S, Bolkenbaas M, et al. Polysaccharide conjugate vaccine against pneumococcal pneumonia in adults. N Engl J Med 2015; 372: 1114-1125.
40. Australian Government Department of Health and Aged Care. National Immunisation Program Schedule [website]. Updated 19 September 2024. Available online at: https://www.health.gov.au/topics/immunisation/when-to-get-vaccinated/national-immunisation-program-schedule (accessed March 2025).
41. Australian Government Department of Health and Aged Care. Respiratory syncytial virus (RSV) vaccine [website]. Updated 5 February 2025. Available online at: https://www.health.gov.au/respiratory-syncytial-virus-rsv-vaccine (accessed March 2025).
42. Naeger S, Pool V, Macina D. Increased burden of pertussis among adolescents and adults with asthma or COPD in the United States, 2007 to 2019. Chest 2024; 165: 1352-1361.
43. Vorrink S, Kort HS, Troosters T, Lammers JW. Level of daily physical activity in individuals with COPD compared with healthy controls. Respir Res 2011; 12: 33.
44. Waschki B, Kirsten AM, Holz O, et al. Disease progression and changes in physical activity in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med 2015; 192: 295-306.
45. Garcia-Aymerich J, Lange P, Benet M, Schnohr P, Anto JM. Regular physical activity reduces hospital admission and mortality in chronic obstructive pulmonary disease: a population based cohort study. Thorax 2006; 61: 772-778.
46. Donaire-Gongzalez D, Gimeno-Santos E, Balcells E, et al. Benefits of physical activity on COPD hospitalisation depend on intensity. Eur Respir J 2015; 46: 1281-1289.
47. Akner G, Larsson K. Undernutrition state in patients with chronic obstructive pulmonary disease. A critical appraisal on diagnostics and treatment. Respir Med 2016; 117: 81-91.
48. Ram FSF, Wedzicha JA, Wright JJ, Greenstone M. Hospital at home for acute exacerbations of chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2003; (4): CD003573.
49. Criner GJ, Bourbeau J, Diekemper RL, et al. Executive summary: prevention of acute exacerbation of COPD: American College of Chest Physicians and Canadian Thoracic Society Guidelines. Chest 2015; 147: 883-893.

Advanced respiratory disease

Updates in symptom control in the last years of life

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Symptoms in advanced respiratory disease are varied and commonly include breathlessness, fatigue and cough. Symptom control can be complex and difficult to navigate, particularly in the last few years of life as the disease progresses and patients' needs escalate. Management is best optimised through holistic multidisciplinary approaches, with management of individual symptoms alongside treatment of the underlying disease process.

Management of advanced respiratory disease has increasingly shifted to primary care and community settings, owing to a growing focus on supported, home-based care and preferences to avoid hospital presentation. Symptoms in advanced respiratory disease are varied, and can be complex to manage, particularly in the last years of life as the disease progresses and patients' needs escalate.[1] The symptoms discussed in this article are most common in chronic obstructive pulmonary disease (COPD) but are also relevant to other chronic conditions such as pulmonary fibrosis, bronchiectasis and lung cancer. Breathlessness in particular is also highly prevalent in advanced cancers and heart failure.[2]

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Defining the last years of life in advanced respiratory disease

Despite well-recognised fluctuation in chronic respiratory conditions (often with periods of exacerbation), indicative prognostic characteristics have been established. In particular, the question 'Would I be surprised if this patient did not survive the next 12 months?' is a useful clinical prompt.[3,4] This question has been found to have high specificity and is a simple prompt for clinicians to actively focus on symptom control, in combination with ongoing disease-directed management of the underlying condition.[3,4]

The nature and intensity of symptoms also signal a patient's changing needs. A modified Medical Research Council (mMRC) breathlessness scale score of 3 ('breathless after walking a few minutes or 100 metres on the flat') or 4 ('too breathless to leave the house or breathless when dressing or undressing') indicates severe breathlessness.[5,6]

Hospitalisation with an acute exacerbation of COPD has long been recognised as a prognostic indicator of advanced respiratory disease.[6,7] Mortality risk varies across studies;

