

**In this article...**

- The burden of severe asthma on patients, healthcare resources and society
- Checklists for primary care nurses to identify and refer patients with severe asthma
- Specialist therapies targeted at different subtypes of severe asthma

# Nurses' role in improving outcomes for patients with severe asthma



Nursing Times  
Self-assessment

## Key points

- 1** Severe asthma has major adverse effects on patients' quality of life, healthcare resources and wider society
- 2** Practice nurses play a key role in monitoring patients with asthma and identifying those needing referral to specialist services
- 3** Respiratory nurse specialists work as part of multidisciplinary teams to assess patients, characterise their asthma subtypes and set up individual treatment plans
- 4** Specialist treatments such as omalizumab and bronchial thermoplasty reduce asthma exacerbations and oral corticosteroid use
- 5** Through specialist services, patients with severe asthma can be enrolled in clinical trials of novel treatments, including monoclonal antibody-based therapies

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**Abstract** Severe asthma has major adverse effects on patients' quality of life, the use of healthcare resources and society as a whole. Asthma exacerbations can be fatal, and many deaths could probably be avoided with appropriate patient support, management and referral. Nurses in primary care play a key role in checking how well patients are managing their condition and refer them when appropriate. In specialist severe asthma services, respiratory nurse specialists assess patients, help define their asthma subtype and administer novel therapies. This article provides an overview of severe asthma management and the role of nurses.

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In the UK, about 5.4 million people live with asthma ([Bit.ly/AsthmaUKStats](http://Bit.ly/AsthmaUKStats)), which is the most common long-term medical condition. Between 5% and 10% of these have severe asthma, which adversely affects their quality of life (QoL) and has wider consequences for the use of healthcare resources and for society; severe asthma exacerbations can be fatal.

Nurses play a vital role in evaluating, monitoring and educating patients with asthma in primary, secondary and tertiary care. This article provides an overview of the role of practice nurses and respiratory nurse specialists in managing severe asthma, ensuring that the patients receive the right treatment at the earliest opportunity.

## What is asthma?

Asthma is a chronic inflammatory disease of the lungs with complex aetiology. Patients' airways become hyper-responsive to certain triggers, including animal fur, tobacco smoke, house dust mites, pollution and pollen ([Bit.ly/AsthmaUKTriggers](http://Bit.ly/AsthmaUKTriggers)). Exposure to a trigger promotes bronchoconstriction and airway inflammation,

leading to ongoing infiltration of inflammatory cells (including eosinophils, basophils and mast cells), secretion of pro-inflammatory cytokines (including interleukin [IL]-4, IL-5 and IL-13) and accumulation of inflammatory cells in the airways (Chung, 2015). Ongoing airway inflammation results in a thickening of the airway smooth muscle, which increases bronchoconstriction and gives rise to the characteristic signs and symptoms of asthma. These include excessive mucus formation, breathlessness, wheezing and cough (Chung, 2015; Burns, 2013).

## A stepwise management approach

There is no National Institute for Health and Care Excellence guidance for asthma management. However, a quality standard (NICE, 2013a) outlines 11 high-priority areas for quality improvement linked to British Thoracic Society and Scottish Intercollegiate Guidelines Network guidance on asthma management (BTS and SIGN, 2014).

In most patients, asthma is effectively managed with inhaled corticosteroids (for

prevention) and inhaled  $\beta_2$ -agonists (for symptom relief) according to steps 1-3 of the BTS/SIGN stepwise management plan (BTS and SIGN, 2014). However, a minority of patients have poorly controlled asthma despite the prescription of optimal inhaled medication. These patients require additional maintenance therapies such as leukotriene receptor antagonists, sustained-release theophylline, oral  $\beta_2$  agonists, or intermittent or regular oral corticosteroids (BTS/SIGN steps 4 and 5). All patients at step 4 (poor control on a moderate dose of inhaled corticosteroid plus add-on therapy) or 5 (continuous or frequent use of oral corticosteroids) require referral to specialist asthma services for assessment and evaluation of their suitability for individualised therapy (BTS and SIGN, 2014).

