

## QRG 141 • British guideline on the management of asthma

*Quick Reference Guide*

*October 2014*



British Thoracic Society  
Scottish Intercollegiate Guidelines Network

**British guideline on the management of asthma**  
Quick Reference Guide

Revised October 2014

This Quick Reference Guide provides a summary of the main recommendations in  
**SIGN 141 British guideline on the management of asthma.**

Recommendations are graded **A B C D** to indicate the strength of the supporting evidence.  
Good practice points ✓ are provided where the guideline development group wishes to  
highlight specific aspects of accepted clinical practice.

Details of the evidence supporting these recommendations can be found in the full guideline,  
available on the SIGN website: [www.sign.ac.uk](http://www.sign.ac.uk). This Quick Reference Guide is also available as  
part of the SIGN Guidelines app.



**ISBN 978 1 909103 29 0**

**First published 2003**  
**Revised edition published 2014**

SIGN and the BTS consent to the photocopying of this QRG for the purpose of  
implementation in the NHS in England, Wales, Northern Ireland and Scotland.

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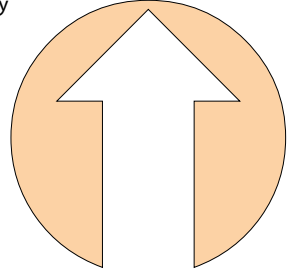
## DIAGNOSIS IN CHILDREN

### INITIAL CLINICAL ASSESSMENT

- B** Focus the initial assessment in children suspected of having asthma on:
- presence of key features in history and examination
  - careful consideration of alternative diagnoses.

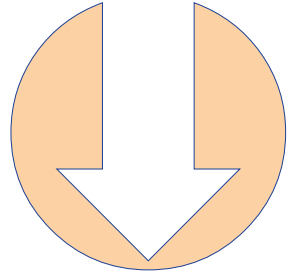
### CLINICAL FEATURES THAT INCREASE THE PROBABILITY OF ASTHMA

- More than one of the following symptoms - wheeze, cough, difficulty breathing, chest tightness - particularly if these are frequent and recurrent; are worse at night and in the early morning; occur in response to, or are worse after, exercise or other triggers, such as exposure to pets; cold or damp air, or with emotions or laughter; or occur apart from colds
- Personal history of atopic disorder
- Family history of atopic disorder and/or asthma
- Widespread wheeze heard on auscultation
- History of improvement in symptoms or lung function in response to adequate therapy.



### CLINICAL FEATURES THAT LOWER THE PROBABILITY OF ASTHMA

- Symptoms with colds only, with no interval symptoms
- Isolated cough in the absence of wheeze or difficulty breathing
- History of moist cough
- Prominent dizziness, light-headedness, peripheral tingling
- Repeatedly normal physical examination of chest when symptomatic
- Normal peak expiratory flow (PEF) or spirometry when symptomatic
- No response to a trial of asthma therapy
- Clinical features pointing to alternative diagnosis



**With a thorough history and examination, a child can usually be classed into one of three groups:**

- **high probability** – diagnosis of asthma likely
- **low probability** – diagnosis other than asthma likely
- **intermediate probability** – diagnosis uncertain.

- ✓ Record the basis on which a diagnosis of asthma is suspected.

## DIAGNOSIS IN CHILDREN

### HIGH PROBABILITY OF ASTHMA

- ✓ In children with a **high probability** of asthma:
  - start a trial of treatment
  - review and assess response
  - reserve further testing for those with a poor response.

### LOW PROBABILITY OF ASTHMA

- ✓ In children with a **low probability** of asthma, consider more detailed investigation and specialist referral.

### INTERMEDIATE PROBABILITY OF ASTHMA

- ✓ In children with an **intermediate probability** of asthma who can perform spirometry and have **evidence of airways obstruction**, assess the change in FEV<sub>1</sub> or PEF in response to an inhaled bronchodilator (reversibility) and/or the response to a trial of treatment for a specified period:
  - if there is significant reversibility, or if a treatment trial is beneficial, a diagnosis of asthma is probable. Continue to treat as asthma, but aim to find the minimum effective dose of therapy. At a later point, consider a trial of reduction, or withdrawal, of treatment.
  - if there is no significant reversibility, and treatment trial is not beneficial, consider tests for alternative conditions.

- C** In children with an **intermediate probability** of asthma who can perform spirometry and have **no evidence of airways obstruction**:
  - **consider testing for atopic status, bronchodilator reversibility and if possible, bronchial hyper-responsiveness using methacholine, exercise or mannitol**
  - **consider specialist referral.**

- ✓ In children with an **intermediate probability** of asthma who cannot perform spirometry, offer a trial of treatment for a specified period:
  - if treatment is beneficial, treat as asthma and arrange a review
  - if treatment is not beneficial, stop asthma treatment, and consider tests for alternative conditions and specialist referral.

In some children, particularly the under 5s, there is insufficient evidence at the first consultation to make a firm diagnosis of asthma but no features to suggest an alternative diagnosis.

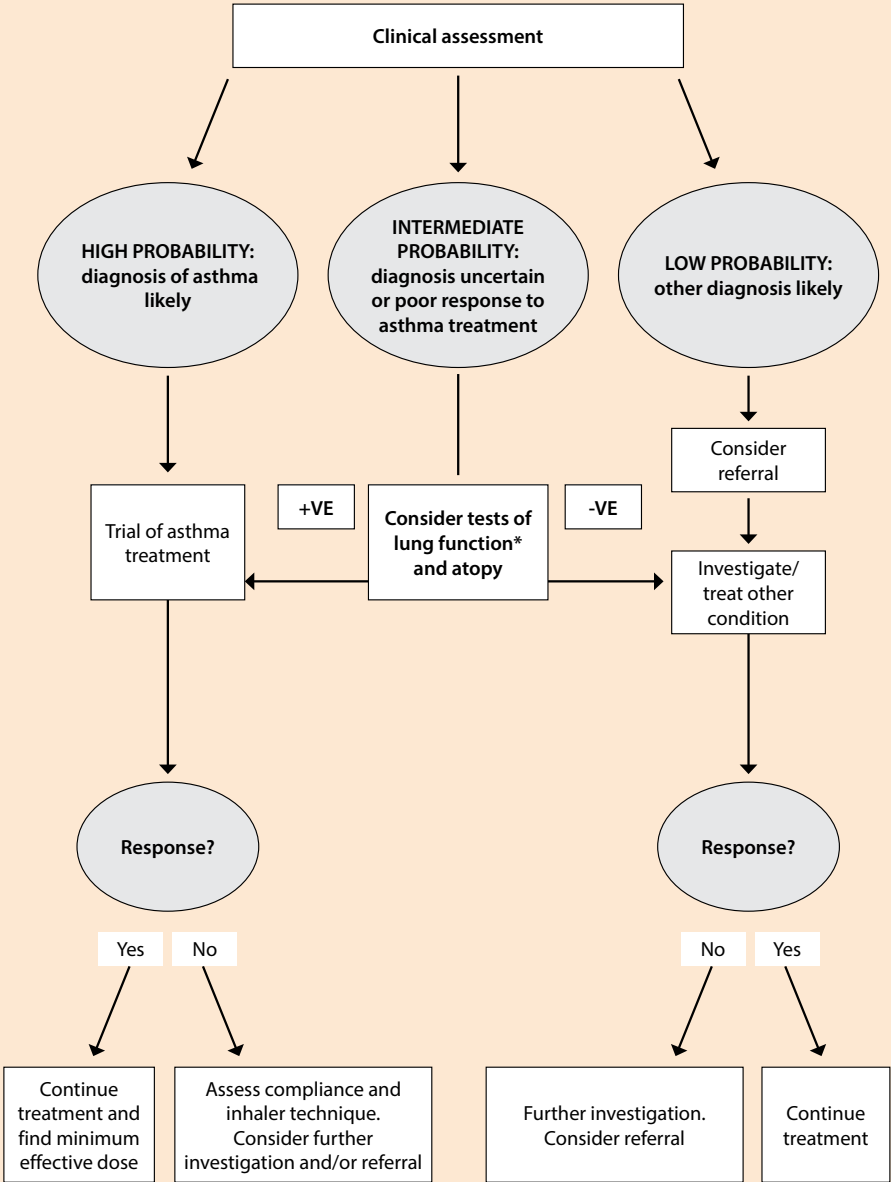
Possible approaches (dependent on frequency and severity of symptoms) include:

- watchful waiting with review
- trial of treatment with review
- spirometry and reversibility testing.