Key points

- Symptoms in advanced respiratory disease are varied, complex and require specific attention to improve patient experiences.
- Key symptoms include the cluster of chronic breathlessness, fatigue and cough, as well as depression and anxiety, insomnia, cachexia, pain and dry mouth.
- Clinical care is best optimised through a holistic, multidisciplinary approach, with individual symptoms targeted through additional management strategies when symptoms persist despite maximising treatment of the underlying disease(s).
- Nonpharmacological interventions for breathlessness are effective and are the main approach to manage chronic breathlessness. These include mobility aids, activity pacing, breathing techniques and the use of a handheld fan to move airflow on the face.
- The psychological impact of advanced respiratory disease is often overlooked and needs to be directly addressed in best practice care.
- Early introduction of advance care planning (ACP) offers patients the opportunity to document their care preferences and address evident lack of support for chronic lung disease in the final stages of disease. The conversation around ACP should be ongoing as patients' preferences evolve throughout disease progression.

however, a 2017 retrospective study reported one- and five-year mortality of patients hospitalised for COPD as 26.2% and 64.3%, respectively, with mechanical ventilation further increasing these risks.[7] Acute hospitalisation is therefore recommended as an opportunity to discuss and plan for future care.[7,8] Low body mass index (less than 21.75 kg/m^2) and cachexia are also reliable prognostic indicators in advanced respiratory disease.[9,10]

Although the ability of prognostic indicators to predict death varies considerably across patients, its utility lies in the opportunity to prompt an additional care focus – notably the treatment of symptoms as a specific treatment goal.

Management of key symptoms

Symptoms in advanced respiratory disease vary; however, key symptoms may occur as a 'respiratory cluster', including chronic breathlessness, fatigue and cough. Other important symptoms include depression, anxiety, insomnia, cachexia, pain and dry mouth.[1] Comprehensive, individualised assessment of the underlying illness, symptoms and the needs of the patient and their carers is essential. This needs assessment usually occurs iteratively over time.[11] Although a broad and holistic approach to symptom management is recommended, individual symptoms should be addressed if they persist despite optimal management of the underlying disease.[1] A useful summary of evidence-based approaches to individual symptom management of COPD is presented in Box 1.[1,11]

Breathlessness

Chronic breathlessness is extremely distressing for patients with chronic respiratory disease, and highly prevalent in people with severe COPD. Both GPs and specialists often voice a lack of confidence in its management.[12,13] Breathlessness is multidimensional and defined as 'an unpleasant subjective experience of discomfort with breathing that worsens as underlying disease processes increase in severity; in its chronic and severe state, breathlessness can lead to significant disability, progressive inactivity, social isolation and substantive suffering'.[14] In addition, 'chronic breathlessness' is defined as breathlessness that 'persists despite optimal treatment of the underlying pathophysiology and that results in disability'.[15,16] A comprehensive approach to the evaluation and treatment of breathlessness is helpful and includes addressing reversible contributing causes, including anaemia, pleural effusion or anxiety; and implementation of evidence-based nonpharmacological interventions.[11]

Nonpharmacological interventions

Nonpharmacological interventions for breathlessness are effective and accessible; therefore, they should be offered to all patients with chronic breathlessness.[1,11] For example, activity pacing, mobility aids and adjusting a patient's living environment can assist in conserving energy for valued activities.[1,11] Increased physical activity and personalised exercise programs (such as pulmonary rehabilitation) can improve stamina and breathlessness.[11] Breathing exercises, such as pursed lip breathing, slow relaxed deep breathing and yoga breathing have been shown to be safe and to improve breathlessness for some people with advanced lung disease.[17,18] Hand-held motorised fans (Figure and videos) are similarly low harm, low cost, easy interventions that directly target and reduce the sensation of breathlessness.[1,11,19] Breathing retraining, accessed through specialist physiotherapy services, can also help improve associated dysfunctional breathing patterns.

