

The British Thoracic Society  
Scottish Intercollegiate Guidelines Network

# British Guideline on the Management of Asthma

Quick Reference Guide



*May 2008*

*revised May 2011*



British Thoracic Society  
Scottish Intercollegiate Guidelines Network

# British Guideline on the Management of Asthma

## Quick Reference Guide



**May 2008**  
Revised May 2011

**ISBN 978 1 905813 29 2**

**First published 2003**  
**Revised edition published 2008**  
**Revised edition published 2009**  
**Revised edition published 2011**

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.

**British Thoracic Society,**  
**17 Doughty Street, London WC1N 2PL**  
**[www.brit-thoracic.org.uk](http://www.brit-thoracic.org.uk)**

**Scottish Intercollegiate Guidelines Network**  
**Elliott House, 8 -10 Hillside Crescent, Edinburgh EH7 5EA**  
**[www.sign.ac.uk](http://www.sign.ac.uk)**

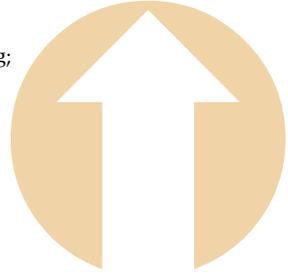
## DIAGNOSIS IN CHILDREN

### 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.

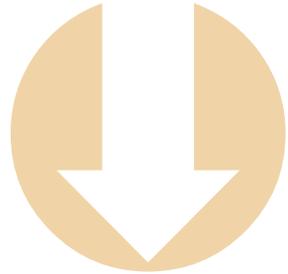
### CLINICAL FEATURES THAT INCREASE THE PROBABILITY OF ASTHMA

- 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.

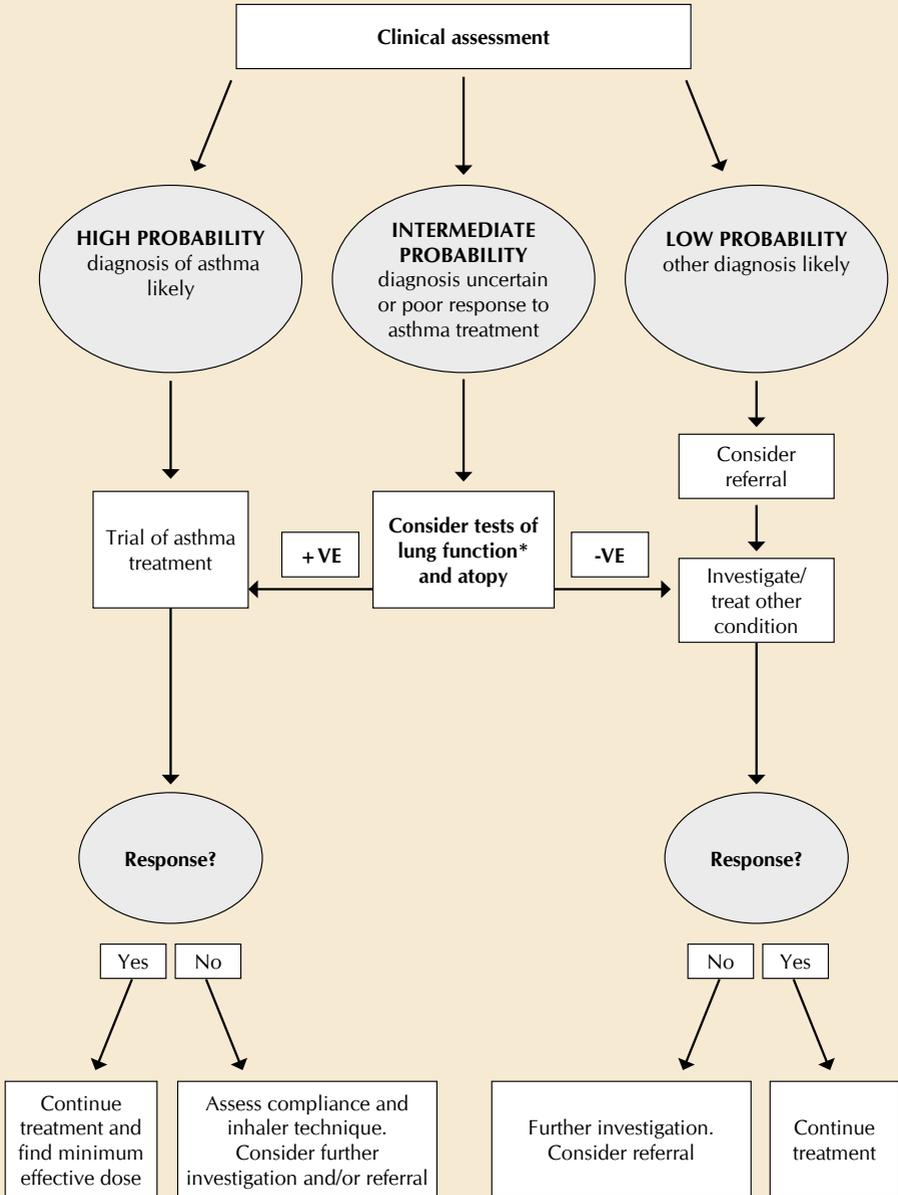
**In some children, particularly the under 5s, there is insufficient evidence for a firm diagnosis of asthma but no features to suggest an alternative diagnosis.**

**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

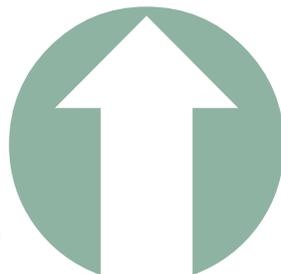
The diagnosis of asthma is based on the recognition of a characteristic pattern of symptoms and signs and the absence of an alternative explanation for them. The key is to take a careful clinical history.