### Remember

The diagnosis of asthma in children is a clinical one. It is based on recognising a characteristic pattern of episodic symptoms in the absence of an alternative explanation.

**Presentation with suspected asthma in children**



\* Lung function tests include spirometry before and after bronchodilator (test of airway reversibility) and possible exercise or methacholine challenge (tests of airway responsiveness). Most children over the age of 5 years can perform lung function tests.

## DIAGNOSIS IN ADULTS

### INITIAL ASSESSMENT

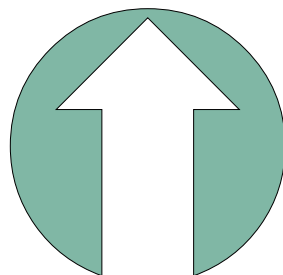
The diagnosis of asthma is based on the recognition of a characteristic pattern of symptoms and signs and the absence of an alternative explanation for them. The key is to take a careful clinical history.

- ✓ Base initial diagnosis on a careful assessment of symptoms and a measure of airflow obstruction:
- in patients with a **high probability** of asthma move straight to a trial of treatment. Reserve further testing for those whose response to a trial of treatment is poor.
  - in patients with a **low probability** of asthma, whose symptoms are thought to be due to an alternative diagnosis, investigate and manage accordingly. Reconsider the diagnosis of asthma in those who do not respond.
  - in patients with an **intermediate probability** of asthma the preferred approach is to carry out further investigations, including an explicit trial of treatments for a specified period, before confirming a diagnosis and establishing maintenance treatment.

**D Spirometry is the preferred initial test to assess the presence and severity of airflow obstruction.**

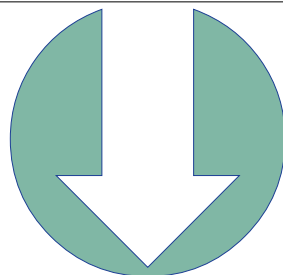
### CLINICAL FEATURES THAT INCREASE THE PROBABILITY OF ASTHMA

- More than one of the following symptoms: wheeze, breathlessness, chest tightness and cough, particularly if:
  - symptoms worse at night and in the early morning
  - symptoms in response to exercise, allergen exposure and cold air
  - symptoms after taking aspirin or beta blockers
- History of atopic disorder
- Family history of asthma and/or atopic disorder
- Widespread wheeze heard on auscultation of the chest
- Otherwise unexplained low FEV<sub>1</sub> or PEF (historical or serial readings)
- Otherwise unexplained peripheral blood eosinophilia



### CLINICAL FEATURES THAT LOWER THE PROBABILITY OF ASTHMA

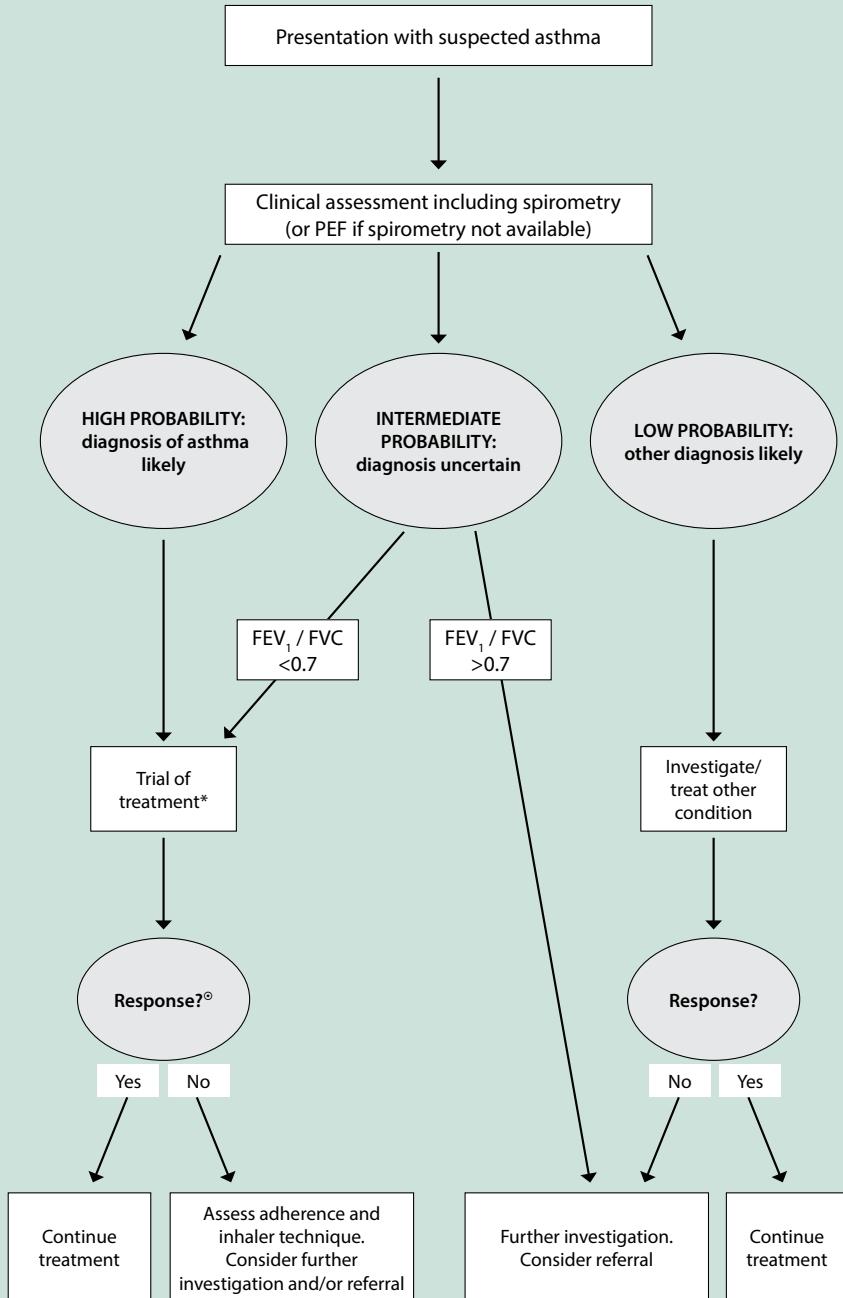
- Prominent dizziness, light-headedness, peripheral tingling
- Chronic productive cough in the absence of wheeze or breathlessness
- Repeatedly normal physical examination of chest when symptomatic
- Voice disturbance
- Symptoms with colds only
- Significant smoking history (ie > 20 pack-years)
- Cardiac disease
- Normal PEF or spirometry when symptomatic\*



\* A normal spirogram/spirometry when not symptomatic does not exclude the diagnosis of asthma. Repeated measurements of lung function are often more informative than a single assessment.



