



## **Lung Foundation Australia**

Submission to

Parliamentary Inquiry – Chronic Disease Prevention  
and Management in Primary Health Care

Submitted by

Heather Allan, Chief Executive Officer

Lung Foundation Australia

31 July 2015

## **Lung Foundation Australia**

### **Parliamentary Inquiry – Chronic Disease Prevention and Management in Primary Health Care**

#### **1.0 Executive Summary**

Chronic lung diseases, including chronic obstructive pulmonary disease (COPD), bronchiectasis and interstitial lung diseases, are major contributors to disability, premature mortality and health care utilisation in Australia. Patients with chronic lung disease experience significant disability as a result of their symptoms, particularly breathlessness. Early diagnosis and optimal management, including pulmonary rehabilitation and patient self-management, can improve outcomes, reduce hospital admissions and improve health related quality of life. In most instances, chronic lung disease can and should be managed at primary care level, but progress has been slow in enhancing best practice for COPD through poor access to key services, resources and training.

The following submission outlines a series of proven interventions that have been shown to reduce hospital admissions and other inappropriate healthcare utilisation and improve patient outcomes, including reducing symptoms of lung disease and associated impacts such as anxiety and depression as well as improving patient quality of life.

The recommendations are:

1. Widen health care priority area for asthma to include other chronic lung diseases such as Chronic Obstructive Pulmonary Disease, bronchiectasis and Interstitial Lung Disease.
2. Work with Lung Foundation Australia (LFA) and the Thoracic Society of Australia and New Zealand (TSANZ) to review the current use of MBS Item 11056 for the delivery of spirometry in primary care and make recommendations that will improve the accuracy and effectiveness of spirometry for the early diagnosis of airways disease.
3. Support Lung Foundation Australia's MBS item application to facilitate wider access to pulmonary rehabilitation and pulmonary maintenance exercise programs in the community, particularly in regional and rural settings.
4. Raise awareness of the benefits of pulmonary rehabilitation and pulmonary maintenance exercise programs amongst primary care clinicians and patients through nationally consistent messages built into training and resources.
5. Reduce wastage and duplication of effort by incentivising PHNs and HHSs to leverage the work already done by peak bodies such as Lung Foundation Australia in relation to clinical and patient resources.
6. Reduce wastage and duplication of effort by incentivising PHNs to work with peak bodies to develop and deliver nationally consistent evidence-based training across the whole primary care continuum.

7. Incentivise HHSs to ensure simple discharge planning in place for patients hospitalised as a result of an exacerbation of their chronic lung disease to support self-management.
8. Support Lung Foundation Australia to build the capacity of patients to self-manage.

## 2.0 Who is Lung Foundation Australia?

Lung Foundation Australia is a national not-for-profit organization working to make lung health a priority for all in Australia. To achieve this, we work with patients, carers and clinicians to:

- Promote lung health
- Raise awareness of lung disease and symptoms of lung disease to facilitate early diagnosis
- Promote evidence-based management of lung disease through the development and translation of guidelines across a variety of clinical and patient settings
- Provide clinical and patient education to promote evidence-based management of chronic lung disease
- Advocate on behalf of those with lung disease
- Raise money to support research.

## 3.0 Impact of chronic lung disease in Australia

Chronic lung diseases, including chronic obstructive pulmonary disease (COPD), bronchiectasis and interstitial lung diseases, are major contributors to disability, premature mortality and health care utilisation in Australia [AIHW 2010, 2014]. COPD is the second leading cause of avoidable hospital admissions [Page et al 2007], and lung cancer is the leading cause of death from cancer in Australia, responsible for almost one in five cancer deaths.

Patients with chronic lung disease experience significant disability as a result of their symptoms, particularly breathlessness. There is a high level of premature work retirement [Fletcher et al 2011] and, as the disease progresses, patients have increasing difficulty in performing simple activities of daily living, e.g. showering, dressing etc. and are more likely to be admitted to hospital.

Early diagnosis and optimal management, including pulmonary rehabilitation and patient self-management, can improve outcomes, reduce hospital admissions and improve health related quality of life [COPD-X Guidelines]. In most instances, chronic lung disease can and should be managed at primary care level, but progress has been slow in enhancing best practice for COPD through poor access to key services, resources and training [Dunt D et al 2012].

### Recommendation:

- Widen asthma health care priority area to include all chronic lung disease.

## 4.0 Early and accurate diagnosis

Spirometry lung function testing is essential to making a diagnosis of airways disease [GOLD Guidelines 2011, COPD-X Guidelines 2015, Australian Asthma Handbook].

Early and accurate diagnosis is required to:

- Institute early treatment (smoking cessation, pharmacotherapy, pulmonary rehabilitation, self-management) to achieve better symptom control, institute measures to reduce exacerbation risk and maximise productivity, quality of life and exercise capacity
- avoid inappropriate prescribing of medications which expose patients to unnecessary risk of adverse effects of medications and expose the health system to unnecessary costs
- prevent avoidable healthcare costs and resource utilisation [Jones et al 2014].

Recent population studies and clinical experience suggest that there is continuing inaccuracy in the diagnosis of airways disease, both asthma and COPD.

The Australian BOLD data (Toelle et al 2013), indicated that 30% of respondents who stated that their GP had told them they had COPD, did not have obstructive spirometry consistent with this diagnosis at the time of the study. On the other hand, there are consistent and reasonable concerns that COPD is underdiagnosed in another group of patients who generally present late either with an exacerbation (Jones et al 2014), or with moderately severe exertional breathlessness (Abramson et al 2012), by which time over 50% of their lung function has been lost.

In Australia, diagnostic spirometry testing occurs in specialised lung function laboratories as well as in GP surgeries. To promote equity of access to spirometry testing in regional and rural Australia, it is important to ensure that general practice is well supported to perform this important diagnostic function.

There are, however, practical barriers to the performance of spirometry in primary care. These relate to:

1. The current requirement that pre- and post- bronchodilator tracing is required and 15 minutes should elapse between the two. This is well beyond the average length of a GP consultation.
2. There is inadequate reimbursement given the cost of equipment, the complexity of the test and the time taken to perform the test as currently defined (Item 11506 Schedule Fee is \$20.55 Benefit: 75%=\$15.45 or 85%=\$17.50).
3. Only post-bronchodilator spirometry with an FEV1/FVC < 0.7 is actually required to make a diagnosis of COPD, but reimbursement is only available when pre- and post- bronchodilator spirometry is performed.
4. Inadequate training of GPs and practice nurses to perform quality spirometry and interpret the results accurately.
5. There is limited access to spirometry through pathology and service providers. This is particularly the case in regional and rural Australia.

Lung Foundation Australia and the Thoracic Society of Australia and New Zealand (TSANZ) have agreed to work together to consult on this complex and important issue in order to make recommendations to government on:

- Appropriate wording for the MBS item number, ie potential change to post-bronchodilator spirometry rather than pre- and post
- Appropriate level of rebate commensurate with the cost of equipment, the complexity of the test and the time taken to perform it
- Identification of potential low level use tests that could be removed to support higher rebate for spirometry
- Identification of proposed delivery models for quality and cost-effective spirometry
- Proposed training and quality assurance programs that will improve the skills and confidence of primary care practitioners and service providers to perform high quality spirometry.