### Severe asthma

Patients with severe asthma are those whose condition remains poorly controlled despite the prescription of optimal treatments, including oral corticosteroids, at steps 4 and 5 of the BTS/SIGN stepwise approach. Severe asthma manifests in different ways: some patients have almost constant symptoms; others experience sudden, unexpected exacerbations requiring emergency care, or have a combination of constant symptoms and frequent exacerbations (Asthma UK, 2010).

### Consequences of severe asthma

The impact of severe asthma on individuals is clearly expressed in Asthma UK's Fighting for Breath report, in which patients describe the effects of treatment and exacerbations on their daily lives. These include:

- Severely restricted physical and social activities;
- Anxiety, depression and fear of fatal or near-fatal asthma attacks and corticosteroid-related side-effects;
- Discrimination, loss of work and educational opportunities, and financial difficulties (Asthma UK, 2010).

The NHS spends an estimated £1 billion every year on treating patients with asthma (Bit.ly/AsthmaUKStats); most of this spending is attributable to the 5-10% of patients with severe asthma (Asthma UK, 2010). The wider impact of severe asthma includes the inability of patients to realise their full potential in terms of education and work; time lost from work; and the cost of benefits for patients unable to work due to the severity of their condition.

Severe asthma exacerbations can be fatal. According to Asthma UK, there were

### Box 1. How well does your patient manage their asthma?

- Does your patient have a written personalised asthma action plan?
- How many times has your patient attended A&E or used out-of-hours services for an asthma-related emergency in the past year?
- Does your patient express confusion about how and when to use their inhaler? Do they show poor inhaler technique?
- Has your patient received prescriptions for more than six short-acting reliever inhalers in the past year?
- Has your patient been prescribed a long-acting  $\beta_2$  antagonist without an inhaled corticosteroid preventer inhaler?
- Has your patient received fewer than 12 prescriptions for preventer inhalers in the past year?
- How many courses of oral corticosteroids has your patient received in the past year?
- Does your patient have their lung function regularly documented?
- Does your patient have a recognised assessment of asthma control documented?
- Is your patient aware of their asthma trigger(s)? Is this documented in their medical records? Do they manage to avoid their asthma trigger(s)?
- Has your patient been tested for specific allergens? Are they aware of their specific allergies?
- Is your patient a current smoker?
- Has your patient failed to attend one or more asthma-related appointments in the past year?
- How much time off work or education has your patient had in the past year due to asthma?
- Does your patient have any form of psychological or mental health issue documented?

Sources: adapted from BTS and SIGN (2014), RCP (2014), NICE (2013a)

1,167 deaths from asthma in the UK in 2011 (Bit.ly/AsthmaUKStats). The recent National Review of Asthma Deaths, which investigated the circumstances surrounding deaths from asthma from February 2012 to January 2013, suggested that 65% of these deaths were avoidable; only 43% of those who died had been cared for in secondary or tertiary care in the 12 months before death; and only 39% had been documented as having severe asthma (Royal College of Physicians, 2014).

### Asthma subtypes

Severe asthma is divided into two subtypes: 'difficult' and 'severe refractory' asthma (Bel et al, 2011). In patients with severe refractory asthma, symptoms remain poorly controlled despite adherence with optimal treatment. In patients with difficult asthma, poor adherence with treatment – which can be due to a variety of reasons (including complex psychosocial factors, ongoing exposure to triggers and poor control of comorbidities) – contributes to ongoing symptoms and exacerbations. Some patients may have symptoms attributable to asthma but no objective evidence of genuine uncontrolled disease (Bel et al, 2011).

These two patient categories may present with similar symptoms and all require referral to specialist asthma centres. Thorough and accurate assessment by a

multidisciplinary team of specialists is required to identify the underlying causes of poor asthma control and define effective personalised management strategies. Timely identification of patients with severe asthma and referral to specialist services for phenotyping and personalised treatment has major benefits to patients, the NHS and society as a whole.

### Managing asthma in primary care

Since asthma is a lifelong condition, effective self-management is essential. Practice nurses play an important role in evaluating and systematically reviewing how well patients manage their condition. Box 1 features a checklist to help practice nurses identify patients who may have difficulties in achieving adequate asthma management. If areas of concern are identified, various measures can be put in place (Newell, 2015):

- Stepping up medication;
- Helping patients with their inhaler technique;
- Helping patients avoid asthma triggers by giving support and advice, including on smoking cessation;
- Following up patients who do not attend appointments;
- Increasing the frequency of reviews;
- Working in partnership with patients to develop a personalised asthma action plan.