Anxiety associated with breathlessness can lead to avoidance of those physical activities that address deconditioning.[1] Psychological and counselling therapies, including cognitive behavioural therapy (CBT), discussed below, can address negative thought processes and reluctance to engage in helpful activities.[1,20] Similarly, education and supported self-management can help patients improve self-efficacy, which in turn can reduce anxiety and depression, increase activity and social contact, and boost quality of life.[1]

Opioids

The 2024 European Respiratory Society Clinical Practice Guideline on symptom management for people with serious respiratory illness recommended against the use of opioids to treat chronic breathlessness.[11] This recommendation is based on the findings from a systematic review undertaken for the Guideline.[21] This systematic review identified that although clinical trials administering one to two doses of opioids in an exercise laboratory-setting led to improved exertional breathlessness during standardised exercise testing, when opioids were administered regularly at home over several days or weeks, there was no beneficial

1. Evidence-based approaches to managing symptoms in patients with COPD[1,11]

Breathlessness
- Smoking cessation
- Pulmonary rehabilitation
- Multicomponent breathlessness services
- Breathing techniques
- Facial airflow from a hand-held fan
- Activity pacing
- Cognitive behavioural therapy
- Tai Chi
- Yoga
- Support and education for family and caregivers

Anorexia
- Nutritional supplementation (for patients with evidence of malnutrition)
- Megestrol acetate

Fatigue
- Pulmonary rehabilitation or graded exercise therapy
- Self-management education programs
- Activity pacing and good sleep hygiene

Pain
- Principles of WHO analgesic ladder

Depression
- Complex interventions
- Cognitive behavioural therapy
- Multicomponent exercise training
- Antidepressant drugs
- Psychological interventions including cognitive behavioural therapy

Cough
- Complex Physiotherapy and Speech and Language Intervention
- Pregabalin and speech pathology treatment
- Gabapentin

Anxiety
- Psychological therapies
- Pharmacological interventions

Daytime sleepiness and insomnia
- Non-invasive positive-pressure ventilation for hypercapnic patients with stable disease
- Establish good sleep hygiene
- Cognitive behavioural therapy
- Benzodiazepines

Dry mouth
- Topical therapies (e.g. oxygenated glycerol triester spray)

Sexual dysfunction
- Exercise therapy and education, advice on positioning
- Pharmacological management

Adapted from Maddocks M, et al. Palliative care and management of troublesome symptoms for people with chronic obstructive pulmonary disease. Lancet 2017; 390: 988-1002.[1]

impact on breathlessness experienced in daily life.[21] Importantly, adverse effects (nausea, constipation and drowsiness) were significantly increased amongst people receiving opioids, and serious adverse events (including hospitalisation and death) occurred in approximately one-third of people receiving opioids in one clinical trial.[21] Additionally, many patients express concerns regarding taking opioids for chronic breathlessness because of concerns regarding medication safety, impacts on the ability to drive, dependence, addiction, stigma and the associations with substance misuse and death or dying.[21]

Importantly, the data for this recent systematic review were predominantly drawn from clinical trials undertaken in people with COPD.[21] As such, there is little evidence regarding the use of opioids to treat chronic breathlessness in people with other advanced, nonmalignant, respiratory illnesses.[21] Opioids may therefore be considered on an individual basis in people at the end of life or with other non-malignant respiratory illnesses with severe persisting breathlessness (despite optimisation of disease-directed treatment and nonpharmacological interventions for symptom management).[21] When opioids are prescribed to treat chronic breathlessness, clinicians must weigh up the potential harms versus benefits, ensure the treatment aligns with the patient's values and goals, and carefully discuss this treatment as part of shared decision-making.[21]

Other pharmaceutical approaches

Benzodiazepines are not recommended to treat breathlessness, except as second- or third-line therapy, or at the very end of life.[22] A recent multisite, randomised, double-blind, placebo-controlled, clinical trial evaluating the effectiveness of mirtazapine on chronic breathlessness in people with severe breathlessness (mMRC score of 3-4) and COPD or interstitial lung disease (ILD), failed to demonstrate any benefits.[23] However, the trial was substantially underpowered because of difficulties with recruitment during the pandemic. It should be noted that there were more adverse effects in the people receiving mirtazapine (64%) compared with people taking placebo (40%); therefore, the authors recommended against the use of mirtazapine to treat severe breathlessness.[23] Further efficacy trials for anxiolytics are needed; however, in the interim, all patients receiving such agents should be monitored for benefit and adverse effects when treated with these or other symptom relief measures.[2,22]