## Presentation with suspected asthma in adults



## SUPPORTED SELF-MANAGEMENT

### Asthma action plans

### Self-management in practice

Self-management education incorporating written personalised asthma action plans (PAAPs) improves health outcomes for people with asthma.

Asthma UK action plans and resources can be downloaded from their website:  
[www.asthma.org.uk/control](http://www.asthma.org.uk/control).

**A** All people with asthma (and/or their parents or carers) should be offered self-management education which should include a written personalised asthma action plan and be supported by regular professional review.

**A** In adults, written personalised asthma action plans may be based on symptoms and/or peak flows: symptom-based plans are generally preferable for children.

- ✓
- A hospital admission represents a window of opportunity to review self management skills. No patient should leave hospital without a written personalised asthma action plan.
  - An acute consultation offers the opportunity to determine what action the patient has already taken to deal with the asthma attack. Their self management strategy may be reinforced or refined and the need for consolidation at a routine follow up considered.
  - A consultation for an upper respiratory tract infection or other known trigger is an opportunity to rehearse with the patient their self management in the event of their asthma deteriorating.
  - Education should include personalised discussion of issues such as trigger avoidance and achieving a smoke-free environment to support people and their families living with asthma.
  - Brief simple education linked to patient goals is most likely to be acceptable to patients.

## SELF-MANAGEMENT IN SPECIFIC PATIENT GROUPS

**A** Self-management education, supported by a written personalised asthma action plan, should be offered to all patients on general practice 'active asthma' registers.

**A** Primary care practices should ensure that they have trained professionals and an environment conducive to providing supported self management.

**A** Prior to discharge, inpatients should receive written personalised asthma action plans, given by healthcare professionals with expertise in providing asthma education.

**B** Culturally appropriate supported self-management education should be provided for people with asthma in ethnic minority groups. Addressing language barriers is insufficient.

## ADHERENCE AND CONCORDANCE

**A** Adherence to long-term asthma treatment should be routinely and regularly addressed by all healthcare professionals within the context of a comprehensive programme of accessible proactive asthma care.

- ✓
- Computer repeat-prescribing systems provide a practical index of adherence and should be used in conjunction with a non-judgemental discussion about adherence.

## IMPLEMENTATION IN PRACTICE

**B** Commissioners and providers of services for people with asthma should consider how they can develop an organisation which prioritises and actively supports self management. This should include strategies to proactively engage and empower patients and train and motivate professionals as well as providing an environment that promotes self-management and monitors implementation.

## NON-PHARMACOLOGICAL MANAGEMENT

There is a common perception amongst patients and carers that there are numerous environmental, dietary and other triggers of asthma and that avoiding these triggers will improve asthma and reduce the requirement for pharmacotherapy. Evidence that non-pharmacological management is effective can be difficult to obtain and more well controlled intervention studies are required.

### PRIMARY PREVENTION

Primary prevention relates to interventions introduced before the onset of disease and designed to reduce its incidence.

**A** Measures to reduce in utero or early life exposure to single aeroallergens, such as house dust mites or pets, or single food allergens, are not recommended for the primary prevention of asthma.

**B** For children at risk of developing asthma, complex, multi-faceted interventions targeting multiple allergens may be considered in families able to meet the costs, demands and inconvenience of such a demanding programme.

**B** In the absence of any evidence of benefit and given the potential for adverse effects, maternal food allergen avoidance during pregnancy and lactation is not recommended as a strategy for preventing childhood asthma.

There is insufficient evidence to make a recommendation relating to the following as a strategy for preventing childhood asthma:

- maternal dietary supplementation during pregnancy
- the use of dietary probiotics in pregnancy.

**C** Breast feeding should be encouraged for its many benefits, including a potential protective effect in relation to early asthma.

**B** Parents and parents-to-be should be advised of the many adverse effects which smoking has on their children including increased wheezing in infancy and increased risk of persistent asthma.

### SECONDARY PREVENTION

Secondary prevention relates to interventions introduced after the onset of disease to reduce its impact.

**A** Physical and chemical methods of reducing house dust mite levels in the home (including acaricides, mattress covers, vacuum-cleaning, heating, ventilation, freezing, washing, air-filtration and ionisers) are ineffective and should not be recommended by healthcare professionals.

**B** Parents with asthma should be advised about the dangers to themselves and to their children with asthma, of smoking, and be offered appropriate support to stop smoking.

**C** Weight loss in overweight patients has many health benefits, and should be supported in people with asthma; if successful, it may lead to improvements in asthma symptoms.

**A** Air ionisers are not recommended for the treatment of asthma.

**A** Breathing exercise programmes (including physiotherapist-taught methods) can be offered to people with asthma as an adjuvant to pharmacological treatment to improve quality of life and reduce symptoms.

## PHARMACOLOGICAL MANAGEMENT

The aim of asthma management is control of the disease. Complete control is defined as:

- no daytime symptoms
- no night time awakening due to asthma
- no need for rescue medication
- no asthma attacks
- no exacerbations
- no limitations on activity including exercise
- normal lung function (in practical terms FEV<sub>1</sub> and/or PEF >80% predicted or best)
- minimal side effects from medication.

### THE STEPWISE APPROACH

1. Start treatment at the step most appropriate to initial severity.
2. Achieve early control
3. Maintain control by:
  - ↑ stepping up treatment as necessary
  - ↓ stepping down when control is good.

- ✓ Before initiating a new drug therapy practitioners should check adherence with existing therapies, inhaler technique and eliminate trigger factors.

Until May 2009 all doses of inhaled corticosteroids were referenced against beclometasone dipropionate (BDP) given via CFC-MDIs. As BDP-CFC is now unavailable, the reference inhaled corticosteroid will be the BDP-HFA product, which is available at the same dosage as BDP-CFC. Adjustments to doses will have to be made for other inhaler devices and other corticosteroid molecules.

### COMBINATION INHALERS

In efficacy studies, where there is generally good adherence, there is no difference in efficacy in giving inhaled corticosteroid and a long-acting  $\beta_2$  agonist in combination or in separate inhalers. In clinical practice, however, it is generally considered that combination inhalers aid adherence and also have the advantage of guaranteeing that the long-acting  $\beta_2$  agonist is not taken without the inhaled corticosteroid.

- ✓ Combination inhalers are recommended to:
  - guarantee that the long-acting  $\beta_2$  agonist is not taken without inhaled corticosteroid
  - improve inhaler adherence.

### STEPPING DOWN

- ✓ Regular review of patients as treatment is stepped down is important. When deciding which drug to step down first and at what rate, the severity of asthma, the side effects of the treatment, time on current dose, the beneficial effect achieved, and the patient's preference should all be taken into account.
- Patients should be maintained at the lowest possible dose of inhaled corticosteroid. Reduction in inhaled corticosteroid dose should be slow as patients deteriorate at different rates. Reductions should be considered every three months, decreasing the dose by approximately 25-50% each time.