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Nurses may encounter patients who meet the criteria for referral to specialist services (summarised in Box 2). Referring patients does not imply that primary care has failed them; indeed, it is consistent with the requirement for nurses to 'make a timely and appropriate referral to another practitioner when it is in the best interests of the individual needing any action, care or treatment' (Nursing and Midwifery Council, 2015).

## How specialist services work

Specialist asthma services provide detailed, complex evaluations of patients with severe asthma using a systematic approach, thereby ensuring patients receive appropriate diagnosis, support and access to specialist treatments (Holmes, 2012). Although each specialist service has its own locally defined pathway, all services are commissioned under a standard NHS contract to ensure comparable patient care, and all adopt a multidisciplinary approach.

Teams are composed of at least two severe asthma respiratory consultants, severe asthma nurse specialists, dietitians, physiotherapists, allergy specialists and clinical psychologists (NHS England, 2013), and may include pharmacists and speech therapists. The multidisciplinary team evaluates newly referred patients to define their asthma phenotype (observable characteristics), as well as the most appropriate individualised treatment plan.

Patients managed by specialist severe asthma services show improved outcomes, including a decreased steroid burden, fewer hospital admissions and improved QoL (Gibeon et al, 2015). The benefits for patients cannot be overestimated; the life-changing impact of this care on one patient can be seen at [Bit.ly/SevereAsthmaPatientView](http://Bit.ly/SevereAsthmaPatientView).

Respiratory nurse specialists play a central role in specialist asthma services, carrying out initial and follow-up assessments, acting as patient advocates, providing continuity of care and ensuring a holistic approach to management.

## Specialist therapies

Once patients have been evaluated, their subtype of asthma ascertained, and adherence and concordance with treatment checked, a personalised treatment plan using newer specialist therapies can be defined based on disease characteristics and co-morbidities. Most of these therapies are only available for patients with severe refractory asthma through

## Box 2. Which patients need referral to specialist services?

A positive answer to one or more of the following questions should trigger a referral to specialist severe asthma services:

- Does your patient show poor adherence and concordance with treatment despite maximised interventions?
- Does your patient have poor asthma symptom control (BTS/SIGN step 4 or 5) despite optimal treatment?
- Has your patient received more than six prescriptions for short-acting reliever inhalers in the past year?
- Has your patient received more than two courses of oral corticosteroids in the past year (practice nurses)?
- Has your patient had two or more asthma-related A&E attendances or admissions in the past year?
- Are you unsure whether or not your patient has asthma?

Sources: BTS and SIGN (2014), RCP (2014) and BTS Standards of Care Committee (2008)

specialist centres (Table 1), so it is all the more important to refer eligible patients in a timely manner to ensure they have access to these treatments.

## Omalizumab for severe persistent allergic asthma

Allergic asthma is caused by the production of immunoglobulin E (IgE) antibodies to asthma triggers. IgE binds to high-affinity receptors on mast cells and its interaction with allergens causes these mast cells to become activated and release a range of pro-inflammatory mediators, which cause airway inflammation.

Omalizumab is a humanised monoclonal antibody targeted at IgE, licensed worldwide as an add-on therapy for treating severe persistent allergic asthma. It is suitable for patients with confirmed IgE-mediated allergic asthma requiring continuous or frequent treatment with

oral corticosteroids (NICE, 2013b). The drug is administered by subcutaneous injection every two or four weeks.

Clinical trials and recent real-world studies of patients treated in specialist asthma services have shown that omalizumab significantly reduces reliance on oral corticosteroids; decreases asthma exacerbations and non-elective hospital attendances; improves lung function; and improves patients' QoL (Niven et al, 2016; Barnes et al, 2013; Norman et al, 2013). Importantly, prospective real-world data also suggests improved work or education attendance and improved employment status (Niven et al, 2016).

