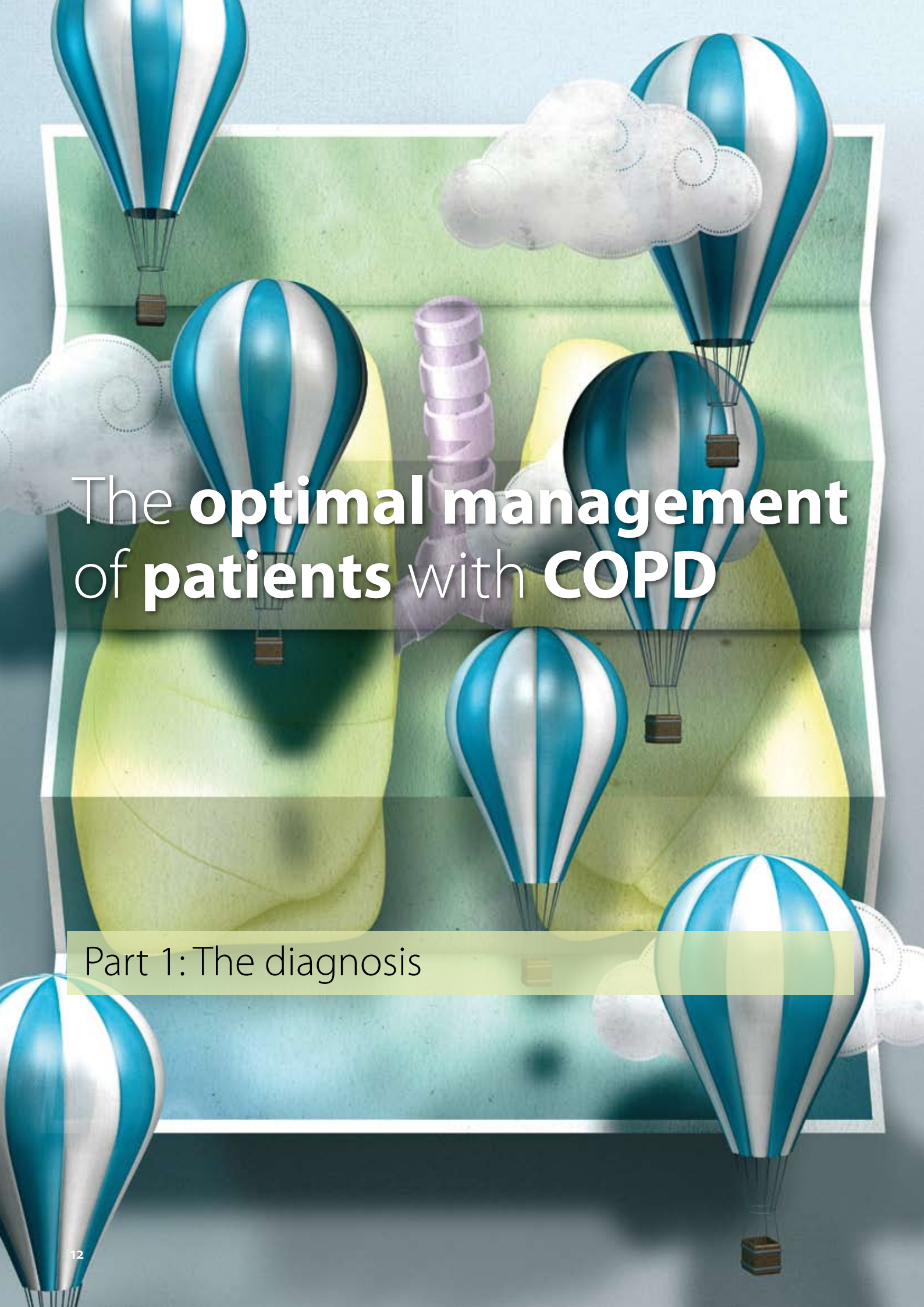

The **optimal management** of **patients** with **COPD**

Part 1: The diagnosis

Chronic obstructive pulmonary disease (COPD) affects approximately one in seven New Zealanders aged over 40 years,[1] and is the fourth leading cause of premature death, illness or impairment in this country behind heart disease, anxiety/depression and stroke.[2] A diagnosis of COPD may be considered in adult patients with long-term exposure to respiratory irritants, e.g. cigarette smoke, or with symptoms typical of COPD, i.e. breathlessness, cough, and/or sputum production. COPD cannot be reliably diagnosed on symptoms alone and requires spirometry to confirm a diagnosis. However, in some patients it can be challenging to differentiate between COPD and asthma with chronic airflow limitation. Spirometry can be reliably performed in primary care with the appropriate training.