### EXERCISE INDUCED ASTHMA

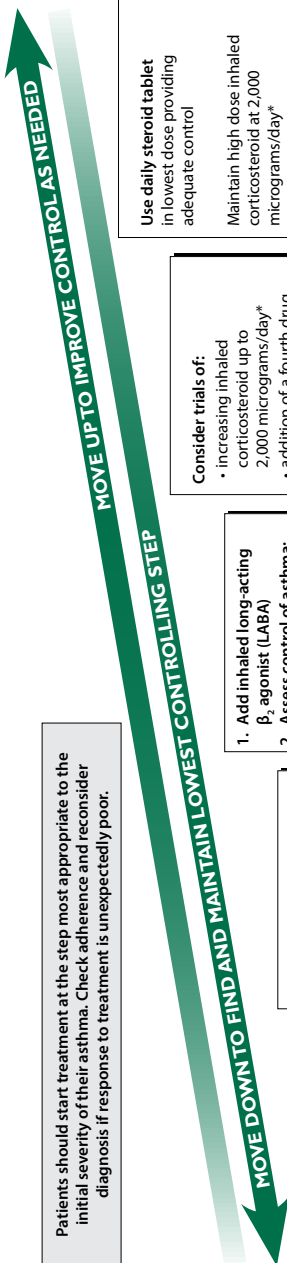
- ✓ For most patients, exercise-induced asthma is an expression of poorly controlled asthma and regular treatment including inhaled corticosteroids should be reviewed.

If exercise is a specific problem in patients taking inhaled corticosteroids who are otherwise well controlled, consider adding one of the following therapies:

- |   |   |  |
|---|---|--|
| A | C | • leukotriene receptor antagonists         |
| A | A | • long-acting $\beta_2$ agonists           |
| C | C | • sodium cromoglicate or nedocromil sodium |
| A | A | • oral $\beta_2$ agonists                  |
| C | C | • theophyllines.                           |

A A Immediately prior to exercise, inhaled short-acting  $\beta_2$  agonists are the drug of choice.

# Summary of stepwise management in adults



Patients should start treatment at the step most appropriate to the initial severity of their asthma. Check adherence and reconsider diagnosis if response to treatment is unexpectedly poor.

**STEP 5**  
Continuous or frequent use of oral steroids

Use daily steroid tablet in lowest dose providing adequate control

Maintain high dose inhaled corticosteroid at 2,000 micrograms/day\*

Consider other treatments to minimise the use of steroid tablets

Refer patient for specialist care

**STEP 4**  
Persistent poor control

Consider trials of:

- increasing inhaled corticosteroid up to 2,000 micrograms/day\*
- addition of a fourth drug eg leukotriene receptor antagonist, SR theophylline,  $\beta_2$  agonist tablet

**STEP 3**  
Initial add-on therapy

1. Add inhaled long-acting  $\beta_2$  agonist (LABA)
2. Assess control of asthma:
  - good response to LABA - continue LABA
  - benefit from LABA but control still inadequate - continue LABA and increase inhaled corticosteroid dose to 800 micrograms/day\* (if not already on this dose)
  - no response to LABA - stop LABA and increase inhaled corticosteroid to 800 micrograms/day.\* If control still inadequate, institute trial of other therapies, leukotriene receptor antagonist or SR theophylline

**STEP 2**  
Regular preventer therapy

Add inhaled corticosteroid 200-800 micrograms/day\* 400 micrograms is an appropriate starting dose for many patients

Start at dose of inhaled corticosteroid appropriate to severity of disease.