Fatigue

Fatigue is defined as 'a profound feeling of physical and psychological weariness that is not relieved by sleep or rest'.[1] Similar to breathlessness, fatigue is complex and requires a multicomponent approach to management, including physical conditioning (individualised pulmonary and graded exercise programs), psychological support, supported self-management and resilience training.[11,24] Additionally, treatment for comorbid depression is crucial, as this may compound the experience of fatigue.[1,25]

The recent European Respiratory Society Clinical Practice Guideline on symptom management for adults with serious respiratory illness emphasised the role of physical activity as the primary approach for managing fatigue in people with chronic respiratory conditions. The Guideline recommends graded exercise, which involves 'establishing a baseline of achievable exercise or physical activity and then making fixed incremental increases in the time spent being physically active'.

Occupational therapy-driven management, with a focus on daily life adjustment and maximising participation, has shown promise. Such evidence-based interventions aim to increase patients' understanding of fatigue, identify exacerbating factors and

Figure. A hand-held motorised fan can help alleviate symptoms of breathlessness. The fan pictured is small, inexpensive and lightweight, with soft blades. For further information, watch these videos: https://lungfoundation.com.au/resources/the-benefits-of-hand-held-fans//
Image courtesy of Lung Foundation Australia. © 2021 Copyright Lung Foundation Australia. The fan can be purchased through the Lung Foundation Australia.

facilitate development of fatigue management strategies (Box 2).[11,25,26]

Cough

Chronic cough related to underlying maximally-treated respiratory disease is a significant source of distress for patients.[1] Primary management approaches include physiotherapy, speech and language therapies (such as sputum-clearance techniques, cough control and cough-reflex hypersensitivity training), and psychoeducational counselling (Box 1).[1]

Pharmacological treatments are not well evidenced. However, a recent systematic review and meta-analysis of the neuromodulator gabapentin reported significant improvement in cough-specific quality of life, cough severity and frequency in chronic refractory cough.[27] Antitussive P2X purinoceptor 3 (P2X3) antagonists, which target airway vagal afferent nerve hypersensitisation, may also provide a pathway to mediate cough reflex. Although P2X3 antagonists are not yet available in Australia, preclinical and preliminary trial data are promising and P2X3 antagonists may be the new dawn in addressing this distressing symptom.[28]

Psychological impact

One often overlooked area within advanced respiratory disease is the psychological impact on patients, particularly in light of sustained symptoms.[29,30] The association between chronic respiratory disease and depression and anxiety is well documented, as is social and existential isolation. Psychological issues are reported in as many as 60% of people with COPD.[20,31,32]

Despite disease and symptom management optimisation, for many, a significant burden remains. Raising issues around psychological coping and patient experience provides patients the opportunity and permission to voice the full impact of their condition.

Key treatments for depression and anxiety include behavioural therapies and CBT, as well as pharmacological interventions (Box 1). Multicomponent exercise training has also shown positive impact for patients with advanced respiratory disease and depression.[1] Psychological therapy and counselling are acknowledged as useful, particularly in patients with chronic disease. CBT is a well-established treatment for anxiety and depression that seeks to increase a patient's understanding of their current difficulties and help manage unhelpful thoughts, and has shown promising outcomes for patients with COPD.[20] Of importance, several studies, including a recent large randomised controlled trial, showed that respiratory nurses trained in, and delivering CBT, improved anxiety and healthcare utilisation (emergency department presentations and hospitalisation) among patients with chronic respiratory disease.[29,33] Peer and facilitated support groups have similarly shown improvement in the wellbeing of patients with chronic respiratory conditions.[29] Empowerment through shared experience and collegial support may also improve active engagement with healthcare.[29]

Connecting patients with support and social services is increasingly important.[34] 'Social prescribing', in which primary care services actively link patients to support services within the community and volunteer sectors, can help improve health and wellbeing.[35] Social prescribing activities, including community gardening, group learning, volunteer work and music- and arts-based activities, are of particular value to patients with chronic conditions, such as advanced respiratory disease, in whom disease-related social isolation plays a key role in psychological dysfunction.