**Recommendation:**

Department of Health to work with Lung Foundation Australia and the Thoracic Society of Australia and New Zealand to:

- review the current use of MBS Item 11506 for the delivery of spirometry at primary care and make recommendations that will improve the accuracy and cost-effectiveness of spirometry for the timely diagnosis of airways disease.

## 5.0 Proven interventions to improve outcomes

The following section outlines the interventions (and supporting evidence base) that have been shown to improve outcomes for patients as well as recommended mechanism/s for service delivery.

### 5.1 Pulmonary Rehabilitation and Pulmonary Maintenance

#### Pulmonary rehabilitation

Chronic lung diseases such as COPD, bronchiectasis and interstitial lung disease share a common limiting symptom – breathlessness. Left unmanaged, this symptom leads to reduced activities of daily living as patients restrict their activities and avoid tasks that make them breathless. As patients then spiral through a cycle of inactivity, daily tasks like walking to the shops and even showering, become difficult, and social isolation is a risk as outings become restricted.

Pharmacological interventions have been shown to be effective for symptom management and exacerbation reduction, however, the most effective evidence-based intervention is actually non-pharmacological – pulmonary rehabilitation.

Pulmonary rehabilitation is an eight to ten week course of supervised exercise and education designed to optimise each patient's physical and social performance and autonomy.

The quality and quantity of evidence supporting the benefits of pulmonary rehabilitation is impressive. The Thoracic Society of Australia and New Zealand/Lung Foundation

Australia ***COPD-X Guidelines*** recommend pulmonary rehabilitation for all symptomatic patients with COPD and there is growing evidence for the effectiveness of pulmonary rehabilitation in other chronic lung diseases such as bronchiectasis [Newall et al 2005], Mandal et al 2012] and interstitial lung disease [Dowman et al 2014]. There is NH&MRC Level 1 evidence to show that pulmonary rehabilitation:

- Reduces hospital admissions and average length of stay [Puhan et al 2011]
- Reduces re-admissions post exacerbation by 27% [Puhan et al 2011]
- Reduces mortality [Puhan et al 2011]
- Improves symptoms of anxiety and depression [Coventry 2009, McCarthy 2015, Coventry et al 2013]
- Improves exercise tolerance/functional exercise capacity [Lee et al 2014, Dowman et al 2014, Newall et al 2005, Mandal et al 2012, Cavalheri et al 2014, Bradley et al 2001]
- Increases quality of life in the four important domains, i.e.
  - Reduces dyspnoea [Dowman et al 2014, Lee et al 2013]; and fatigue [Dowman et al 2014, McCarthy et al 2015; and improved emotional function and mastery [Dowman et al 2014]
- Reduces anxiety and depression [Coventry 2009, Coventry 2013, McCarthy 2015]

There is also NH&MRC Level II evidence to show that pulmonary rehabilitation is cost effective [Griffiths et al 2001].

The Cochrane review by Puhan et al (2011) evaluated pulmonary rehabilitation compared to no pulmonary rehabilitation after a hospitalisation for an acute exacerbation of COPD. The review identified that the numbers needed to treat (NNT) with pulmonary rehabilitation to avoid one hospital re-admission was four.

Yet, this highly effective intervention is not widely available or understood by general practitioners. Nor is it known to the majority of patients.

#### *Pulmonary maintenance exercise programs*

The benefits of pulmonary rehabilitation have been shown to last for 6-18 months, depending on the patient. Evidence also shows that after completion of a pulmonary rehabilitation program, continuing with a supervised pulmonary maintenance exercise program will extend the benefits of pulmonary rehabilitation [Ringbaek et al 2010, Spencer et al 2010].

#### *Current access to pulmonary rehabilitation and pulmonary maintenance exercise programs*

Access to pulmonary rehabilitation and pulmonary maintenance exercise is currently inadequate. There are approximately 270 pulmonary rehabilitation programs and 183 pulmonary maintenance exercise programs available in Australia for an estimated disease population of 1.5 million [Toelle et al 2013]. These programs are predominantly available in urban and larger regional settings, leaving patients in smaller regional or rural settings with little or no access. The Lung Foundation estimates that fewer than 5

per cent of the patients with COPD who could benefit currently have access to pulmonary rehabilitation.

Referral to some hospital based pulmonary rehabilitation programs is restricted to those patients who have seen a respiratory physician. Yet the majority of patients with COPD are treated predominantly by general practitioners, and there is increasing evidence that community based pulmonary rehabilitation is effective [Goyder et al 2013].

*Mechanism for service delivery: MBS item for pulmonary rehabilitation and pulmonary maintenance exercise*

The Lung Foundation has been working with the Department of Health on an application for a series of MBS item numbers to enable primary care physiotherapists and exercise physiologists to deliver pulmonary rehabilitation (PR) followed by a pulmonary maintenance exercise (PME) program so that this evidence-based intervention is more widely accessible in the community, particularly in regional and rural settings where access is extremely limited.

The application is at protocol development stage and will be considered by the Protocol Advisory Sub-Committee (PASC) at its next meeting, 14 August. (1405 Draft Discussion Analytic Protocol (DAP) to guide the assessment of pulmonary rehabilitation. August 2015.)

*Recommendations:*

- 1. Support Lung Foundation Australia's MBS application to facilitate wider access to pulmonary rehabilitation and pulmonary maintenance exercise programs in the community, particularly in regional and rural settings.*
- 2. Raise awareness of the benefits of pulmonary rehabilitation and pulmonary maintenance exercise programs amongst primary care clinicians and patients through nationally consistent messages built into training and resources.*

## **5.2 Self-management**

*Self-management* refers to what a person living with a disease does to be actively involved in their own health care. It involves the person knowing about their condition, sharing decision-making about their healthcare, following agreed care plans, monitoring and managing symptoms of their condition, managing the impacts of their condition on physical emotional and social life, and having confidence to access community support services [Dept of Health Western Australia 2011].

*Self-management support* is what carers, healthcare providers, community organisations and systems do to increase the capacity of people living with diseases to actively participate in their own healthcare. Support can be invaluable to link people to personal, medical, disability and community resources, including psychological and allied health services; provide strategies for care planning and negotiating the health system; and

address medication management, pain control, risk reduction, behaviour change and learning to interpret changes in the disease and act on those changes. [National Health Priority Action Council 2006, Department of Health WA 2011, Holman et al 2000].

In chronic lung disease, patient self-management should include:

- Participation in pulmonary rehabilitation
- Development and adherence to an agreed action plan to recognise and manage the onset of infection that could lead to an exacerbation
- Ensuring immunisations are up-to-date
- Maintenance of physical activity
- Using established techniques to reduce breathlessness
- Adopting lifestyle changes , i.e. smoking cessation, diet, avoidance of sedentary behaviours

In a Cochrane review of the impact of self-management conducted by Zwerink et al (2014), self-management improved health related quality of life scores (St George's Respiratory Questionnaire) and led to a lower probability of respiratory-related hospitalisations and all-cause hospitalisations. Over one year of follow up, eight participants with a high baseline risk of respiratory-related hospital admission needed to be treated to prevent one participant with at least one hospital admission. 20 participants with a low baseline risk of hospitalisation needed to be treated to prevent one participant with at least one respiratory-related hospital admission. (The content and duration of the self-management programs were diverse in the studies included in the review.)

The Lung Foundation believes that, in order to ensure patients effectively participate in the management of their condition, they need to receive self-management support from trusted sources, including Lung Foundation Australia and their managing clinician, usually their general practitioner or specialist.