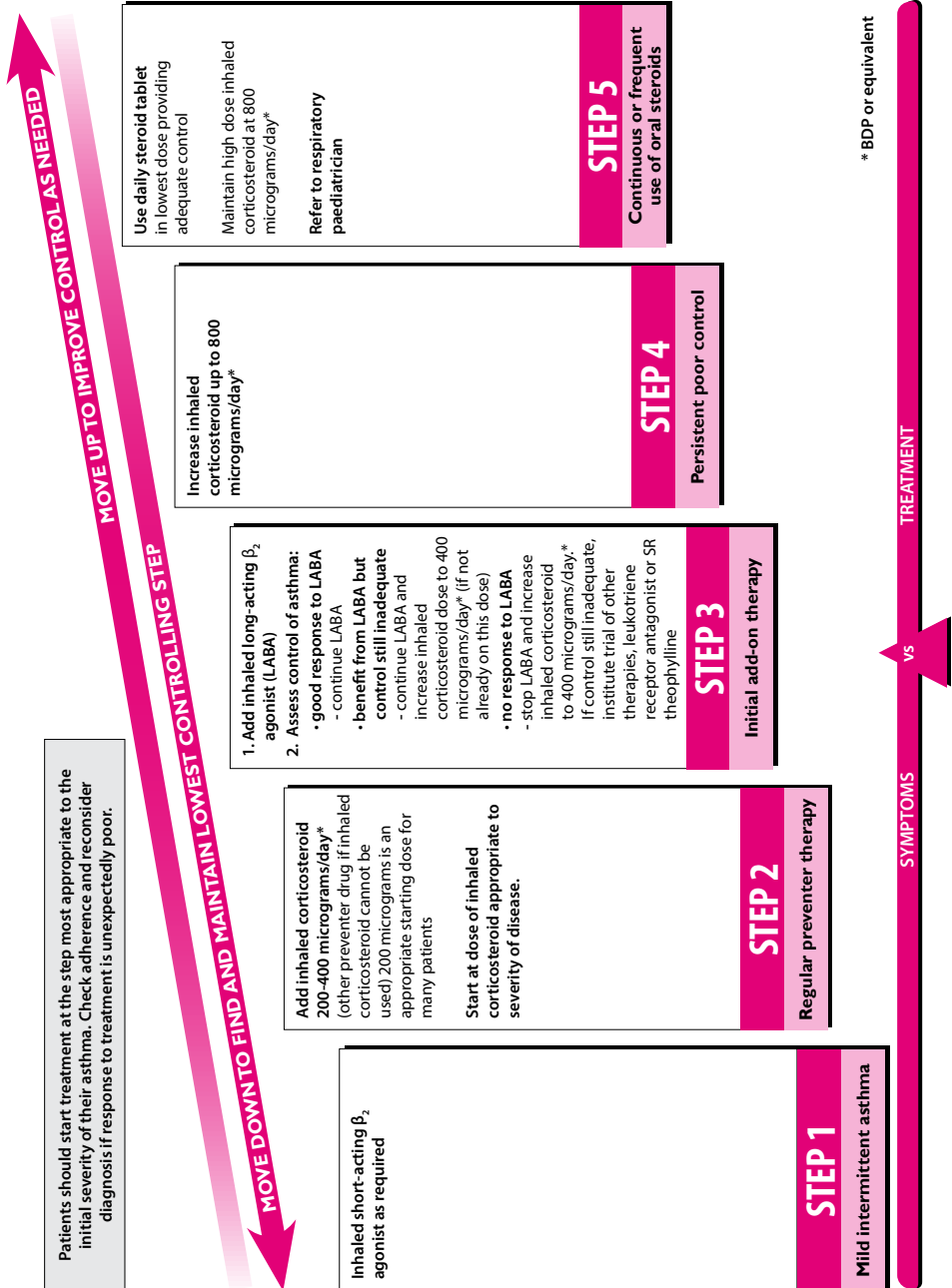
**STEP 1**  
Mild intermittent asthma

Inhaled short-acting  $\beta_2$  agonist as required

\* BDP or equivalent

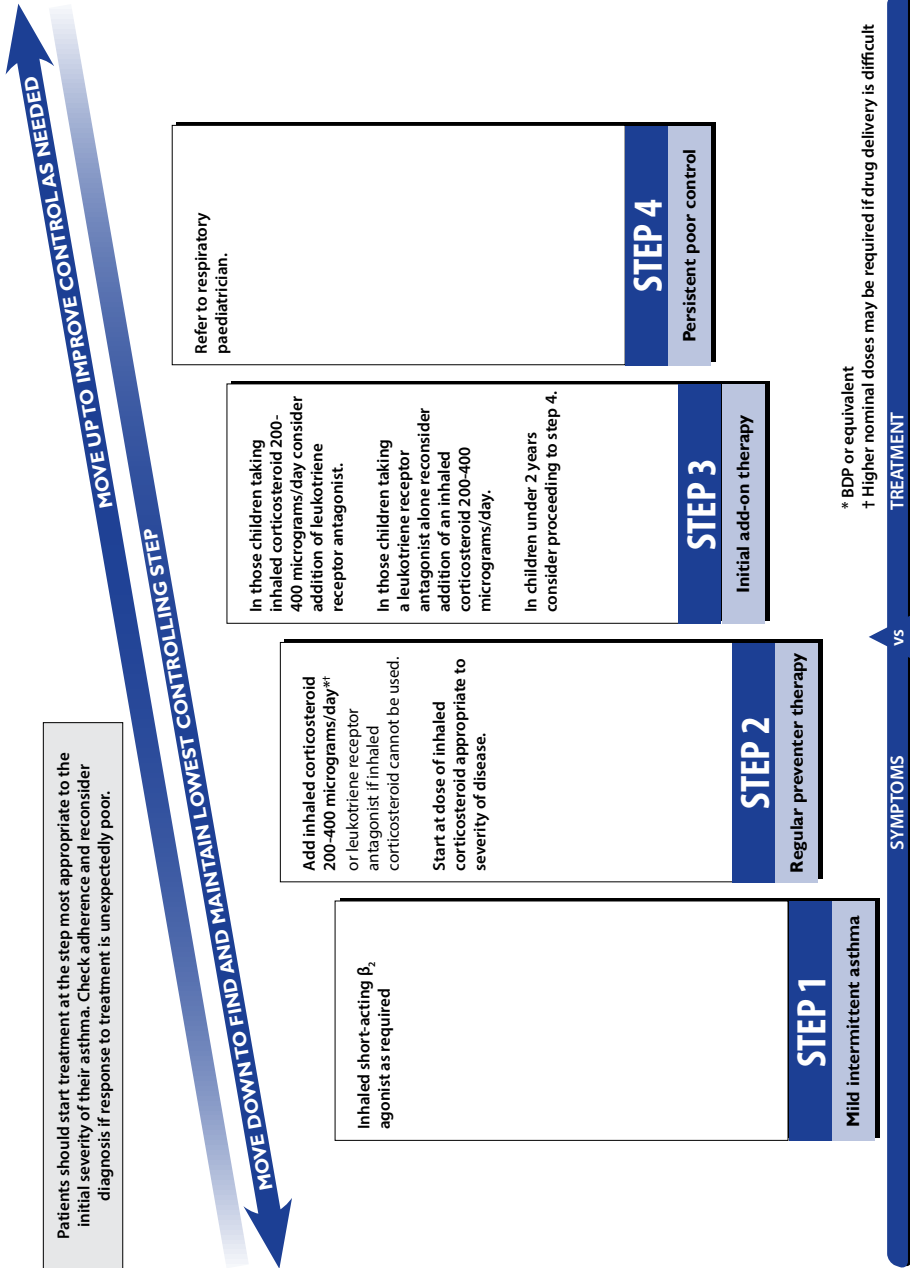


## Summary of stepwise management in children aged 5-12 years



Patients should start treatment at the step most appropriate to the initial severity of their asthma. Check adherence and reconsider diagnosis if response to treatment is unexpectedly poor.

# Summary of stepwise management in children less than 5 years



## INHALER DEVICES

### TECHNIQUE AND TRAINING

**B** ✓ ✓ Prescribe inhalers only after patients have received training in the use of the device and have demonstrated satisfactory technique.

### β<sub>2</sub> AGONIST DELIVERY

#### ACUTE ASTHMA

**A A B** Children and adults with mild and moderate asthma attacks should be treated by pMDI + spacer with doses titrated according to clinical response.

#### STABLE ASTHMA

**A A** In children aged 5-12, pMDI + spacer is as effective as any other hand held inhaler.

**A** In adults pMDI ± spacer is as effective as any other hand held inhaler, but patients may prefer some types of DPI.

#### INHALED CORTICOSTEROIDS FOR STABLE ASTHMA

**A** In children aged 5-12 years, pMDI + spacer is as effective as any DPI.

**A** In adults, a pMDI ± spacer is as effective as any DPI.

### PRESCRIBING DEVICES

- ✓
- The choice of device may be determined by the choice of drug
  - If the patient is unable to use a device satisfactorily, an alternative should be found
  - The patient should have their ability to use the prescribed inhaler device assessed by a competent healthcare professional
  - The medication needs to be titrated against clinical response to ensure optimum efficacy
  - Reassess inhaler technique as part of structured clinical review.

✓ Prescribing mixed inhaler types may cause confusion and lead to increased errors in use. Using the same type of device to deliver preventer and reliever treatments may improve outcomes.

### INHALER DEVICES IN CHILDREN

In young children, little or no evidence is available on which to base recommendations.

✓ In children, pMDI and spacer are the preferred method of delivery of β<sub>2</sub> agonists or inhaled corticosteroids. A face mask is required until the child can breathe reproducibly using the spacer mouthpiece. Where this is ineffective a nebuliser may be required.



# MANAGEMENT OF ACUTE ASTHMA IN ADULTS

## ASSESSMENT OF SEVERE ASTHMA

**B** Healthcare professionals must be aware that patients with severe asthma and one or more adverse psychosocial factors are at risk of death.

### INITIAL ASSESSMENT

#### MODERATE ASTHMA

- increasing symptoms
- PEF >50-75% best or predicted
- no features of acute severe asthma

#### ACUTE SEVERE ASTHMA

Any one of:

- PEF 33-50% best or predicted
- respiratory rate  $\geq 25$ /min
- heart rate  $\geq 110$ /min
- inability to complete sentences in one breath

#### LIFE-THREATENING ASTHMA

In a patient with severe asthma any one of:

- PEF <33% best or predicted
- SpO<sub>2</sub> <92%
- PaO<sub>2</sub> <8 kPa
- normal PaCO<sub>2</sub> (4.6-6.0 kPa)
- silent chest
- cyanosis
- poor respiratory effort
- arrhythmia
- exhaustion, altered conscious level
- hypotension

#### NEAR-FATAL ASTHMA

Raised PaCO<sub>2</sub> and/or requiring mechanical ventilation with raised inflation pressures

<b>Clinical features</b>	Severe breathlessness (including too breathless to complete sentences in one breath), tachypnoea, tachycardia, silent chest, cyanosis or collapse <i>None of these singly or together is specific and their absence does not exclude a severe attack</i>
<b>PEF or FEV<sub>1</sub></b>	PEF or FEV <sub>1</sub> are useful and valid measures of airway calibre. PEF expressed as a % of the patient's previous best value is most useful clinically. In the absence of this, PEF as a % of predicted is a rough guide
<b>Pulse oximetry</b>	Oxygen saturation (SpO <sub>2</sub> ) measured by pulse oximetry determines the adequacy of oxygen therapy and the need for arterial blood gas measurement (ABG). The aim of oxygen therapy is to maintain SpO <sub>2</sub> 94-98%
<b>Blood gases (ABG)</b>	Patients with SpO <sub>2</sub> <92% or other features of life-threatening asthma require ABG measurement
<b>Chest X-ray</b>	Chest X-ray is not routinely recommended in patients in the absence of: <ul style="list-style-type: none"> <li>- suspected pneumomediastinum or pneumothorax</li> <li>- suspected consolidation</li> <li>- life-threatening asthma</li> <li>- failure to respond to treatment satisfactorily</li> <li>- requirement for ventilation</li> </ul>

## MANAGEMENT OF ACUTE ASTHMA IN ADULTS

### CRITERIA FOR ADMISSION

- B** Admit patients with any feature of a life-threatening or near-fatal asthma attack.
- B** Admit patients with any feature of a severe asthma attack persisting after initial treatment.
- C** Patients whose peak flow is greater than 75% best or predicted one hour after initial treatment may be discharged from ED, unless there are other reasons why admission may be appropriate.