2. Practical recommendations for managing patients with respiratory disease-related fatigue[11,25,26]

- Discuss and assess the impact of fatigue on activities of daily living
- Refer for pulmonary rehabilitation with a focus on endurance and fitness training through graded exercise, or consider physiotherapy if pulmonary rehabilitation is not available
- Consider occupational therapy for analysis of daily activities and routines to assess the effort and energy required for different activities
- Provide or refer for education on methods of planning, pacing and prioritising activities to enable participation in valued activities
- Provide or refer for education on simplification skills, body mechanics, environmental adaptations, appropriate assistive devices and rest periods
- Address psychological impact and anxiety through strategies such as relaxation techniques and targeted participation in leisure activities
- Address sleep hygiene and nutritional issues
- Consider referral to specialist nursing or physiotherapy for education on self-management and self-efficacy for self-management of daily fatigue

Adapted from Connolly D, et al. Managing fatigue in patients with chronic conditions in primary care. Fam Pract 2013; 30: 123-124.

Other symptoms

Other symptoms associated with chronic respiratory disease include anorexia, dry mouth and insomnia. Evidence for the management of these symptoms is varied. Anorexia management relies primarily on nutritional supplementation, patient education and dietetic support. For patients with dry mouth, it can be helpful to review inhaler therapies that may contribute to this symptom and consider changing the device or the medication. Additionally, local topical therapies (such as oral lubricants of saliva substitutes)

3. Language to help raise advance care planning[41]

Healthcare professionals, particularly doctors, may find some of the language prompts below helpful when having a conversation with patients about advance care planning.

Introducing the topic: 'I try to talk to all my patients about what they would want if they became more unwell. Have you ever thought about this?'

Speaking for the person: 'Who would you like me to talk to if you were unable to talk to me about important medical treatment decisions?'

Goals and values: 'What does it mean to you to 'live well'? What are your goals at this time?'

Care and treatment: 'What do you understand about where things stand right now with your illness?'

Concluding the conversation: 'Thank you for clarifying your goals, values and acceptable outcomes. Does your family (or carer or friends) know what you would want?'

Reproduced with permission from: Advance Care Planning Australia (2024). Understanding advance care planning: starting the conversation.[41]

can be helpful.[36] Insomnia and daytime sleepiness is treated with sleep hygiene and CBT, and benzodiazepines may be prescribed for short-term intervention.[1] Comorbidities may also contribute to symptoms, thus the approach to management should always be to maximise the treatment of all contributing underlying conditions.

The importance of advance care planning

Despite the life-limiting nature of chronic respiratory diseases, few patients have plans in place for the later stages of disease and care, and less than 18% of patients with COPD in Australia access palliative care in the last 12 months of life.[37-40]

Advance care planning (ACP) is a process and opportunity in which patients 'think about, discuss and record preferences for the type of care they wish to receive and the outcomes they would consider acceptable'.[41] The process involves a series of conversations engaging patients and their family in exploring values, burdens and preferences, and allows healthcare professionals, the patient and their family to develop a shared understanding of how to best provide care that addresses and reflects the person's expressed goals.[41]

ACP increases palliative care involvement, and reduces the likelihood of clinically futile treatments and decision-making in a period of crisis. For patients with COPD, ACP can provide a heightened sense of control, and reduce anxiety and depression.[42,43]

Providing multiple and early opportunities to discuss long-term care wishes and priorities with patients is recommended.[41] These conversations are likely to evolve, as the patient's perspectives may change over time, emphasising the importance of ongoing conversations and willingness for continued discussion of healthcare preferences, even after an advance directive is in place.[41] Advance Care Planning Australia provides information on ACP, and includes language to help raise the conversation (Box 3) and videos for health professionals.[41]

Efficient conversations for long-term care

Patient-driven and patient-led consultations are sometimes erroneously considered too time consuming within the constraints of busy clinical practice.[44] Instead, evidence indicates that interactions commenced with a simple question as to the patient's priorities result in more time-efficient consultations and care that is more strongly aligned with patient's current and ongoing needs.[45] This becomes increasingly important when addressing care within the final years of life. Creating opportunities for patients to voice their priorities for care and ensuring the opportunity is taken to start a longer discussion over several consultations that plans care for now and the future, rather than attempting to address all issues raised, is essential.[44,45]