The role of self-management for COPD is not widely promoted in general practice, possibly due to:

1. Lack of awareness of the importance of self-management
2. Lack of awareness of what constitutes self-management
3. Lack of time or remuneration to support education of the patient in self-management.

Lung Foundation is well placed to work with Primary Health Networks to support the education of both general practice and the patient to increase patient engagement in managing their chronic lung condition.

#### *Mechanism for service delivery #1: PHN & HHS collaboration with relevant peak body*

Lung Foundation has been working with selected Medicare Locals to deliver chronic disease management training to promote evidence-based management and support the role of primary care clinicians to provide self-management support for those with chronic lung disease. However, too often, Medicare Locals and HHSs have decided to "reinvent



the wheel” by developing their own training and resources, thus duplicating work already done on a national level by the Lung Foundation.

Primary Health Networks, as commissioning bodies, should look to engage peak bodies as partners to up-skill primary care clinicians. Peak bodies, such as Lung Foundation Australia (representing chronic lung disease), are effective partners to ensure:

- Training and resources are evidence based -- consistent with COPD-X guidelines
- Training promotes both pharmacological and non-pharmacological evidence-based interventions, including pulmonary rehabilitation and role of self-management
- Training is flexible and available in different formats to meet different needs, including on-line, webinar, face-to-face
- Include nationally consistent messages that reinforce patient messages and are based on most up-to-date evidence
- No duplication of effort -- the Lung Foundation produces clinical and patient resources in consultation with key opinion leaders. It is a waste of scarce resources for others to develop new training in these areas.
- Training programs are endorsed by relevant bodies: Royal Australian College of General Practitioners (RACGP), Australian Primary Health Care Nurse Association (APNA), Australian College of Nursing (A.C.N), Australian Physiotherapy Association (APA); Exercise & Sports Science Australia (ESSA)
- Linkage to community services including pulmonary rehabilitation and pulmonary maintenance exercise

*Mechanism for service delivery #2: Post discharge planning to maximise patient engagement in self-management including pulmonary rehabilitation*

In 2012-13 there were 59,700 hospital admissions as a result of COPD alone [AIHW 2012-13]. The media length of stay for each hospitalisation in the public system is 7.7 days [AIHW 2012-13].

The risk of mortality following an exacerbation of COPD is higher than the risk of mortality for patients admitted to hospital following a heart attack [Halpin et al 2008]. A delay of 24hrs or more in presentation for and initiation of treatment for a COPD exacerbation doubles the chance of hospital admission [Chandra et al 2009].

The course of COPD involves a rapid decline in health status after the second severe exacerbation and high mortality in the weeks following every severe exacerbation. Targets for COPD management should include delaying the second severe exacerbation and improving treatment of severe exacerbations to reduce their excessive early mortality [Suisse et al 2012].

Hospital avoidance and re-admission avoidance for this patient population relies heavily on patient participation in pulmonary rehabilitation; patient self-management and action planning to recognize and manage the onset of exacerbation; medicine adherence and correct usage; and appropriate follow-up and management post-discharge at primary care.

Incentive payments should be in place to ensure that each patient who has been admitted to hospital with an exacerbation of their chronic lung disease has a simple discharge plan, including:

- The hospital making an appointment for the patient to see their GP for appropriate follow-up
- Referral to pulmonary rehabilitation
- Referral to Lung Foundation Australia
- Inhaler use review and education before discharge
- Review checklist, including smoking cessation, action plan for exacerbations, immunisations
- Supply of Lung Foundation patient self-management material.

Recommendations:

1. Reduce waste and duplication of effort by incentivising PHNs and HHSs to leverage the work already done by peak bodies such as Lung Foundation Australia in developing resources.
2. Reduce waste and duplication of effort by incentivising PHNs to work with peak bodies such as Lung Foundation Australia to deliver nationally consistent and evidence-based training across the whole primary care continuum.
3. Incentivise HHSs to ensure a simple discharge plan is in place for every patient hospitalised as a result of an exacerbation of their chronic lung disease.
4. Support Lung Foundation to build the capacity of patients to self-manage through the provision resources, training and seminars.

## 6.0 Summary of recommendations

The following is a summary of the recommendations outlined in the previous pages.

### **6.1 Widen health care priority area for asthma to include other chronic lung diseases such as Chronic Obstructive Pulmonary Disease, bronchiectasis and Interstitial Lung Disease.**

Asthma has been nominated as one of the Government's health care priority areas for several years. This is appropriate given the significant prevalence of asthma. However, given the impact of other chronic lung diseases on hospital services, primary care services and the patient population itself, it is timely to widen the priority area to include all chronic lung diseases.

### **6.2 Work with Lung Foundation Australia and the Thoracic Society of Australia and New Zealand (TSANZ) to review the current use of MBS Item 11056 for the delivery of spirometry in primary care and make**

**recommendations that will improve the accuracy and effectiveness of spirometry for the early diagnosis of airways disease.**

Early diagnosis of airways disease through spirometry allows the timely intervention to improve better outcomes for patients and to ensure appropriate use of scarce health care resources. The current MBS item (11506) acts as a disincentive to perform quality spirometry because of the time taken, its wording and the level of remuneration. Lung Foundation Australia and the TSANZ are about to start a consultation process that will review and recommend changes to improve the use, performance of spirometry in Australia as well as suggest effective delivery models. We suggest the government work with us on this review.

**6.3 Support Lung Foundation Australia's MBS item application to facilitate wider access to pulmonary rehabilitation and pulmonary maintenance exercise programs in the community, particularly in regional and rural settings.**

The Lung Foundation application for MBS rebate to facilitate wider access to pulmonary rehabilitation and pulmonary maintenance exercise programs is currently at protocol development stage. The draft protocol will be considered by the Protocol Assessment Sub-Committee (PASC) at its meeting on August 13<sup>th</sup>. A successful application which results in a rebate would encourage community physiotherapists and exercise physiologists to work with Primary Health Networks to establish pulmonary rehabilitation and pulmonary maintenance exercise programs as part of the PHN's chronic disease management program. The establishment of community programs will widen access to this important intervention beyond urban and larger regional centres. It will also take pressure of hospital programs which should be reserved for the more acute patients.

**6.4 Raise awareness of the benefits of pulmonary rehabilitation and pulmonary maintenance exercise programs amongst primary care clinicians and patients through nationally consistent messages built into training and resources.**

In order to increase referrals to and uptake of pulmonary rehabilitation, it is important to raise awareness of the benefits of this important intervention with both the referring clinicians in primary care and the patient. All training of primary care clinicians in chronic respiratory disease should include information on pulmonary rehabilitation, as should patient resources.

**6.5 Reduce wastage and duplication of effort by incentivising PHNs and HHSs to leverage the work already done by peak bodies such as Lung Foundation Australia in relation to clinical and patient resources.**

Too often Medicare Locals and HHSs put scarce health resources into developing local clinical and patient resources to support management of chronic lung disease –

resources already developed by peak bodies such as Lung Foundation Australia. With the reform to PHNs, it is timely to ensure that consistent messages, based on the latest evidence, are promoted to both clinician and patient. Peak bodies are already doing this and they should be supported to get their materials out more widely. PHNs, as commissioning bodies, should work with existing programs and not re-create work already done.