COPD is a significant cause of morbidity and mortality in New Zealand

COPD is almost an entirely preventable disease as more than 85% of cases are caused by tobacco smoking.[3] Approximately 15% of people who smoke long-term will develop COPD, although individual susceptibility to the damaging effects of cigarette smoke varies greatly.[3] The major risk factors for COPD include:[3, 4, 5]

- Tobacco smoking – especially smoking 20 cigarettes per day for 20 or more years
- Long-term cannabis smoking
- Air pollution
- Airway infection
- Occupational exposure, e.g. exposure to cadmium, silica, asbestos or dusts
- Genetic predisposition, including alpha1-antitrypsin deficiency
- Bronchial hyper-responsiveness
- Childhood asthma may also be a risk factor

Māori are more severely affected by COPD

The burden of COPD among Māori and Pacific peoples represents one of the most significant healthcare disparities in New Zealand. This is primarily due to the higher rates of smoking in Māori and Pacific peoples, compared to the rest of the New Zealand population. The prevalence of COPD among Māori is more than twice that of non-Māori and the burden of the disease is greater.[6] Māori males aged 50 – 64 years are almost five times more likely to be hospitalised due to COPD and more than four and a half times more likely to die due to COPD than non-Māori males.[7] Māori females aged 50 – 64 years are more than six and a half times more likely to be hospitalised due to COPD and more than five times likely to die due to COPD.[7] Māori are also affected by COPD up to 20 years earlier than non-Māori.[6]

For further information see: "Diagnosis and management of COPD in Māori and Pacific peoples", BPJ 43, 2012.

Forming a diagnosis of COPD

A clinical diagnosis of COPD can be considered in anyone aged over 35 years who has had long-term exposure to cigarette smoke, occupational exposure to dust, fumes or gas, or who has typical symptoms of COPD, i.e. breathlessness, cough and/or sputum production.[8] Symptoms such as chest tightness, wheezing, and airway irritability are also common, although wheezing is not an indication of disease severity.[8]

Take a focused history

Many patients will be aware that they have increasing breathlessness, increasing frequency or duration of "colds" and limitations in their physical ability.[9] However, they may not have attributed these symptoms to a respiratory illness and instead consider them to be due to old age, a lack of fitness or merely "a smoker's cough". Patients can often note periods where they have had significant worsening of symptoms without recognising these as exacerbations.[9]

For patients suspected of having COPD take a focused history to identify risk factors and symptoms. A focused history includes:

- Exposure to COPD risk factors, i.e. cigarette smoke, occupational or environmental compounds
- Previous respiratory conditions including asthma, allergies, sinusitis, nasal polyps, respiratory infections during childhood
- Pattern of symptom onset, e.g. age, gradual versus acute, triggers
- Exacerbation history or prior hospitalisations for respiratory symptoms
- Co-morbidities such as heart disease, osteoporosis and musculoskeletal disorders which may further limit the patient's ability to remain active

- The impact the patient's symptoms are having on their life, e.g. physical activity, ability to work or fulfil family duties, depression or anxiety, sexual activity
- The amount of family and social support the patient is able to accesss
- Opportunities that the patient has to reduce exposure to risk factors or triggers, e.g. smoking cessation

The Modified Medical Research Council Dyspnoea Scale (Table 1) is a useful tool that allows patients to communicate their level of breathlessness to health professionals.[8]

Table 1: Modified Medical Research Council Dyspnoea Scale, adapted from Abramson *et al*, (2014)[8]

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

The differential diagnosis of COPD

The differential diagnosis of respiratory disorders is influenced by the age of the patient. Asthma is the most likely chronic airway disease in children and young adults, once infectious disease has been excluded. COPD becomes increasingly more likely from the age of 35 years.