When to start a palliative approach in COPD

The recent European Respiratory Society Clinical Practice Guideline: Palliative care for people with COPD or ILD recommends that a palliative care approach should be considered 'when people with COPD or ILD and their informal caregivers have physical, psychological, social or spiritual/existential unmet needs'. And that 'needs should be assessed using report from the person with illness, or their informal caregiver report, but surrogate markers of disease severity and/or health service utilisation may help identify those likely to have unmet needs.'[46]

Healthcare professionals often hesitate to consider a palliative approach 'due to the uncertain disease trajectory, lack of a clear transition to "end of life", normalisation of living with COPD, and lack of professional awareness of the potential role of palliative care'. However, early engagement with palliative care is recommended and has been shown to improve survival and quality of death in patients with COPD.[46,47]

Involvement of specialist palliative care teams may be of benefit for patients experiencing unresolved symptoms and challenging situations.[6] Reasons for referral may include: management of persisting refractory symptoms; psychosocial, spiritual or existential care; co-ordination of care; active management of the terminal phase (at home or in a hospice); and emotional care and bereavement support of relatives and carers.[47] Patient and caregiver reluctance and misunderstanding of palliative care (as specific to cancer and the final days of life), compounds referral challenges; however, once referred, acceptability is high.[46]

Conclusion

Management of respiratory symptoms is best optimised through holistic approaches that address individual symptoms in addition to the underlying disease. Symptom burden commonly escalates in the last years of life as the disease progresses. Identifying patients within this category is crucial for well-managed and planned care. Key prognostic indicators for chronic disease include the question 'would I be surprised if this patient did not survive the next 12 months?'. Similarly, discussing patients' priorities for care and early engagement with ACP can better facilitate care that addresses their ongoing needs. **RMT**

References

A list of references is included in the online version of this article (https://medicinetoday.com.au/mt/2025/march/supplements/topics-copd-collection).

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Advanced respiratory disease