#### **6.6 Reduce wastage and duplication of effort by incentivising PHNs to work with peak bodies to develop and deliver nationally consistent evidence-based training across the whole primary care continuum.**

Peak bodies are well placed to deliver cost-effective training in a range of different formats to clinicians across the country. By working with a national body like Lung Foundation Australia PHNs ensure consistency of message, training based on the latest evidence and models of training delivery honed over time through delivery and feedback.

#### **6.7 Incentivise HHSs to ensure simple discharge plan in place for patients hospitalised as a result of an exacerbation of their chronic lung disease.**

Introduce practice incentive payment to ensure every patient who has been admitted to hospital with an exacerbation of their lung disease is discharged with a follow-up plan to ensure appropriate linkage to primary care to manage their condition, including a confirmed appointment with their GP, referral to pulmonary rehabilitation and a patient self-management education package.

#### **6.8 Support Lung Foundation Australia to build the capacity of patients to self-manage.**

Lung Foundation Australia has developed a significant infrastructure to support patient self-management. The developed resources are patient-centred and evidence based. Currently, these resources are available on-line. Additional funding would allow the LFA to deliver training via webinars and face-to-face training.

## **Appendix 1**

# COPD resources available from Lung Foundation Australia

ELIZABETH HARPER BAppSc – AppChem

**A range of clinical and patient resources and training opportunities to support the diagnosis and management of patients with COPD is available from Lung Foundation Australia.**

**L**ung Foundation Australia is a national not-for-profit organisation dedicated to making lung health a priority for all in Australia and working across five areas:

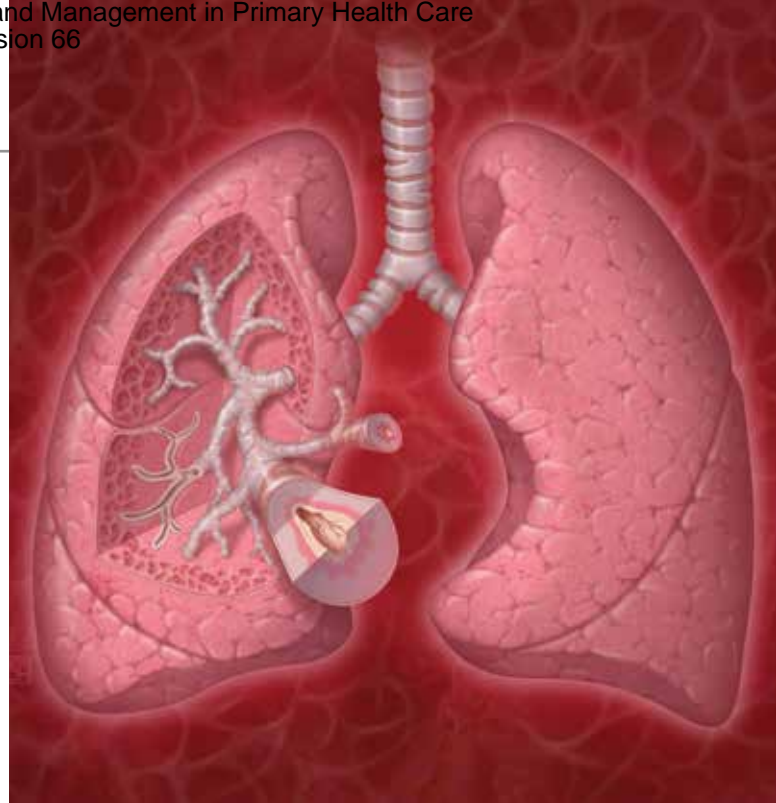
- community awareness
- patient support through education and resources
- clinical training and resource development
- research support
- advocacy.

The Lung Foundation represents all lung diseases, collaborating with other lung organisations to provide a valuable link to community services. One of the largest programs provided by the Lung Foundation is the COPD National Program. A selection of some of the resources that have been developed by Lung Foundation Australia and in particular its COPD National Program are described below, and website addresses for those available online are listed in the Box.

## Guidelines and summaries

### COPD-X Plan

Lung Foundation Australia and the Thoracic Society of Australia and New Zealand's *The COPD-X Plan: Australian and New Zealand Guidelines for the Management of Chronic Obstructive*



*Pulmonary Disease 2015* is available online (see Box 1). The COPD-X Guidelines Committee meets four times each year to review the current literature. Recommended updates are then made to the full guidelines as required. The latest update reflects the published evidence on COPD up to May 2015. The guidelines summarise current evidence on optimal management of people with COPD and are intended to be a decision support aid for GPs, other primary health care clinicians, hospital-based clinicians and specialists working in respiratory health.

### COPD-X Concise Guide for Primary Care

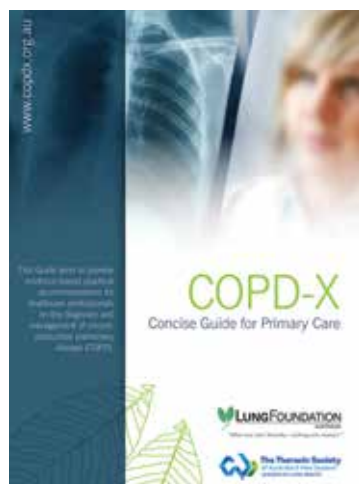
The Royal Australian College of General Practitioner-endorsed *COPD-X Concise Guide for Primary Care* is a 40-page document available to download as a pdf (Figure 1). Published jointly by Lung Foundation Australia and the Thoracic Society of Australia and New Zealand, it includes 22 pages of guidelines, with the remainder comprising references and structural components. It provides primary care practitioners with 50 clear recommendations (graded according to strength of the recommendation and the quality of the evidence) for diagnosis and management of COPD. It also contains additional practice tips and links to additional services and/or information in an easy to read layout.

### Stepwise Management of Stable COPD

The *Stepwise Management of Stable COPD* is a single page translation of the COPD-X guidelines, dividing the interventions into nonpharmacological and pharmacological interventions for patients with mild, moderate and severe COPD. On the reverse side of the stepwise management is a guide to the addition of therapies, highlighting classes of medicines that should not be used together. Images of the individual medicines, grouped in their classes, are also included in this document, which is reproduced on pages 39–40.

**Medicine**Today 2015; 16(7 Suppl): 36–44

Ms Harper is Director of the COPD National Program, Lung Foundation Australia, Brisbane, Qld.



**Figure 1.** COPD-X Concise Guide for Primary Care.

Reproduced with permission from Lung Foundation Australia.



**Figures 2a and b.** Lung Foundation Australia's COPD and Lung Health Checklist posters and flyers. Reproduced with permission from Lung Foundation Australia.



## Decision support tools

### Primary Care Respiratory Toolkit

The online Primary Care Respiratory Toolkit steps the primary care practitioner through each of the key areas of the COPD-X guidelines, with useful calculators to aid consultations. It has been developed to help promote the early diagnosis and best practice management of COPD. It includes a lung age estimator (an interactive motivational tool for smoking cessation), cigarette pack-year calculator, spirometry calculator and management of exacerbation algorithm.

### Education and training

A number of COPD clinical resources and education and training opportunities aimed specifically at GPs or nurses are available from Lung Foundation Australia, including the following.

