

# Distinguishing asthma from COPD—part 2

Asthma in elderly patients is poorly studied, increasingly common, and often under-recognised and undertreated. Elderly patients have largely been excluded from clinical trials because of age and comorbidity. The British Thoracic Society's guidelines on asthma are applicable to all age groups. However, special considerations apply to older adults. Distinguishing asthma from chronic obstructive pulmonary disease (COPD) can be difficult—this distinction is important because prognosis and treatments differ. Inhaler technique is often poor in elderly patients and inadequately assessed. The risk of adverse effects is much greater than for younger patients. Drug interactions with adverse consequences are common, and may necessitate adjustment in therapeutic doses.

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The US National Asthma Education and Prevention Program defines asthma as a lung disease characterised by: airflow obstruction that is reversible (not completely in some patients); airway inflammation; and increased airway responsiveness to various stimuli.<sup>1</sup> This definition still applies to asthma in elderly patients. However, incomplete reversibility is common in older patients, particularly if asthma is longstanding, and some patients develop fixed airflow obstruction. This can lead to diagnostic confusion with chronic obstructive pulmonary disease (COPD).

The US National Asthma Education and Prevention Program produced a report on managing asthma in elderly patients in 1996.<sup>1</sup> It concluded that separate guidelines were unnecessary but that more detail was needed on important considerations relevant to older people. Subsequent guidelines, published in 2007, included a section

on asthma in this population.<sup>2</sup> The National Asthma Council of Australia produced a handbook of asthma management in elderly people.<sup>3</sup> Current guidelines from the British Thoracic Society for asthma do not contain specific guidance for older adults other than highlighting a lack of useful data.<sup>4</sup>

Part 2 of this article deals with differential diagnosis and complications of treatment. Part 1, looking at prevalence and diagnostic tests for asthma in older people was published in *GM* January 2010.

## Differential diagnosis

The three most common causes of chronic or intermittent dyspnoea in older adults are COPD, heart failure, and asthma.<sup>5</sup> Distinguishing between these conditions is often difficult. Smoking is a risk factor for all three conditions, and can

result in similar symptoms such as wheeze, chest tightness, dyspnoea, and cough with nocturnal and exercised-induced exacerbations.

## Heart failure or asthma?

Echocardiography may not be rapidly available to distinguish between heart failure and asthma, but a diagnosis of cardiac failure is improbable with normal chest X-ray and ECG. Spirometry in cardiac failure often shows a mixed obstructive-restrictive pattern. Substantial airflow obstruction is much more likely to be due to airways disease than to cardiac failure. B-type natriuretic peptide measurement can help make the distinction,<sup>6</sup> because it is elevated in acute and chronic cardiac failure, particularly systolic failure. Finally, a trial of appropriate therapy may be helpful.

## Asthma or COPD?

A substantial history of smoking suggests COPD but does not exclude asthma. Many asthmatic people smoke, and asthma and COPD can coexist. A history of smoking can result in an erroneous label of COPD, especially in elderly people.<sup>7</sup> Airflow obstruction that is significantly reversible favours a diagnosis of asthma. However, in longstanding asthma, reversibility often declines and fixed airflow obstruction may develop.<sup>8</sup> This is thought to be due to chronic airway inflammation leading to bronchial thickening and subepithelial fibrosis.<sup>9</sup> These patients usually have asthma from early adulthood or childhood, whereas COPD usually develops in middle-age.

Low diffusion capacity in a patient with a substantial smoking history strongly suggests COPD.<sup>10</sup> A CT scan of the chest showing emphysema may be helpful. For cases in which the distinction

between asthma and COPD is not clear, some physicians choose to use alternative terms such as airways disease and quantify the degree of reversibility. Clinical features and lung-function parameters can be helpful in distinguishing COPD from asthma (tables 1 and 2).

## Why distinguish COPD from asthma?

Correct diagnosis is important because severe chronic asthma responds better to appropriate treatment and has a better prognosis than COPD.<sup>11</sup> 10-year mortality in COPD is approximately 60% and 15% in late onset asthma.<sup>12</sup> The average yearly decline in FEV<sub>1</sub> in COPD is 70 ml; in asthma it is 5 ml.<sup>12</sup> Evidence suggests that inhaled corticosteroids maintain control in asthma and slow the decline in FEV<sub>1</sub>. Corticosteroids are thought to have no overall effect on the rate of decline of FEV<sub>1</sub> in COPD.