Updates in symptom control in the last years of life

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References

1. Maddocks M, Lovell N, Booth S, Man WD, Higginson I. Palliative care and management of troublesome symptoms for people with chronic obstructive pulmonary disease. Lancet 2017; 390: 988-1002.
2. Wiseman R, Rowett D, Allcroft P, Abernethy A, Currow D. Chronic refractory dyspnoea: evidence based management. Aust Fam Physician 2013; 42: 137-140.
3. Noppe D, Veen In't, Mooren KJ. COPD patients in need of palliative care: Identification after hospitalization through the surprise question. Chron Respir Dis 2019; 16: 1479972318796219.
4. Tripp D, Janis J, Jarrett B, et al. How well does the surprise question predict 1-year mortality for patients admitted with COPD? J Gen Intern Med 2021; 36: 2656-2662.
5. Bestall J, Paul E, Garrod R, Garnham R, Jones P, Wedzicha J. Usefulness of the Medical Research Council (MRC) dyspnoea scale as a measure of disability in patients with chronic obstructive pulmonary disease. Thorax 1999; 54: 581-586.
6. Philip j, Chang YK, Collins A. Consensus palliative care referral criteria for people with chronic obstructive pulmonary disease. Thorax 2024; 79: 1006-1016.
7. García-Sanz M-T, Cánive-Gómez J-C, Senín-Rial L, et al. One-year and long-term mortality in patients hospitalized for chronic obstructive pulmonary disease. J Thorac Dis 2017; 9: 636-645.
8. Suissa S, Dell'Aniello S, Ernst P. Long-term natural history of chronic obstructive pulmonary disease: severe exacerbations and mortality. Thorax 2012; 67: 957-963.
9. Kwan HY, Maddocks M, Nolan CM, et al. The prognostic significance of weight loss in chronic obstructive pulmonary disease-related cachexia: a prospective cohort study. J Cachexia Sarcopenia Muscle 2019; 10: 1330-1338.
10. Guo Y, Zhang T, Wang Z, et al. Body mass index and mortality in chronic obstructive pulmonary disease: a dose–response meta-analysis. Medicine (Baltimore) 2016; 95: e4225.
11. Holland AE, Spathis A, Marsaa K, et al. European Respiratory Society Clinical Practice Guideline on symptom management for adults with serious respiratory illness. Eur Respir J 2024; 63: 2400335.
12. Smallwood N, Currow D, Booth S, Spathis A, Irving L, Philip J. Differing approaches to managing the chronic breathlessness syndrome in advanced COPD: a multi-national survey of specialists. COPD 2018; 15: 294-302.
13. Politis J, Eastman P, Le B, Furler J, Irving L, Smallwood N. Managing severe chronic breathlessness in chronic obstructive pulmonary disease is challenging for general practitioners. Am J Hosp Palliat Care 2021; 38: 472-479.
14. Mularski RA. Advancing a common understanding and approach to dyspnea management. Consensus proposal for the chronic breathlessness syndrome. American Thoracic Society; 2017; 14: 1108-1110.
15. Johnson MJ, Yorke J, Hansen-Flaschen J, et al. Towards an expert consensus to delineate a clinical syndrome of chronic breathlessness. Eur Respir J 2017; 49: 1602277.
16. Kochovska S, Ekström M, Hansen-Flaschen J, et al. Hiding in plain sight: the evolving definition of chronic breathlessness and new ICD-11 wording. Eur Respir J 2023; 61: 2300252.
17. Donescky-Cuenco D, Nguyen HQ, Paul S, Carrieri-Kohlman V. Yoga therapy decreases dyspnoea-related distress and improves functional performance in people with chronic obstructive pulmonary disease: a pilot study. J Altern Complement Med 2010; 15: 225-234.
18. Burge AT, Gadowski AM, Jones A, et al. Breathing techniques to reduce symptoms in people with serious respiratory illness: a systematic review. Eur Respir Rev 2024; 33: 240012.
19. Bausewein A, Holland L, Romero A, et al. Airflow for the reduction of breathlessness in people with serious respiratory illness: a systematic review. Eur Respir Rev 2024 [in press, not yet published].
20. Heslop-Marshall K, Burns G. The role of cognitive behavioural therapy in living well with COPD. Breathe 2019; 5: 95-97.
21. Smallwood NE, Pascoe A, Wijsenbeek M, et al. Opioids for the palliation of symptoms in people with serious respiratory illness: a systematic review and meta-analysis. Eur Respir Rev 2024; 33: 230265.
22. Verberkt CA, van den Beuken-van Everdingen MHJ, Schols JM, Datla S, Dirksen CD, Johnson MJ, et al. Respiratory adverse effects of opioids for breathlessness: a systematic review and meta-analysis. Eur Respir J 2017; 50: 1701153.
23. Higginson IJ, Brown ST, Oluyase AO, et al. Mirtazepine to alleviate severe breathlessness in patients with COPD or interstitial lung diseases (BETTER-B): an international, multicentre, double-blind, randomised, placebo-controlled, phase 3 mixed-method trial. Lancet 2024: 12; 763-774.
24. Burge AT, Gadowski AM, Romero L, et al. The effect of graded exercise therapy on fatigue in people with serious respiratory illness: a systematic review. Eur Respir Rev 2024; 33: 240027.
25. Kahlmann V, Moor CC, Wijsenbeek MS. Managing fatigue in patients with