### TREATMENT OF ACUTE ASTHMA

#### OXYGEN

- C**
  - Give supplementary oxygen to all hypoxaemic patients with acute severe asthma to maintain an SpO<sub>2</sub> level of 94-98%. Lack of pulse oximetry should not prevent the use of oxygen.
- A**
  - In hospital, ambulance and primary care, nebulisers for giving nebulised  $\beta_2$  agonist bronchodilators should preferably be driven by oxygen.

#### STEROID THERAPY

- A** Give steroids in adequate doses in all cases of acute asthma attack.
- ✓ Continue prednisolone 40-50 mg daily for at least five days or until recovery.

#### OTHER THERAPIES

- A** Nebulised magnesium is not recommended for treatment in adults with acute asthma.
- B** Consider giving a single dose of IV magnesium sulphate to patients with:
  - acute severe asthma (PEF <50% best or predicted) who have not had a good initial response to inhaled bronchodilator therapy.

- ✓ Magnesium sulphate (1.2-2 g IV infusion over 20 minutes) should only be used following consultation with senior medical staff.

- B** Routine prescription of antibiotics is not indicated for patients with acute asthma.

#### $\beta_2$ AGONIST BRONCHODILATORS

- A** Use high-dose inhaled  $\beta_2$  agonists as first line agents in patients with acute asthma and administer as early as possible. Reserve intravenous  $\beta_2$  agonists for those patients in whom inhaled therapy cannot be used reliably.
- ✓ In patients with acute asthma with life-threatening features the nebulised route (oxygen-driven) is recommended.
- A** In severe asthma that is poorly responsive to an initial bolus dose of  $\beta_2$  agonist, consider continuous nebulisation with an appropriate nebuliser.

#### IPRATROPIUM BROMIDE

- B** Add nebulised ipratropium bromide (0.5 mg 4-6 hourly) to  $\beta_2$  agonist treatment for patients with acute severe or life-threatening asthma or those with a poor initial response to  $\beta_2$  agonist therapy.

#### REFERRAL TO INTENSIVE CARE

- Refer any patient:
- requiring ventilatory support
  - with acute severe or life-threatening asthma, who is failing to respond to therapy, as evidenced by:
    - deteriorating PEF
    - persisting or worsening hypoxia
    - hypercapnia
    - ABG analysis showing  $\downarrow$  pH or  $\uparrow$  H<sup>+</sup>
    - exhaustion, feeble respiration
    - drowsiness, confusion, altered conscious state
    - respiratory arrest

### FOLLOW UP

- ✓
  - It is essential that the patient's primary care practice is informed within 24 hours of discharge from the emergency department or hospital following an asthma attack.
  - Keep patients who have had a near-fatal asthma attack under specialist supervision indefinitely
  - A respiratory specialist should follow up patients admitted with a severe asthma attack for at least one year after the admission.

## MANAGEMENT OF ACUTE ASTHMA IN CHILDREN AGED 2 YEARS AND OVER

### ACUTE SEVERE

SpO<sub>2</sub> <92% PEF 33-50% best or predicted

- Can't complete sentences in one breath or too breathless to talk or feed
- Heart rate >125 (>5 years) or >140 (2-5 years)
- Respiratory rate >30 breaths/min (>5 years) or >40 (2-5 years)

### LIFE-THREATENING

SpO<sub>2</sub> <92% PEF <33% best or predicted

- Silent chest
- Cyanosis
- Poor respiratory effort
- Hypotension
- Exhaustion
- Confusion

### CRITERIA FOR ADMISSION

- ✓ Increase β<sub>2</sub> agonist dose by giving one puff every 30-60 seconds, according to response, up to a maximum of ten puffs
- ✓ Parents/carers of children with an acute asthma attack at home and symptoms not controlled by up to 10 puffs of salbutamol via pMDI and spacer, should seek urgent medical attention.
- ✓ If symptoms are severe additional doses of bronchodilator should be given as needed whilst awaiting medical attention.
- ✓ Paramedics attending to children with an acute asthma attack should administer nebulised salbutamol, using a nebuliser driven by oxygen if symptoms are severe, whilst transferring the child to the emergency department.
- ✓ Children with severe or life-threatening asthma should be transferred to hospital urgently
- B** Consider intensive inpatient treatment of children with SpO<sub>2</sub> <92% in air after initial bronchodilator treatment.

#### The following clinical signs should be recorded:

- Pulse rate – increasing tachycardia generally denotes worsening asthma; a fall in heart rate in life-threatening asthma is a pre-terminal event
- Respiratory rate and degree of breathlessness – ie too breathless to complete sentences in one breath or to feed
- Use of accessory muscles of respiration – best noted by palpation of neck muscles
- Amount of wheezing – which might become biphasic or less apparent with increasing airways obstruction
- Degree of agitation and conscious level – always give calm reassurance

NB Clinical signs correlate poorly with the severity of airways obstruction. Some children with acute severe asthma do not appear distressed.

### INITIAL TREATMENT OF ACUTE ASTHMA

#### OXYGEN

- ✓ Children with life-threatening asthma or SpO<sub>2</sub> <94% should receive high flow oxygen via a tight fitting face mask or nasal cannula at sufficient flow rates to achieve normal saturations of 94–98%.

## MANAGEMENT OF ACUTE ASTHMA IN CHILDREN AGED 2 YEARS AND OVER

### BRONCHODILATORS

**A** Inhaled  $\beta_2$  agonists are the first line treatment for acute asthma.

**A** A pMDI + spacer is the preferred option in children with mild to moderate asthma.

**B** Individualise drug dosing according to severity and adjust according to the patient's response.

**A** If symptoms are refractory to initial  $\beta_2$  agonist treatment, add ipratropium bromide (250 micrograms/dose mixed with the nebulised  $\beta_2$  agonist solution).

✓ Repeated doses of ipratropium bromide should be given early to treat children who are poorly responsive to  $\beta_2$  agonists.

**C** Consider adding 150 mg magnesium sulphate to each nebulised salbutamol and ipratropium in the first hour in children with a short duration of acute severe asthma symptoms presenting with an oxygen saturation less than 92%.

✓ Discontinue long-acting  $\beta_2$  agonists when short-acting  $\beta_2$  agonists are required more often than four hourly.

### STEROID THERAPY

**A** Give oral steroids early in the treatment of acute asthma attacks.

- ✓
- Use a dose of 20 mg prednisolone for children aged 2–5 years and a dose of 30–40 mg for children >5 years. Those already receiving maintenance steroid tablets should receive 2 mg/kg prednisolone up to a maximum dose of 60 mg.
  - Repeat the dose of prednisolone in children who vomit and consider intravenous steroids in those who are unable to retain orally ingested medication.
  - Treatment for up to three days is usually sufficient, but the length of course should be tailored to the number of days necessary to bring about recovery. Tapering is unnecessary unless the course of steroids exceeds 14 days.