#### GP resources

- An active learning module being delivered in September in Melbourne. This module covers the aetiology, pathophysiology, epidemiology, risk assessment and screening, case-finding, diagnosis with spirometry, assessment of severity, optimising nonpharmacotherapy interventions and pharmacological interventions, inhaler devices and technique, preventing deterioration, development of care plans and self-management support, and management of exacerbations.
- COPD-X guidelines presentation video.
- Face-to-face workshops.

#### Nursing resources

- COPD Nurse Training and Support Program, an online interactive training program providing all the necessary

education to help primary care nurses support patients with COPD to self-manage their condition.

- Face-to-face workshops.

### Clinical resources

Clinical resources for health professionals available from Lung Foundation Australia cover disease management, risk assessment and screening and health promotion.

#### Disease management

- COPD Action Plan. This is available as an electronic editable pdf, or in rich text format that can be downloaded to widely used medical software. It should be completed in collaboration with the patient and their carer (if appropriate) to provide guidance on the daily medication regimen and action to take if the patient becomes unwell. Written instructions on how to develop an action plan are provided at the end of the COPD Action Plan (see pages 41–43).
- Algorithm – Managing a COPD Exacerbation in Primary Care. Available electronically, this guides health practitioners in the stepping up and stepping down of treatment in patients having a COPD exacerbation (see page 44). It is currently being trialled in participating general practices located across six regions as part of a pilot program called ‘Have the CHAT’ (which aims to help patients recognise symptoms of an exacerbation earlier).

#### Risk assessment and screening

- Lung Health Checklist flyers and posters are available, highlighting risk factors and symptoms of lung disease and encouraging patients to check their lung health (Figures 2a and b).



### ONLINE COPD RESOURCES FROM LUNG FOUNDATION AUSTRALIA

#### COPD-X guidelines

<http://copdx.org.au>

#### Concise Guide for Primary Care

<http://copdx.org.au>

#### Stepwise Management of Stable COPD

<http://copdx.org.au>

#### Primary Care Respiratory Toolkit

<http://lungfoundation.com.au/health-professionals/clinical-resources/copd/primary-care-respiratory-toolkit>

#### COPD Action Plan

<http://copdx.org.au>

#### Managing a COPD Exacerbation in Primary Care

<http://copdx.org.au>

#### COPD Nurse Training and Support Program

<http://lungfoundation.com.au/health-professionals/training-and-education/copd-nurse-training-and-support-program>

#### COPD screening devices

<http://lungfoundation.com.au/health-professionals/clinical-resources/copd/targeted-copd-case-finding-using-copd-screening-devices-in-the-community>

#### World COPD Day

<http://worldcopdday.lungfoundation.com.au>

#### Airwaves Clinical Update

<http://lungfoundation.com.au/news-media/airwaves-clinical-update>

#### Lung Diseases & Fact Sheets

<http://lungfoundation.com.au/patient-area/lung-diseases>

#### C.O.P.E. – COPD. Online. Patient. Education

<http://www.cope.lungfoundation.com.au>

#### Patient inhaler device technique handouts

<http://lungfoundation.com.au/patient-area/resources/inhaler-technique-fact-sheets>

#### LungNet News

<http://lungfoundation.com.au/news-media/lungnet>

#### Check in with your lungs – interactive Lung Health Checklist

<http://lungfoundation.com.au/patient-area/checklist>

COPD risk factors and symptoms to promote earlier diagnosis. Lung Foundation Australia provides a website ([www.worldcopdday.lungfoundation.com.au](http://www.worldcopdday.lungfoundation.com.au)) where health professionals can register to participate in activities such as setting up a static display, risk assessment and screening, spirometry testing and fundraising 'walks for COPD'. A map locator shows interested members of the public where they can participate in an event. The activities are linked to media opportunities. Lung Health Checklist flyers and posters, T-shirts (What is COPD?) and balloons are available from Lung Foundation Australia to promote the day.

### Clinical newsletter

- Airwaves Clinical Update is a clinical e-newsletter for health professionals with links to resources, articles of interest, research awards and news of upcoming events.

### Patient resources

Lung Foundation Australia has developed and provides numerous resources to support patients with COPD and their carers, including those listed below.

- Information and Support Centre, accessed via a toll-free number (1800 654 301) or email ([enquiries@lungfoundation.com.au](mailto:enquiries@lungfoundation.com.au)), which provides contacts to pulmonary rehabilitation programs and patient support groups among other services.
- Fact sheets, brochures and booklets, available to download from its website.
- Better Living with COPD: A Patient Guide.*
- DVDs to support patient self-management of COPD.
- A lung care nurse, who by appointment will call back patients.
- C.O.P.E. – COPD. Online. Patient. Education. Developed in partnership with BUPA Health Foundation, this online interactive program for patients delivers the educational component of pulmonary rehabilitation from the comfort of a patient's home in five one-hour modules.
- Patient inhaler device technique handouts, available to download.
- Patient education seminars, held in each capital city.
- LungNet News, a newsletter published in February, May, August and November providing information for patients.
- Lung Health Checklist, a short questionnaire, available in an interactive online format or downloadable as a pdf, for members of the public to check the health of their lungs. MT

- COPD screening device resources. Position statements and instructional videos on the use of COPD screening devices and templates for recording screening results are available on Lung Foundation Australia's website.

### Health promotion

- World COPD Day, held annually in November (on November 18 in 2015), focuses on raising awareness of

COMPETING INTERESTS: The COPD National Program receives sponsorship monies from the following pharmaceutical companies: Boehringer Ingelheim, Menarini Australia, Air Liquide Healthcare, Novartis Pharmaceuticals, AstraZeneca and GlaxoSmithKline, in addition to monies from the sales of educational resources, donations and bequests and miscellaneous competitive grants.



# Stepwise Management of Stable COPD

	MILD	MODERATE	SEVERE
<b>Typical Symptoms</b>	<ul style="list-style-type: none"> <li>few symptoms</li> <li>breathless on moderate exertion</li> <li>recurrent chest infections</li> <li>little or no effect on daily activities</li> </ul>	<ul style="list-style-type: none"> <li>increasing dyspnoea</li> <li>breathless walking on level ground</li> <li>increasing limitation of daily activities</li> <li>cough and sputum production</li> <li>exacerbations requiring oral corticosteroids and/or antibiotics</li> </ul>	<ul style="list-style-type: none"> <li>dyspnoea on minimal exertion</li> <li>daily activities severely curtailed</li> <li>experiencing regular sputum production</li> <li>chronic cough</li> <li>exacerbations of increasing frequency and severity</li> </ul>
<b>Lung Function</b>	FEV <sub>1</sub> ≈ 60–80% predicted	FEV <sub>1</sub> ≈ 40 –59% predicted	FEV <sub>1</sub> < 40% predicted
<b>Non-Pharmacological Interventions</b>	<p><b>RISK REDUCTION</b> Check smoking status, support smoking cessation, recommend annual influenza and pneumococcal vaccine according to immunisation handbook</p> <p><b>OPTIMISE FUNCTION</b> Encourage physical activity, review nutrition, provide education, develop GP management plan and initiate regular review</p> <p><b>CONSIDER CO-MORBIDITIES</b> especially osteoporosis, coronary disease, lung cancer, anxiety and depression</p> <p><b>REFER TO PULMONARY REHABILITATION</b> and consider psychosocial needs, agree written action plan</p> <p>Consider oxygen therapy, surgery, palliative care and advanced care directives</p>		
<b>Pharmacological Interventions</b>	<p><b>CHECK DEVICE USAGE TECHNIQUE AND ADHERENCE AT EACH VISIT</b> - Up to 90% of patients don't use devices correctly</p> <p><b>SHORT-ACTING RELIEVER MEDICATION:</b> Short-acting beta<sub>2</sub>-agonist (SABA) or short-acting muscarinic antagonist (SAMA).</p> <p>Refer to Table 1 overleaf.</p> <p><b>SYMPTOM RELIEF:</b> Long-acting muscarinic antagonist (LAMA) and/or long-acting beta<sub>2</sub>-agonist (LABA).</p> <p>Refer to Table 1 overleaf. <b>These medicines may also help to prevent exacerbations. **SEE PRECAUTIONS<sup>1-3**</sup></b></p> <p><b>EXACERBATION PREVENTION:</b> When FEV<sub>1</sub> &lt;50% predicted AND 2 or more exacerbations in the previous 12 months, commence inhaled corticosteroid (ICS)/LABA combination therapy. <b>**SEE PRECAUTIONS<sup>4**</sup></b></p> <p>Consider low dose theophylline</p>		