## Bronchial thermoplasty

Bronchial thermoplasty is approved by NICE as an option for treating severe asthma, with special arrangements for consent, audit and clinical governance

Table 1. Treatments for severe refractory asthma in specialist services

Treatment	Target	Eligible patients
Omalizumab	IgE*	Patients with confirmed IgE-mediated allergic asthma who require continuous or frequent ( $\geq 4$ courses in the previous 12 months) oral corticosteroids
Bronchial thermoplasty	Bronchial smooth muscle	Patients displaying diurnal variation in peak flow and bronchial wall thickening on CT scan
Immunomodulatory agents (for example, methotrexate)	Immune system	Steroid-responsive patients with confirmed eosinophilic asthma
Antifungal agents (for example, itraconazole)	Fungal allergy with probable colonisation	Patients with confirmed allergy or sensitisation to fungi (for example, <i>Aspergillus fumigatus</i> , <i>Alternaria alternata</i> )
Macrolides (such as erythromycin or azithromycin)	Bacterial infection	Patients with non-eosinophilic asthma, mucus hypersecretion and recurrent bacterial infections

\* Ig = immunoglobulin

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(NICE, 2012). It involves the application of short pulses of radiofrequency energy to the smooth muscle of the bronchial wall. Treatment occurs over three sessions at least three weeks apart; it reduces airway smooth muscle mass, thereby decreasing the ability of airways to constrict in response to triggers (Janssen, 2012).

Bronchial thermoplasty carries a risk of short-term deterioration, but over the longer term it persistently reduces airway reactivity, decreases asthma exacerbations and corticosteroid use, and improves lung function and QoL (Janssen, 2012). It is not suitable for all patients with severe asthma, especially not for those with bronchiectasis, bronchial wall dilatation or atypical infection (Holmes, 2012).

### Immunomodulators for eosinophilic asthma

For patients with severe eosinophilic asthma (confirmed by sputum and blood differential counts), treatment with an immunomodulatory agent – such as methotrexate, azathioprine or ciclosporin – is an option despite the limited evidence base. Immunomodulators can reduce oral corticosteroid burden in some patients, although treatment does not appear to improve asthma control or lung function (Knarborg et al, 2014).

### Antifungal agents for severe asthma fungal sensitisation phenotype

Patients with severe asthma and a confirmed allergy or sensitisation to fungi can be treated with antifungal agents such as itraconazole. Evidence is limited with regard to patient outcomes, but it suggests that the treatment results in improved lung function and QoL (Denning et al, 2014). Patients treated with itraconazole require close monitoring due to associated side-effects. Patients who take inhaled corticosteroids need to reduce the dosage

by 50% due to an interaction with itraconazole (Denning et al, 2014).

### Macrolides for non-eosinophilic asthma

Non-eosinophilic asthma is associated with hypersecretion of mucus and recurrent bacterial infections, and is characterised by increased neutrophils in sputum differential counts. Macrolides such as erythromycin and azithromycin have been shown to be beneficial in the treatment of this form of asthma, although evidence remains limited (Brusselle and Joos, 2014).

### Drugs in clinical trials

In addition to the treatments described above, there are clinical trials of other therapies, including monoclonal antibody-based therapies targeted at a range of pro-inflammatory factors. Patients who are seen by specialist severe asthma services may have the opportunity to take part in these trials. The monoclonal antibody-based agents currently showing beneficial effects in asthma clinical trials include mepolizumab and reslizumab (targeted at IL-5), dupilumab and AMG 317 (targeted at IL-4 R $\alpha$ ), benralizumab (targeted at IL-5 R $\alpha$ ) and lebrikizumab and tralokinumab (targeted at IL-13) (Chung, 2015).

### Conclusion

Practice nurses and respiratory nurse specialists play a major role in the care of patients with asthma, and are uniquely placed to identify and support those with severe asthma. Beyond oral corticosteroids, there is a range of specialist treatments, which can only be accessed via specialist asthma services, so timely referral is crucial for all patients with poorly controlled asthma.

In specialist centres, multidisciplinary teams conduct intensive assessments and characterise patients' asthma subtypes, allowing them to develop personalised treatment plans. This ensures that patients receive the best possible treatment, including access to clinical trials, to minimise acute and near-fatal exacerbations, improve symptom control and maximise patients' QoL. Specialist services also contribute to ongoing research into the effectiveness of specialist treatments when used in real-world clinical settings, thereby helping build an evidence base that can be used to inform treatment decisions. **NT**

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