## Aspiration

The incidence of gastro-oesophageal reflux disorder increases with age and is associated with asthma. Micro-aspiration due to reflux can lead to cough and bronchospasm. In elderly patients, chronic aspiration due to impaired gag reflex can cause cough and wheeze. Aspiration is associated with dementia, stroke and Parkinson's disease as well as sedating medication. A Cochrane review found that treating gastro-oesophageal reflux disorder in asthmatic patients did not result in any improvement in lung function or symptoms.<sup>13</sup>

## Management

Management of asthma in older patients is the same as in younger ones, as set out in guidelines from the British Thoracic Society.<sup>4</sup> The components are a stepwise approach to therapy, patients'

	<b>Asthma</b>	<b>COPD</b>
Patient smokes	Possibly	Nearly always
Age at onset	Early adult or childhood. Can develop in later life (late-onset) asthma	Usually 50+ years
Symptoms	Variability (but variability may be lost in longstanding asthma)	Persistent
Cough and sputum	Dry cough common	Common and usually productive
Nocturnal symptoms	Common	Less common
Allergic symptoms	Common	Not common
Family history of allergy	Common	Not common
Seasonality	Winter exacerbations may occur	Winter exacerbations common
Chest X-ray	Often normal. Hyperinflation and bronchial thickening may be seen	Bullae, hyperinflation, lack of vascular markings
Eosinophilia	Common	Less common
Total IgE	May be elevated	Rarely elevated

**Table 1:** Characteristics of asthma and COPD

	<b>Asthma</b>	<b>COPD</b>
FEV <sub>1</sub>	Reduced or normal	Reduced
FVC	Reduced or normal	Reduced
FEV <sub>1</sub> /FVC	Reduced or normal	Reduced
Reversibility*	High	Some or none
Total lung capacity	Normal or increased	Normal or increased
Residual volume	Increased	Increased
Diffusion capacity	Normal or increased	Reduced

**Table 2:** Lung function tests in asthma and COPD

\*(FEV<sub>1</sub>>12% or >200 ml with bronchodilator)

education, monitoring, and control of environmental factors. However, there are some special considerations in the management of asthma in elderly individuals.

### Disease monitoring

Elderly patients often have blunted awareness of bronchospasm;<sup>14</sup> those with inflamed airways and poor lung function may under-report symptoms. For this reason, spirometry is particularly important for assessing severity and monitoring disease activity. Spirometry is more sensitive and reproducible than peak flow measurement.

### Inhaler technique

Metered-dose devices are commonly prescribed to elderly patients, but their inhaler technique is often not checked.<sup>15</sup> Patients' perception of the adequacy of their inhaler technique correlates poorly with actual performance.<sup>15</sup> Older adults often have difficulty coordinating triggering the device and inhalation. Poor vision, cognition, grip strength, and coordination are all associated with poor inhaler technique.

Breath-actuated inhalers can be used to overcome problems with coordination. Those that require comparatively low inspiratory flow rates to activate (eg, autohaler) are most likely to be useful in elderly people.<sup>16,17</sup> Dry-powder inhalers do not require the coordination of inhalation and triggering. They are simple to use and are acceptable for elderly people. They do require significant inspiratory flow rates to be effective, which may be a limiting factor in elderly people. Many inhalers come with adjuncts to improve grip and triggering and therefore enable operation by elderly people.

Most metered-dose inhalers discharge aerosol at approximately 70 miles per hour. Only 10–20% of the drug reaches the lung. The rest is deposited in the upper airway. A spacer can improve drug delivery by removing the need for coordination of activation and inspiration, and by slowing down the drug aerosol and thereby reducing oropharyngeal deposition. The patient discharges a metered-dose device into one end of a plastic cylinder and then breathes in through the other end. One deep breath or three or four steady breaths in and out can be used. In a study of 40 elderly patients, 87% used a metered-dose inhaler correctly and

97% with a spacer.<sup>18</sup> Spacers reduce the deposition of inhaled steroid in the oropharynx and so reduce side-effects such as oral thrush.