interstitial lung disease. Chest 2020; 158: 2026-2033.
26. Connolly D, O'Toole L, Redmond P, Smith SM. Managing fatigue in patients with chronic conditions in primary care. Fam Pract 2013; 30: 123-124.
27. Xie S, Xie M, Shen Y, Cheng D. Gabapentin for chronic refractory cough: a systematic review and meta-analysis. Heliyon 2023; 9: e15579.
28. Abdulqawi R, Dockry R, Holt K, et al. P2X3 receptor antagonist (AF-219) in refractory chronic cough: a randomised, double-blind, placebo-controlled phase 2 study. Lancet 2015; 385: 1198-1205.
29. Hunter R, Barson E, Willis K, Smallwood N. Mental health illness in chronic respiratory disease is associated with worse respiratory health and low engagement with non-pharmacological psychological interventions. Intern Med J 2021; 51: 414-418.
30. Wang J, Willis K, Barson E, Smallwood N. The complexity of mental health care for people with COPD: a qualitative study of clinicians' perspectives. NPJ Prim Care Respir Med 2021; 31: 40.
31. Bolton LE, Seymour J, Gardiner C. Existential suffering in the day-to-day lives of those living with palliative care needs arising from chronic obstructive pulmonary disease. BMJ & Supportive Palliative Care; 2020; 10 (Suppl1): A66-A67. [Poster presentation] Abstract available online at: https://spcare.bmj.com/content/10/Suppl_1/A66.3 (accessed March 2025).
32. Disler RT, Green A, Luckett T, et al. Experience of advanced chronic obstructive pulmonary disease: metasynthesis of qualitative research. J Pain Symptom Manage 2014; 48: 1182-1199.
33. Heslop-Marshall K, Baker C, Carrick-Sen D, et al. Randomised controlled trial of cognitive behavioural therapy in COPD. ERJ Open Res 2018; 4: doi: 10.1183/23120541.00094-2018.
34. Wildman JM, Moffatt S, Steer M, Laing K, Penn L, O'Brien NJ. Service-users' perspectives of link worker social prescribing: a qualitative follow-up study. BMC Public Health 2019; 19: 98.
35. Pescheny JV, Randhawa G, Pappas Y. The impact of social prescribing services on service users: a systematic review of the evidence. Eur J Public Health 2020; 30: 664-673.
36. Frydrych A. Dry mouth: xerostomia and salivary gland hypofunction. Aust Fam Physician 2016; 45: 488-492.
37. Rosenwax L, Spilsbury K, McNamara BA, Semmens J. A retrospective population based cohort study of access to specialist palliative care in the last year of life: who is still missing out a decade on? BMC Palliat Care 2016; 15: 46.
38. Smallwood N, Thompson M, Warrender-Sparkes M, et al. Integrated respiratory and palliative care may improve outcomes in advanced lung disease. ERJ Open Res 2018; 4: doi: 10.1183/23120541.00102-2017.
39. Australian Institute of Health and Welfare (AIHW). Palliative care services in Australia. AIHW; 2024. Available online at: https://www.aihw.gov.au/reports/palliative-care-services/palliative-care-services-in-australia/contents/palliative-care-workforce (accessed March 2025).
40. Smallwood N, Ross L, Taverner J, et al. A palliative approach is adopted for many patients dying in hospital with chronic obstructive pulmonary disease. COPD 2018; 15: 503-511.
41. Advance Care Planning Australia. Understanding advance care planning. Advance Care Planning Australia 2024. Available online at: https://www.advancecareplanning.org.au/understand-advance-care-planning/starting-the-conversation (accessed March 2025).
42. Ke LS, Huang X, O'Connor M, Lee S. Nurses' views regarding implementing advance care planning for older people: a systematic review and synthesis of qualitative studies. J Clin Nurs 2015; 24: 2057-2073.
43. Janssen DJ, Engelberg RA, Wouters EF, Curtis JR. Advance care planning for patients with COPD: past, present and future. Patient Educ Couns 2011; 86: 19-24.
44. Warnecke E. The art of communication. Aust Fam Physician 2014; 43: 156-158.
45. Stewart M, Brown JB, Weston W, McWhinney IR, McWilliam CL, Freeman T. Patient-centered medicine: transforming the clinical method. 3rd edn. London: Taylor & Francis; 2013.
46. Janssen DJA, Bajway S, Hilton Boon M, et al. European Respiratory Society clinical practice guideline: palliative care for people with COPD or interstitial lung disease. Eur Respir J 2023; 62: 2202014.
47. COPD-X Plan Guidelines. Palliative and supportive care. COPD-X Plan Guidelines 2024. Available online at: https://copdx.org.au/copd-x-plan/o-optimise-function/o10-palliation-and-end-of-life-issues/ (accessed March 2025).