### SECOND LINE TREATMENT OF ACUTE ASTHMA

**B** Consider early addition of a single bolus dose of intravenous salbutamol (15 micrograms/kg over 10 minutes) in a severe asthma attack where the patient has not responded to initial inhaled therapy.

**A** Aminophylline is not recommended in children with mild to moderate acute asthma.

**B** Consider aminophylline for children with severe or life-threatening asthma unresponsive to maximal doses of bronchodilators and steroids.

IV magnesium sulphate is a safe treatment for acute asthma although its place in management is not yet established.

## MANAGEMENT OF ACUTE ASTHMA IN CHILDREN AGED UNDER 2 YEARS

- The assessment of acute asthma in early childhood can be difficult
- Intermittent wheezing attacks are usually due to viral infection and the response to asthma medication is inconsistent
- Prematurity and low birth weight are risk factors for recurrent wheezing
- The differential diagnosis of symptoms includes:
  - Aspiration pneumonitis
  - Pneumonia
  - Bronchiolitis
  - Tracheomalacia
  - Complications of underlying conditions such as congenital anomalies and cystic fibrosis

## TREATMENT OF ACUTE ASTHMA

### BRONCHODILATORS

**B** Oral  $\beta_2$  agonists are not recommended for acute asthma in infants.

**A** For mild to moderate acute asthma attacks, a pMDI + spacer and mask is the optimal drug delivery device.

**B** Consider inhaled ipratropium bromide in combination with an inhaled  $\beta_2$  agonist for more severe symptoms.

### STEROID THERAPY

**B** In infants, consider steroid tablets early in the management of severe asthma attacks in the hospital setting.

✓ Steroid tablet therapy (10 mg of soluble prednisolone for up to three days) is the preferred steroid preparation for use in this age group.

For children with frequent episodes of wheeze associated with viruses caution should be taken in prescribing multiple courses of oral steroids.

## DIFFICULT ASTHMA

Difficult asthma is defined as persistent symptoms and/or frequent exacerbations despite treatment at step 4 or 5

### ASSESSING DIFFICULT ASTHMA

- D** Patients with difficult asthma should be systematically evaluated, including:
- confirmation of the diagnosis of asthma, and
  - identification of the mechanism of persisting symptoms and assessment of adherence to therapy.
- D** This assessment should be facilitated through a dedicated multidisciplinary difficult asthma service, by a team experienced in the assessment and management of difficult asthma.

### FACTORS CONTRIBUTING TO DIFFICULT ASTHMA

#### POOR ADHERENCE

- C** Healthcare professionals should always consider poor adherence to maintenance therapy before escalating treatment in patients with difficult asthma.

#### PSYCHOSOCIAL FACTORS

- C** Healthcare professionals should be aware that difficult asthma is commonly associated with coexistent psychological morbidity.
- D** Assessment of coexistent psychological morbidity should be performed as part of a difficult asthma assessment. In children this may include a psychosocial assessment of the family.

#### MONITORING AIRWAY RESPONSE

- B** In patients with difficult asthma, consider monitoring induced sputum eosinophil counts to guide steroid treatment.

## ASTHMA IN ADOLESCENTS

Adolescents are defined by the World Health Organisation (WHO) as young people between the ages 10 and 19 years of age.

Key elements of working effectively with adolescents in the transition to adulthood include:

- seeing them on their own, separate from their parents/carers, for part of the consultation, and
- discussing confidentiality and its limitations.

### PREVALENCE OF ASTHMA IN ADOLESCENCE

Asthma is common in adolescents but is frequently undiagnosed because of under-reporting of symptoms.

- ✓ Clinicians seeing adolescents with any cardiorespiratory symptoms should consider asking about symptoms of asthma.

### DIAGNOSIS AND ASSESSMENT

Symptoms and signs of asthma in adolescents are no different from those of other age groups.

Exercise-related wheezing and breathlessness are common asthma symptoms in adolescents but only a minority show objective evidence of exercise-induced bronchospasm. Other causes such as hyperventilation or poor fitness can usually be diagnosed and managed by careful clinical assessment.

<b>Questionnaires</b>	<ul style="list-style-type: none"><li>• The asthma control questionnaire (ACQ) and the asthma control test (ACT) have been validated in adolescents with asthma.</li></ul>
<b>Quality of life measures</b>	<ul style="list-style-type: none"><li>• QoL scales (such as AQLQ12+) can be used.</li></ul>
<b>Lung Function</b>	<ul style="list-style-type: none"><li>• Tests of airflow obstruction and airway responsiveness may provide support for a diagnosis of asthma but most adolescents with asthma will have normal lung function.</li></ul>
<b>Bronchial hyper-reactivity</b>	<ul style="list-style-type: none"><li>• A negative response to an exercise test is helpful in excluding asthma in children with exercise related breathlessness.</li></ul>
<b>Anxiety and depressive disorders</b>	<ul style="list-style-type: none"><li>• Major depression, panic attacks and anxiety disorder are commoner in adolescents with asthma and make asthma symptoms more prominent.</li><li>• Brief screening questionnaires for anxiety and depression may help identify those with significant anxiety and depression.</li></ul>

### NON-PHARMACOLOGICAL MANAGEMENT

- ✓ Adolescents with asthma (and their parents and carers) should be encouraged to avoid exposure to ETS and should be informed about the risks and urged not to start smoking.
- ✓ Adolescents with asthma should be asked if they smoke personally. If they do and wish to stop, they should be offered advice on how to stop and encouraged to use local NHS smoking cessation services.
- ✓ Healthcare professionals should be aware that CAM use is common in adolescents and should ask about its use.

## PHARMACOLOGICAL MANAGEMENT

Specific evidence about the pharmacological management of adolescents with asthma is limited and is usually extrapolated from paediatric and adult studies. Pharmacological management of asthma is covered on pages 8-11.

Specific evidence about inhaler device use and choice in adolescents is also limited. Inhaler devices are covered on page 12.

## INHALER DEVICES

- ✓ Adolescent preference for inhaler device should be taken into consideration as a factor in improving adherence to treatment.
- ✓ As well as checking inhaler technique it is important to enquire about factors that may affect inhaler device use in real life settings, such as school.
- ✓ Consider prescribing a more portable device (as an alternative to a pMDI with spacer) for delivering bronchodilators when away from home.

## LONG TERM OUTLOOK AND ENTRY INTO THE WORK PLACE

Young adults with asthma have a low awareness of occupations that might worsen asthma (eg, exposure to dusts, fumes, spray, exertion and temperature changes, see page 22).

- ✓ Clinicians should discuss future career choices with adolescents with asthma and highlight occupations that might increase susceptibility to work related asthma symptoms.

## ORGANISATION AND DELIVERY OF CARE

- B** School based clinics may be considered for adolescents with asthma to improve attendance.
- B** Peer-led interventions for adolescents in the school setting should be considered.
- ✓ Integration of school based clinics with primary care services is essential.

## Transition to adult based health care

Transition to adult services is important for all adolescents with asthma, irrespective of the asthma severity. Transition should be seen as a process and not just the event of transfer to adult services. It should begin early, be planned, involve the young person, and be both age and developmentally appropriate. In the UK, general guidance on transition is available from the RCPCH and DOH websites.

## PATIENT EDUCATION AND SELF MANAGEMENT

Effective transition care involves preparing adolescents with asthma to take independent responsibility for their own asthma management. Clinicians need to educate and empower adolescents to manage as much of their asthma care as they are capable of doing while supporting parents gradually to hand over responsibility for management to their child.