Based on COPD-X Plan: Australian and New Zealand Guidelines for the Management of COPD; Australian Therapeutic Guidelines.

## PRECAUTIONS:

- <sup>1</sup> An assessment should be undertaken to exclude asthma or Asthma-COPD Overlap before initiating LABA monotherapy. LABA monotherapy should not be used in asthma or Asthma-COPD Overlap.
- <sup>2</sup> Once a LABA is commenced, ipratropium bromide (a SAMA) should be discontinued.
- <sup>3</sup> If starting a fixed dose LABA/LABA combination inhaler, discontinue existing inhalers containing a LABA or LABA. Refer to Table 1 overleaf.
- <sup>4</sup> If starting an ICS/LABA combination inhaler, discontinue existing inhalers containing a LABA. Refer to Table 1 overleaf.

FEBRUARY 2015

✉ Lung Foundation Australia  
PO Box 1949  
Milton Qld 4064  
**Free call:** 1800 654 301  
**Website:** [www.lungfoundation.com.au](http://www.lungfoundation.com.au)

Advocacy • Awareness • Education • Support • Research

**Table 1: Guide to addition of therapies\***

\*Red boxes with crosses indicate classes of therapies that **should not** be used together.

	SABA	SAMA	LAMA	LABA	LABA/ LAMA	ICS/ LABA
<b>SABA</b>	×					
• Salbutamol (Ventolin™, Airomir™, Asmol™) • Terbutaline (Bricanyl™)						
<b>SAMA</b>		×	×		×	
• Ipratropium bromide (Atrovent™)						
<b>LAMA</b>		×	×		×	
• Tiotropium bromide (Spiriva™) • Glycopyrronium bromide (Seebri™)						
<b>LABA</b>				×	×	×
• Salmeterol (Serevent™) • Eformoterol (Oxis™, Foradile™)						
<b>LABA/ LAMA</b>		×	×	×	×	×
• Indacaterol/Glycopyrronium bromide (Ultibro™)						
<b>ICS/ LABA</b>						
• Fluticasone propionate/Salmeterol (Seretide™) • Budesonide/Eformoterol (Symbicort™)						
• Fluticasone furoate/Vilanterol (Breco™)						

## Relievers

Spacers are recommended to be used with puffers



Ventolin® Inhaler

Airomir® Inhaler



Asmol® Inhaler

Airomir® Autohaler



Bricanyl® Turbuhaler® (not used with spacer)

Atrovent® Metered Aerosol

## Maintenance

ICS (For patients with COPD and Asthma)



Flixotide® Inhaler

Flixotide® Accuhaler®



Pulmicort® Turbuhaler®



Spiriva® HandiHaler®



Breco® Genuair®



Seebri® Breezhaler®



Incruse® Ellipta®



Ultibro® Breezhaler®



Anoro® Ellipta®



Symbicort® Turbuhaler®



Seretide® Accuhaler®



Symbicort® Rapihaler™



Seretide® MDI

LABA



Onbrez® Breezhaler®



Foradil® Aerolizer®



Oxis® Turbuhaler®



Serevent® Accuhaler®



Breco® Ellipta®

## Flare Up Medicines

1. Antibiotics
2. Oral steroids (Prednisone, Prednisolone)

**Notes:** • Handihaler, Breezhaler and Aerolizer devices require a capsule to be loaded into the device. All other devices are preloaded.  
• LABA monotherapy unsuitable for patients with Asthma or Asthma-COPD Overlap.

Visit [www.lungfoundation.com.au](http://www.lungfoundation.com.au) and click on Health Professional to find out more or call us on **1800 654 301** to order copies.

# COPD ACTION PLAN

(Chronic Obstructive Pulmonary Disease)

For more information refer to 'Writing a COPD Action Plan'



**LUNG FOUNDATION**  
AUSTRALIA

"When you can't breathe...nothing else matters"

Date: \_\_\_\_\_ (Ask your doctor to review each year with your care plan)

Patient Name: \_\_\_\_\_ Date of Birth: \_\_\_\_\_

GP Name: \_\_\_\_\_ GP Phone: \_\_\_\_\_ A/H: \_\_\_\_\_

Health Worker Name: \_\_\_\_\_ Health Worker Phone: \_\_\_\_\_

## Feeling your usual self

- I can do my usual daily activities
- Sleeping as usual

- Taking usual medicine
- Usual amount of phlegm

My FEV<sub>1</sub> is: \_\_\_\_\_  
CO<sub>2</sub> Retainer: ☐ Yes ☐ No ☐ Unknown

**ACTION:** Continue taking your usual medicines as listed below.

Annual Influenza Immunisation - Date: \_\_\_\_\_

Last Pneumococcal Immunisation - Date: \_\_\_\_\_

My usual medicines	Colour of device	How many puffs or tablets	How often
Oxygen:	Yes/No:	Setting or l/min:	hrs/day:

## Feeling harder to breathe/Feeling sick

### FEELING HARDER TO BREATHE THAN USUAL

- More phlegm or thicker than usual
- More coughing
- Not sleeping well
- Loss of appetite
- Not much energy

**ACTION:** Follow plan below for extra medicines. Plan your day, get rest, relax, use breathing techniques, huff and cough to clear phlegm as required.

My extra medicine	Colour of device	How many puffs or tablets	How often

### FEELING SICK

- Taking reliever medicine 3-4 hourly, but not getting adequate relief

**ACTION:** Start taking prednisolone. Contact your Health Worker/Nurse or Doctor.

- A change in colour and/or volume of phlegm
- Fever

**ACTION:** Start taking antibiotics as well as prednisolone. Contact your Health Worker/Nurse or Doctor.

Prednisolone*			Antibiotics*		
Strength	Tablets each day	No. of days	Strength	Tablets each day	No. of days

\* GP to fill in if prescribed.

## Not feeling good (trouble breathing and/or wheezing)

- Difficulty sleeping/woken easily
  - Blood in your phlegm
  - Swollen ankles
- ACTION:** Contact Doctor

- Very short of breath at rest
  - Confused, slurring of speech
  - High fever
  - Drowsy
  - Chest pain
  - Afraid/scared
- ACTION:** Phone an Ambulance 000

**CAUTION! Ambulance/Paramedics:** Oxygen supplementation to maintain SpO<sub>2</sub> 92% max (exceeding 92% risks hypercapnia)

Show them this plan.