Table 2 provides features that are helpful for distinguishing between COPD and asthma, however, this can be complicated by the fact that some patients may have features of both conditions. Post-bronchodilator spirometry (see below) can be useful in differentiating asthma from COPD, but is less helpful in differentiating between asthma with fixed airflow limitation and COPD.[10]

Asthma-COPD overlap syndrome (ACOS)

Asthma and COPD are relatively common conditions, therefore they may be present concurrently in some patients. Patients with features of both COPD and asthma have more frequent exacerbations, reduced quality of life and more rapidly declining lung function than patients with COPD alone.[10] The increased severity of outcomes in these patients has led to the identification of asthma-COPD overlap syndrome (ACOS) that is thought to account for approximately 15 – 25% of all obstructive airway diseases.[11] Features associated with ACOS are shown in Table 2. Currently this syndrome lacks a clinical definition and no defining features have been identified. This is in part because the way that clinical trials are designed makes ACOS hard to study; patients with asthma are generally excluded from studies involving COPD and patients with COPD are often excluded from trials investigating asthma.

Having three or more of the features for either COPD or asthma, without any features of the other condition, and the absence of an alternative diagnosis provides a degree of diagnostic certainty.[10] However, the absence of any of these features does not have a strong predictive value and does not rule out either asthma or COPD.[10] If a patient has a similar number of features for COPD and asthma then a diagnosis of ACOS is more likely.

Referral to a respiratory physician is recommended for patients suspected of having ACOS.[10]

Other respiratory conditions to consider

Bronchiectasis is frequently present in patients with moderate-to-severe COPD and is associated with increased exacerbation frequency, bacterial colonisation and mortality rate. Bronchiectasis is suggested in patients with large volumes of purulent sputum and wheeze that does not respond to treatment, and is often associated with bacterial infections.[9] COPD is not treated any differently in patients with bronchiectasis, although some patients may need more aggressive and longer duration of treatment with antibiotics.

For further information see: "Bronchiectasis: rates still increasing among Pacific peoples", BPJ 46 (Sep, 2012).

Additional differential diagnoses to consider, especially if the patient does not have a history of smoking or has borderline respiratory results, include: respiratory infection, alpha1-antitrypsin deficiency and tuberculosis.[8]

Spirometry confirms a diagnosis of COPD

COPD cannot be diagnosed based on the presence of symptoms alone. Spirometry is required to confirm a diagnosis,[9] however, the results of spirometry are not disease specific.[12] For example, it may not be possible to differentiate between COPD, chronic bronchitis or asthma as the cause of a patient's low FEV_1.[12]

Spirometry can be performed in primary care

Spirometry can be reliably performed in a general practice setting, although training is required in both the technique and the maintenance of the equipment.

When performing spirometry:[8]

- Patients should be clinically stable and free of respiratory infection
- Patients should not have inhaled a short-acting bronchodilator in the previous six hours, or a long-acting beta2-agonist (LABA) in the previous 12 hours
- **An (FEV_1) < 80% predicted and a (FEV_1) /FVC ratio < 0.7 indicates an airflow limitation**

The terminology of spirometry[12, 13]

Forced vital capacity (FVC) is the maximum volume of air exhaled forcefully after a maximal inspiration. For a healthy adult this should last at least six seconds, although patients with COPD may take considerably longer than this to exhale.

Forced expiratory volume in one second (FEV_1) is the volume of air exhaled during the first second of the forced expiratory manoeuvre. The ratio of FEV_1 to FVC expressed as a percentage is used to assess obstructive lung disorders.

Table 2: Typical features of COPD, asthma and asthma-COPD overlap syndrome (ACOS), adapted from GINA, 2014[10]

Clinical feature	COPD	Asthma	ACOS
Age of onset	Usually older, e.g. > age 35 years	Usually during childhood but can be at any age	Usually older, but may have had symptoms earlier in life
Pattern of symptoms	Long-term symptoms which are often continuous and particularly noticeable with exercise. Some days may be better than others.	Symptoms may vary from day-to-day or over longer periods. Often triggered by exercise, emotions, including laughter, dust or allergies. Will often limit the patient's activity.	Exertional dyspnoea and other respiratory symptoms may be persistent but there may be noticeable variability
Lung function	FEV_1 may be improved by treatment but post-bronchodilator FEV_1/FVC < 0.7 generally persists	Variable airflow limitation, e.g. post-bronchodilatory reversibility, airway hyper-responsiveness	Airflow limitation not fully reversible but displays current or historical variability
Lung function when symptoms absent	Airflow limitation persists	May be normal	Airflow limitation persists
History	History of exposure to noxious particles or gases, e.g. cigarette smoke	Many patients display atopy and have allergies and personal history of asthma in childhood, and/or family history of asthma	Often has previously had a diagnosis of asthma, allergies, a family history of asthma, and a history of noxious exposure
Time course	Generally a slow progression of symptoms despite treatment	Will often improve spontaneously or with treatment, but can develop into a fixed airflow limitation	Symptoms are partially, but significantly, relieved by treatment. Progressive, with high treatment needs.
Chest x-ray	Severe hyperinflation with other changes visible	Usually normal	As for COPD