### Adherence

- When asked, adolescents with asthma admit their adherence with asthma treatment and with asthma trigger avoidance is often poor.
- Strategies to improve adherence emphasise the importance of focusing on the individual and their lifestyle and using individualised asthma planning and personal goal setting



## ASTHMA IN PREGNANCY

Several physiological changes occur during pregnancy which could worsen or improve asthma. Pregnancy can affect the course of asthma, and asthma and its treatment can affect pregnancy outcomes.

- B** Women should be advised of the importance of maintaining good control of their asthma during pregnancy to avoid problems for both mother and baby.
- C** Monitor pregnant women with moderate/severe asthma closely to keep their asthma well controlled.
- ✓ Advise women who smoke about the dangers for themselves and their babies and give appropriate support to stop smoking.

## DRUG THERAPY IN PREGNANCY

The following drugs should be used as normal during pregnancy:

- C** • short acting B<sub>2</sub> agonists
  - C** • long acting B<sub>2</sub> agonists
  - B** • inhaled corticosteroids
  - C** • oral and intravenous theophyllines
- C** Use steroid tablets as normal when indicated during pregnancy for severe asthma. Steroid tablets should never be withheld because of pregnancy.
- C** If leukotriene receptor antagonists are required to achieve adequate control of asthma then they should not be withheld during pregnancy.

## ACUTE ASTHMA IN PREGNANCY

- C** Give drug therapy for acute asthma as for non-pregnant patients, including systemic steroids and magnesium sulphate.
- D** Acute severe asthma in pregnancy is an emergency and should be treated vigorously in hospital
- D** Deliver high flow oxygen immediately to maintain saturation 94-98%.
- ✓
  - Continuous fetal monitoring is recommended for acute severe asthma
  - For women with poorly controlled asthma there should be close liaison between the respiratory physician and obstetrician, with early referral to critical care physicians for women with acute severe asthma

## MANAGEMENT DURING LABOUR

- C** If anaesthesia is required, regional blockade is preferable to general anaesthesia.
- D** Use prostaglandin F<sub>2α</sub> with extreme caution in women with asthma because of the risk of inducing bronchoconstriction.
- ✓
  - Advise women:
    - that an acute asthma attack is rare in labour
    - to continue their usual asthma medications in labour
  - Women receiving steroid tablets at a dose exceeding prednisolone 7.5 mg per day for >2 weeks prior to delivery should receive parenteral hydrocortisone 100 mg 6-8 hourly during labour
  - In the absence of an acute severe asthma attack, reserve Caesarean section for the usual obstetric indications.

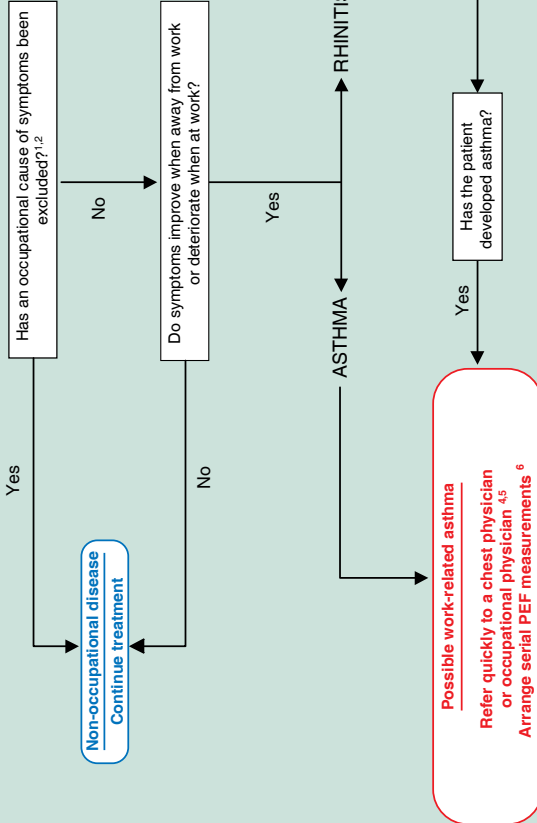
## DRUG THERAPY IN BREASTFEEDING MOTHERS

- C** Encourage women with asthma to breastfeed
- C** Use asthma medications as normal during lactation.

## WORK-RELATED ASTHMA AND RHINITIS: CASE FINDING AND MANAGEMENT IN PRIMARY CARE

### High risk work<sup>2</sup> includes:

- baking
- pastry making
- spray painting
- laboratory animal work
- healthcare
- dentalfare
- food processing
- welding
- soldering
- metalwork
- woodwork
- chemical processing
- textile, plastics and rubber manufacture
- farming and other jobs with exposure to dusts and fumes



1. At least 1 in 10 cases of new or reappearance of childhood asthma in adult life are attributable to occupation.
2. Enquire of adult patients with rhinitis or asthma about their job and the materials with which they work.
3. Rhino-conjunctivitis may precede IgE-associated occupational asthma; the risk of developing asthma being highest in the year after the onset of rhinitis.
4. The prognosis of occupational asthma is improved by early identification and early avoidance of further exposure to its cause
5. Confirm a diagnosis supported by objective criteria and not on the basis of a compatible history alone because of the potential implications for employment.
6. Arrange for workers whom you suspect of having work-related asthma to perform serial peak flow measurements at least four times a day.

**Guidelines for the Identification, Management and Prevention of Occupational Asthma • [www.bohrf.org.uk/content/asthma.htm](http://www.bohrf.org.uk/content/asthma.htm)**

## ORGANISATION AND DELIVERY OF CARE

### EDUCATING CLINICIANS

There is strong evidence that educating clinicians can improve health outcomes for patients. Interventions need to be of sufficient intensity to engage with, and change, the way practices are organised.

- B** Training for primary care clinicians should include educational outreach visits using multifaceted programmes that include consultation training including goal setting.

### STRUCTURED REVIEW

Proactive clinical review of people with asthma improves clinical outcomes. Evidence for benefit is strongest when reviews include discussion and use of a written personalised asthma action plan (PAAP).

- A** In primary care, people with asthma should be reviewed regularly by a nurse or doctor with appropriate training in asthma management. Review should incorporate a written action plan.

- ✓ It is good practice to audit the percentage of patients reviewed annually. Consider focusing on particular groups such as those overusing bronchodilators, patients on higher treatment steps, those with asthma attacks or from groups with more complex needs.

### ASTHMA CLINICS

There is insufficient evidence to make a recommendation about the provision of care through primary care asthma clinics or specialist asthma clinics. Within primary care, structured reviews may be delivered as appointments in routine surgeries, or within a dedicated asthma clinic.

### INTERVENTIONS INVOLVING SPECIFIC GROUPS

#### SCHOOL-BASED INTERVENTIONS

- B** Consider a multifaceted approach to school-based asthma education programmes targeting children's health professionals as well as the children themselves.

#### ETHNICITY/CULTURE-BASED INTERVENTIONS

- C** Establish intensive clinic-based programmes for people from ethnic minority groups who have attended emergency care.

#### LAY-LED INTERVENTIONS

- A** Lay-led self-management programmes for people with asthma are not recommended.

#### PHARMACIST-LED INTERVENTIONS

Evidence for pharmacist-led interventions is lacking and further high quality randomised trials testing pharmacist-led interventions to improve asthma outcomes are needed.

ISBN 978 1 909103 29 0  
www.sign.ac.uk



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The Healthcare Environment Inspectorate, the Scottish Health Council, the Scottish Health Technologies Group, the Scottish Intercollegiate Guidelines Network (SIGN) and the Scottish Medicines Consortium are key components of our organisation.