Impaired mini-mental state exam scores predict difficulty using inhalers.<sup>19</sup> Patients with an abbreviated mental test score of less than 4 could not learn to use inhalers. A score of 8 or more was needed for 100% success with a metered-dose inhaler and spacer and 7 or higher for breath-actuated devices.<sup>19</sup>

### Nebulisers

Nebulisers are no more effective than inhaled therapy in chronic asthma. Home nebulisers may be useful for patients who cannot manage inhalers if they can be given by a carer.

### Self-management plans

Self-management plans for asthma reduce mortality, improve peak expiratory flow rate, and quality of life.<sup>20</sup> Little research has been done for self-management plans in elderly people. Simple drug regimens with minimum dose frequency are most likely to be effective. Written instructions in large type and involving carers with monitoring symptoms and expiratory flow can be useful. Self-monitoring of expiratory flow may be impractical for elderly patients. Those with poor perception of airflow limitation may fail to recognise exacerbations early and then present late for medical attention.

A self-management or action plan usually includes written information agreeing treatment goals; how to recognise worsening asthma by monitoring symptoms and peak expiratory flow rate; how to step-up treatment by increasing bronchodilators, inhaled steroids or by starting oral steroids; and when to seek medical attention.

## Drug treatment

The risk of adverse effects in asthma treatment is much greater for elderly people than for young patients. The benefits of treatment need to be balanced against this risk.

### Oral steroids

Chronic oral steroid therapy for the management of asthma in older patients is frequently associated with numerous adverse effects (table 3), and should be used only as a last resort. Patients taking steroids for more than 3 months of any year or

requiring three or more courses per year are at high risk of side effects. Guidelines issued by the Royal College of Physicians recommend starting bisphosphonates in patients taking oral steroids if they are older than 65 years or are at risk of fragility fractures. In other patients on oral steroids whose treatment is intended to continue for more than 3 months, measurement of bone density should be considered. A T-score of -1.5 or less may indicate the need for a bone-sparing agent.<sup>21</sup>

### Inhaled corticosteroids

Inhaled corticosteroids have some systemic adsorption and so there is potential for adverse consequences. Fluticasone has equal efficacy as beclomethasone and budesonide at half the dose. 800 µg/day of beclomethasone is unlikely to cause systemic side-effects, but may cause oral thrush, cough, and dysphonia. Rinsing the mouth after inhaler use or using a large volume spacer may help.

Some patients need antifungals to treat oral thrush. Cough may be reduced by pretreatment with bronchodilator or switching to dry powder devices. High doses of inhaled corticosteroids may increase risk of fracture, although the data for this are conflicting.<sup>22-24</sup> One systematic review reported no change in bone density at doses of up to 1000 µg/day.<sup>24</sup> Cataracts are associated with long term use of 2000 µg/day of beclomethasone or equivalence.<sup>25</sup> Inhaled corticosteroids may also cause glaucoma in elderly people.<sup>26</sup>

### β-agonists

Concerns about β-agonists causing hypokalaemia and arrhythmias in older people go back to the 1970s. No clinical trials have specifically looked at the incidence of adverse

	Possible adverse effects
Oral steroids	Hypertension Fluid retention Congestive heart failure Hypokalaemia Metabolic alkalosis (particularly with thiazides) Risk of arrhythmia Poor glycaemic control in diabetes Cataracts Thin skin and bruising Myopathy Osteoporosis Hypoadrenalism Psychosis Depression Gastritis Varicella zoster Immunosuppression
Inhaled corticosteroids	Cough Oral thrush Dysphonia Skin bruising Risk of fracture Cataracts Glaucoma <sup>27</sup>
β-agonists	Hypokalaemia Cardiac arrhythmia Tremor
Theophylline	Cardiac arrhythmia Gastric irritation Seizures, Serum levels increased by macrolides and quinolones Serum levels increased in heart or liver failure
Ipratropium	Anticholinergic effect Mucosal dryness Urinary retention

**Table 3:** Side-effects of treatments for asthma

effects in elderly patients with asthma.<sup>28</sup> However, a meta-analysis investigating adverse effects in patients with obstructive lung disease up to 67 years old showed an increased incidence of minor cardiovascular events such as sinus tachycardia.<sup>29</sup> The relative risk of major events (arrhythmias, congestive cardiac failure, and acute coronary syndrome) was 1.66, but this was not statistically significant. Almost all the studies excluded patients with known cardiovascular disease. The risk of adverse effects of  $\beta$ -agonists in the general elderly population is therefore likely to be much higher.