ACOS – Asthma COPD Overlap Syndrome

Over-diagnosis of COPD is more likely in older patients who have decreased lung function and under-diagnosis of COPD is more likely in younger patients, especially when the FEV_1/FVC is close to 0.7.[13]

For information on spirometry training courses see: **www.asthmafoundation.org.nz/education/for-health-professionals/spirometry-courses-in-nz/**

Patients with suspected COPD should be referred to a respiratory service if reliable spirometry is unable to be performed in primary care, or there is uncertainty surrounding a test result, or if the patient has difficulty performing spirometry.

If there will be a delay in accessing spirometry testing there are clinical questionnaires that can be used to determine the likelihood of a patient having COPD. These can be downloaded and completed by the patient and clinician in a few minutes. However, patients suspected of having COPD should still undergo spirometry testing early during their management to confirm a diagnosis.

The Clinical COPD Questionnaire is available from: **http://ccq.nl**

Spirometry is not recommended to "screen" for COPD

Spirometry testing should be reserved for patients who are suspected of having COPD. There is no evidence that spirometry screening improves management or outcomes in patients with COPD before they develop significant symptoms.[9]

Assessing COPD severity with spirometry

The results of spirometry are used to assess the severity of COPD, in combination with the clinical signs and symptoms of hypoxaemia, hypercapnia, pulmonary hypertension, heart failure and polycythaemia.[8] Table 3 provides a tool for assessing COPD severity, although symptom descriptions may not always match spirometry levels.

The role of post-bronchodilator spirometry

COPD guidelines recommend that patients with a diagnosis of COPD have a post-bronchodilator spirometry test documented in their clinical record.[8] A post-bronchodilator FEV_1/FVC < 0.7 confirms the presence of persistent airflow limitation limitation, and is therefore consistent with a diagnosis of COPD. [9] Post-bronchodilator testing is appropriate for all patients with suspected COPD who display a complete reversal of baseline

Table 3: COPD severity assessment guide, adapted from Abramson *et al* (2014)[8]

COPD severity	FEV_1 (% predicted)	Symptoms
Mild	60 – 80	▪ Breathlessness on moderate exertion ▪ Recurrent chest infections ▪ Little or no impact on daily activity
Moderate	40 – 59	▪ Increasing dyspnoea ▪ Breathlessness walking on level ground ▪ Increasing limitation of daily activities ▪ Cough and sputum production ▪ Exacerbations require corticosteroids and/or antibiotics
Severe	< 40	▪ Dyspnoea following minimal exertion ▪ Daily activity severely limited ▪ Chronic cough ▪ Regular sputum production

Frequency of exacerbations is likely to increase with severity. Other long-term conditions are likely to be present in patients with varying degrees of COPD severity. Conditions may include: cardiovascular disease, peripheral vascular disease, chronic kidney disease, lung cancer, sleep apnoea, muscle dysfunction, osteoporosis, obesity, type 2 diabetes, anxiety and depression. Treatment will also be guided by the results of routine investigations used to manage these long-term conditions.

airflow limitation, once treatment with a bronchodilator is initiated, to exclude the possibility of asthma.

To assess the patient's post-bronchodilator response once a baseline spirometry measurement has been taken:

1. Give a bronchodilator, e.g. salbutamol 200 – 400 micrograms (two to four puffs of a standard 100 micrograms per puff inhaler), via a metered dose inhaler (MDI) and spacer using correct inhalation technique
2. Repeat spirometry 15 – 30 minutes after the bronchodilator has been given
   - An increase in FEV_1 of ≥ 12% and ≥ 200 mL is regarded as indicating reversibility

It is important if post-bronchodilator spirometry testing is performed that the results are not used to predict the patient's response to future treatments. Patients with COPD may experience symptomatic and functional benefits from the use of bronchodilators, without any change in spirometry, due to a reduction in hyperinflation. Furthermore, any acute response to a bronchodilator that a patient displays may not predict a subsequent response to long-acting beta agonists. Whenever post-bronchodilator spirometry is considered it is important to remember that even in patients who have never smoked, poorly controlled asthma can lead to a chronic and irreversible narrowing of the airways.[8]

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