# Things to talk about with the Health Worker, Nurse or Doctor

## Know your baseline...

### Your baseline is when you are feeling your usual self

- How breathless are you?
- How far can you walk?
- How well do you sleep and eat?
- What is the colour of your phlegm?
- How much phlegm do you cough up?

### Relievers



Ventolin® Inhaler



Asmol® Inhaler



Airomir™ Inhaler



Airomir™ Autohaler®



Bricanyl® Turbuhaler®  
(not used with spacer)



Atrovent® Metered Aerosol



### Maintenance

#### ICS (For patients with COPD and Asthma)



Flixotide® Inhaler



Flixotide® Accuhaler®



QVAR® Inhaler



Pulmicort® Turbuhaler®

#### LAMA



Spiriva® HandiHaler®



Bretaris® Genuair®



Seebri® Breezhaler®



Incruse® Ellipta™

#### LAMA/LABA



Ultibro® Breezhaler®



Anoro® Ellipta®

#### ICS/LABA



Symbicort® Turbuhaler®



Symbicort® Rapihaler™



Seretide® Accuhaler®



Seretide® MDI

#### LABA



Alvesco® Inhaler



Onbrez® Breezhaler®



Foradil® Aerolizer®



Oxis® Turbuhaler®



Serevent® Accuhaler®



Breo® Ellipta®

### Flare Up Medicines

1. Antibiotics
2. Oral steroids (Prednisone, prednisolone)

### What you do to stay well

- Don't smoke
- Check your inhaler technique regularly
- Walk daily/keep active
- Attend lung rehab
- Get flu and pneumonia immunisations

**Notes:** • Handihaler, Breezhaler and Aerolizer devices require a capsule to be loaded into the device. All other devices are preloaded. • LABA monotherapy unsuitable for patients with Asthma or Asthma-COPD Overlap.

---



---



---



---

### RESOURCES

Lung Foundation Australia | 1800 654 301 | [www.lungfoundation.com.au](http://www.lungfoundation.com.au)  
Better Living with COPD – Patient Guide



**LUNG FOUNDATION**  
AUSTRALIA

"When you can't breathe... nothing else matters"

Your nearest Support Group contact person: \_\_\_\_\_

Your nearest Pulmonary Rehabilitation Program: \_\_\_\_\_

Your nearest Lungs in Action class: \_\_\_\_\_



# Writing a COPD Action Plan



## Suggested steps for developing a COPD Action Plan

### STEP 1

In the green section of the action plan, **complete the details about the patient's prescribed maintenance medication** including inhalers, oral medications, and oxygen. It is also helpful to include the patient's lung function results in this section (*most recent FEV<sub>1</sub> and date*). Make a note on the plan to **indicate if the patient retains CO<sub>2</sub>**.

### STEP 2

**Involve the patient in the development of the plan** asking them about their previous experiences with exacerbations and action plan use. Consider and identify their symptoms (*infective/non-infective*), treatment and outcomes.

### STEP 3

When completing the COPD Action Plan **consider the increased reliever dose, frequency and delivery method, antibiotic choice and steroid regime**. Include specific instructions to individualise the plan (*e.g. antibiotic "Use if mucus turns green". Identify if a reducing schedule is required*).

### STEP 4

In partnership with the patient and medical officer **discuss the possible actions that the patient and carer can safely do prior to urgent medical review** (*e.g. Start steroids and/or start antibiotics*). **NOTE: This should be seriously considered if the patient has frequent severe exacerbations as they are at higher risk of further episodes and faster deterioration in their lung function.**

### STEP 5

Liaise with the **medical officer to review, sign and date the plan**. Have the medical officer provide prescriptions for the medications recommended in the action plan and to reinforce the plan to the patient.

### STEP 6

**Explain the plan to the patient and carer** including signs to watch for and actions to take. Talk about worsening signs that would indicate an exacerbation, such as an increased use of reliever medication due to increased breathlessness, increased cough, change in colour and/or volume of sputum production, etc. Encourage them to keep a symptom diary on a daily basis to monitor changes in symptoms.

### STEP 7

Ask the **patient to sign the plan and keep it somewhere visible at home**. For example, both the COPD Action Plan and symptom diary could be put on the fridge for ease of reference.

### STEP 8

**Consider using editable pdfs**, save and import or print and scan to the patients electronic clinical file. Give the patient a copy to bring with them to their next appointment for review and reinforcement. Explain to them that bringing the COPD Action Plan and symptom diary to follow-up appointments will assist in managing their COPD.

Adapted from 'Suggested strategy for developing a COPD Action Plan', developed by Statewide Respiratory Clinical Network, Queensland Health

COPD Online, an interactive training program for primary care nurses.

1800 654 301  
[www.lungfoundation.com.au](http://www.lungfoundation.com.au)

 **LUNG FOUNDATION**  
AUSTRALIA  
*"When you can't breathe... nothing else matters"*

# Algorithm – Managing a COPD Exacerbation in Primary Care



## Patient is feeling unwell

and finding it harder to breathe than usual or experiencing any of the following:

- More coughing
- More phlegm
- Thicker phlegm than usual.

**Recommend** they start using more short-acting bronchodilator (SABA) e.g. *salbutamol* 4-8 puffs (400-800 mcg), via MDI and spacer every 3-4 hours, titrated to response.



## Patient is feeling worse

- 3-4 hourly SABA not relieving symptoms adequately

**Recommend:** Commence oral prednisolone 30-50mg daily for 5 days, then stop.

**If clinical features of infection are present:**

- A change in colour and/or volume of phlegm
- With or without fever

**Recommend:** Also commence oral antibiotics (amoxicillin or doxycycline) for 5 days.



## Patient still unwell

2-5 days after treatment commenced

**Recommend:**

- Review by GP or specialist.
- Review and reinforce the use of the COPD Action Plan.

## When the patient is feeling better

**Recommend:**

- Step down short-acting bronchodilator use
- Return to usual daily prescribed medicines
- Write or review and reinforce the use of the COPD Action Plan.

**If patient has frequent exacerbations (2 or more in last 12 months) they are at higher risk of further exacerbation and mortality.**

**Recommend:** Early review to:

- Optimise pharmacotherapy following "Stepwise Management of Stable COPD"
- Check immunisation status
- Check smoking status
- Refer to pulmonary rehabilitation
- Arrange a follow-up review when stable

## When to send to hospital

if any of the following:

- Marked increased intensity of symptoms
- New or worsening peripheral oedema
- Worsening of hypoxaemia from usual (*if known*)  
**SpO<sub>2</sub> <92% if not on home oxygen**
- Shortness of breath that is worsening and/or at rest
- High fever
- Altered mental state (confusion, slurred speech, drowsiness)
- Chest pain
- Worsening of co-morbidities (e.g. *heart failure, ischaemic heart disease, diabetes*)
- Inability to perform daily activities
- Increased anxiety (feeling scared/afraid)

It is recommended that you consult the suite of COPD-X Guidelines for further information when using this algorithm (COPD-X Plan: Australian and New Zealand Guidelines for the Management of COPD; COPD-X Concise Guide for Primary Care; Stepwise Management of Stable COPD). Visit [www.copdx.org.au](http://www.copdx.org.au) for further details.