In the Salmeterol Multicenter Asthma Research Trial<sup>30</sup> there was a significant increase in mortality in patients taking long-acting  $\beta$ -agonists without inhaled corticosteroids compared with placebo. This occurred predominantly in African-American patients.<sup>30</sup>

### Leukotriene-receptor antagonists

Zafirlukast has been evaluated in elderly patients with asthma. In an open-label trial including 321 patients older than 66 years there was a statistically significant improvement in symptoms and morning peak expiratory flow rate.<sup>31</sup> Side-effects were only slightly more common than in younger adults (17.5 versus 18.8%).

### Theophyllines

Theophylline may be used as an add-on therapy for patient with inadequate control on long acting  $\beta$ -agonists and inhaled corticosteroids (British Thoracic Society step 3). The drug has anti-inflammatory and bronchodilatory properties and has a narrow therapeutic range. Bronchodilation occurs with plasma level of 10–20 mg/l;

with anti-inflammatory properties occurring at lower doses. The risk of life-threatening adverse effects such as seizures and arrhythmias increases with age. Patients over 75 years have a 16-fold increased risk of adverse events relative to that of 25-year-olds.<sup>32</sup> Blood-level monitoring is required. Theophylline clearance is reduced in liver or cardiac failure and with concomitant use of macrolides and quinolones.

### Adverse drug interactions

Adverse drug interactions increase with age and are a common cause of admission in the elderly (table 4).  $\beta$ -blockers can induce bronchospasm in asthmatic patients, even when administered in ophthalmic solutions (eg, timolol) and are best avoided.

Elderly patients with asthma commonly take non-steroidal anti-inflammatory drugs (NSAIDs). In

a small number of older patients, NSAIDs may cause significant bronchospasm. The syndrome of aspirin-induced asthma is defined as rhinoconjunctivitis, nasal polyps, and asthma and is thought to occur in up to 20% of all asthmatic patients.

## Conclusion

Asthma is increasingly common in elderly patients and is poorly studied and frequently under-recognised and undertreated. Elderly patients have been largely excluded from asthma trials. Guidelines from the British Thoracic Society on asthma are applicable to older adults, but special considerations apply. Inhaler technique should be checked and appropriate devices, including spacers, selected. Older adults are more at risk of adverse drug reactions. Care needs

	Comorbid condition	Adverse effect in asthma
$\beta$ -blockers (including eye drops)	Hypertension Ischaemic heart disease Glaucoma Tremor	Bronchospasm Blunted response to bronchodilators
Non-steroidal anti-inflammatory drugs†	Arthritis Musculoskeletal disease	Bronchospasm
Non-potassium-sparing diuretics	Hypertension Cardiac failure	Hypokalaemia Dysrhythmias
Angiotensin-converting-enzyme inhibitors	Cardiac failure Hypertension	Cough
Cholinergic drugs	Urinary retention Glaucoma	Bronchospasm
Antihistamines	Allergic rhinitis	Prolonged QT-interval Arrhythmias

**Table 4:** Adverse drug interactions

\* $\beta$ -blockers are best avoided in asthma. Atenolol, bisoprolol, metoprolol, nebivolol are cardioselective compared with other  $\beta$ -blockers and have the least effect on bronchial  $\beta_2$  receptors.

†A small percentage of elderly patients may develop severe bronchospasm.

to be taken to minimise the risks from oral and inhaled steroids and  $\beta$ -agonists. Drug interactions need to be considered, for example hypokalaemia with concomitant use of  $\beta$ -agonists and diuretics, and increased theophylline levels with concomitant use of certain antibiotics.

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