Also see Australian Therapeutic Guidelines Respiratory version 5 (<http://www.tg.org.au/?sectionid=49>) and Antibiotic version 15 Guidelines (<http://www.tg.org.au/?sectionid=41>)

1800 654 301  
[www.lungfoundation.com.au](http://www.lungfoundation.com.au)



**LUNG FOUNDATION**  
AUSTRALIA

*"When you can't breathe...nothing else matters"*

Reproduced with permission from Lung Foundation Australia. This algorithm is currently being trialled in participating general practices located across six regions as part of a pilot initiative called 'Have the CHAT', which aims to help patients recognise symptoms of an exacerbation earlier.

## References

AIHW, Poulos LM, Cooper SJ, Ampon R, Reddel HK, et al. *Mortality from asthma and COPD in Australia*. Cat. No. ACM 30. Canberra: AIHW. 2014.

AIHW. *Asthma, chronic obstructive pulmonary disease and other respiratory diseases in Australia*. Canberra: AIHW, 2010 Contract No.: Cat. No ACM 20.

Page A, Ambrose S, Glover J et al. *Atlas of Avoidable Hospitalisations in Australia: ambulatory care-sensitive conditions*. Adelaide PHIDU. University of Adelaide. 2007

Fletcher et al. *COPD uncovered: an international survey on the impact of chronic obstructive pulmonary disease [COPD] on a working age population*. BMC Public Health 2011, 11:612.

Dunt D et al. *Signs of progress in the Australian post 2000 COPD experience but some old problems remain*. Int J COPD 2012; 7: 357–366

McKenzie DK, Abramson M, Crockett AJ, et al. *The COPD-X Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease*. Brisbane: Lung Foundation Australia and Thoracic Society of Australia and New Zealand.

Global initiative for obstructive lung disease (GOLD), *Global Strategy for the diagnosis, management and prevention of Chronic Obstructive Pulmonary Disease*, Am J Respir Crit Care Med. Jan 17 2013.

Australian Asthma Handbook, Version 1.0 2014. <http://www.astmahandbook.org.au/>.

Toelle B., Xuan W., Bird T Respiratory symptoms and illness in older Australians: the Burden of Obstructive Lung Disease (BOLD) study. Med J Aust 2013; 198(3):144-148.

Goyder et al. *Is a large scale community programme as effective as a community rehabilitation program delivered in the setting of a clinical trial?* BMC Med Res Methodol, 2013; 13:103.

Jones RC., Price D., Ryan D., et al. *Opportunities to diagnose chronic obstructive pulmonary disease in routine care in the UK: a retrospective study of a clinical cohort*. The Lancet Respiratory Medicine. 2014;2(4):267-276.

Abramson M.J., Schattner R.L., Sulaiman N.D., Del Colle E.A., Aroni R., Thien F. *Accuracy of asthma and COPD diagnosis in Australian general practice: a mixed methods study*. Prim Car Respir J 2012;21(2):167-173.

Newall, C., R.A Stockley, and S.L. Hill, *Exercise training and inspiratory muscle training in patients with bronchiectasis*. Thorax, 2005. 60(11):p.193-202.

Mandal, P., et al., *A pilot study of pulmonary rehabilitation and chest physiotherapy versus chest physiotherapy alone in bronchiectasis*. Respir Med, 2012. **106**(12):p.1647-54.

Dowman, L., C.J. Hill, and A.E. Holland, *Pulmonary rehabilitation for interstitial lung disease*. Cochrane Database Syst Rev, 2014. **10**:p. CD006322.

Lee, A.L and A.E. Holland, *Time to adapt exercise training regimens in pulmonary rehabilitation – a review of the literature*. Int J Chron Obstruct Pulmon Dis, 2014. **9**:p.1275-88.

Cavalheri, V., et al., *Exercise training for people following lung resection for non-small cell lung cancer – a Cochrane systematic review*. Cancer Treat Rev, 2014. **40**(4): p.585-94.

Bradley, J. and F. Moran, *Physical training for cystic fibrosis*. Cochrane Database Syst Rev, 2008(1): p.CD002768.

McCarthy, B., et al., *Pulmonary rehabilitation for chronic obstructive pulmonary disease*. Cochrane Database Syst Rev, 2015. **2**:p. CD003793.

Coventry, P.A., *Does pulmonary rehabilitation reduce anxiety and depression in chronic obstructive pulmonary disease?* Curr Opin Pulm Med, 2009. **15**(2): p.143-9.

Coventry, P.A., et al., *The effect of complex interventions on depression and anxiety in chronic obstructive pulmonary disease: systematic review and meta-analysis*. PLoS One, 2013. **8**(4): p.e60532.

Griffiths, T.S., et al., *Cost effectiveness of an outpatient multidisciplinary pulmonary rehabilitation programme*. Thorax, 2001. **56**(10): p. 779-84.

Puhan, M.A. et al., *Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease*. Cochrane Database Syst Rev, 2011(10): p. CD005305.

Ringbaek, T., Brondum, E., Martinez G., Thogersen, J., Lange, P (2010). *The Long-term effects of 1-year maintenance training on physical functioning and health status in patients with COPD: A randomized controlled study*. J Cardiopulm Rehabil Prev. 2010 Jan-Feb;**30**(1):47-52.

Spencer, L., Alison, J.A., McKeough, Z.J., (2010). *"Maintaining benefits following pulmonary rehabilitation – a randomised controlled trial"*. Eur Respir J. 2010 Mar **35**(3):571-7. doi: 10.1183/09031936.00073609.

Toelle B, Xuan W, Bird T, Abramson M, Atkinson D, Burton D, James A, Jenkins C, Johns D, Maguire G, Musk A, Walters E, Wood-Baker R, Hunter M, Graham B, Southwell P, Vollmer W, Buist A, Marks G. *Respiratory symptoms and illness in older Australians: The Burden of Obstructive Lung Disease (BOLD) study*. Med J Aust 2013; 198:144-148.

Australian Institute of Health and Welfare 2013. *Australian Hospital Statistics 2011-2012*. Health Services series no. 50. Cat No. HSE 134. Canberra: AIHW

Department of Health Western Australia, *WA chronic conditions self-management strategic framework*. 2011, Department of Health, Western Australia: Perth WA.



Zwerink M., Brusse-Keizer M., van der Valk PDLPM, Zielhuis G.A., Monninkhop E.M., van der Palen J., Frith P.A., Effing T. *Self management for patients with chronic obstructive pulmonary disease*. Cochrane Database Syst Rev, 2014, Issue 3. Art. No.:CD002990. DOI: 10.1002/14651858.CD002990.pub3.

Australian Institute of Health and Welfare, 2012-13, <http://www.aihw.gov.au/copd/>. Accessed 31 July 2015.

Chandra D, Tsai CL, Camargo CA, Jr. *Acute exacerbations of COPD: delay in presentation and the risk of hospitalization*. COPD 2009; 6:95-103.

Suissa S., *Long-term natural history of chronic obstructive pulmonary disease: severe exacerbations and mortality*. BMJ Open Respiratory Research, <http://thorax.bmj.com/content/early/2012/06/07/thoraxjnl-2011-201518> Published on line 8 June 2012.

Halpin D. *Mortality in COPD: Inevitable or Preventable? Insights from the Cardiovascular Arena*. COPD: Journal of Chronic Obstructive Pulmonary Disease 2008. 5:3, 187-200.