- ☑ 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.
  - the preferred approach in patients with an **intermediate probability** of having asthma 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.**

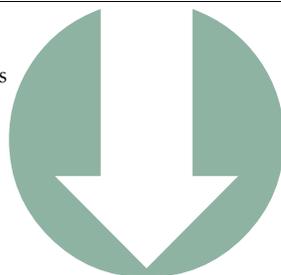
### CLINICAL FEATURES THAT INCREASE THE PROBABILITY OF ASTHMA

- 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



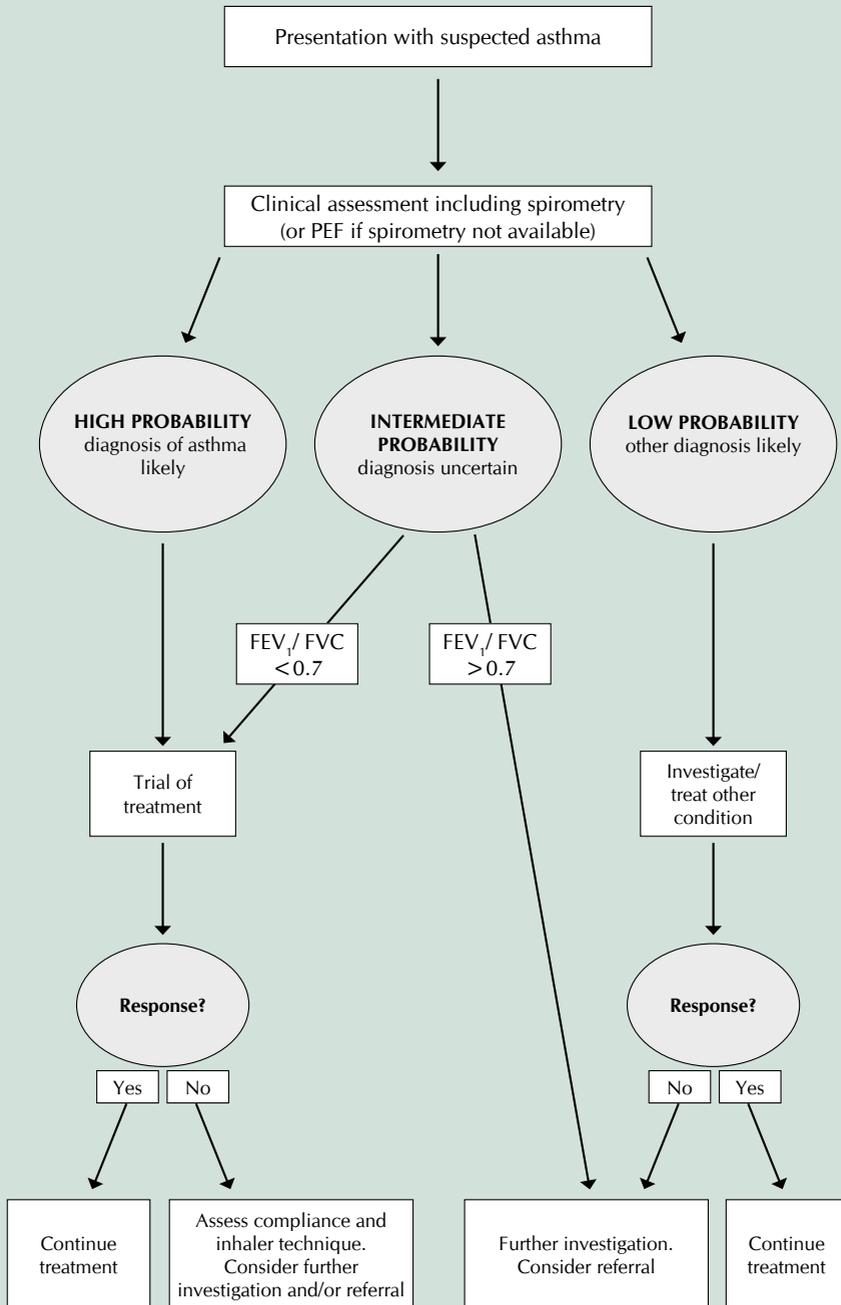
### CLINICAL FEATURES THAT LOWER THE PROBABILITY OF ASTHMA

- 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



## 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. Evidence that non-pharmacological management is effective can be difficult to obtain and more studies are required.

### PROSPECTS FOR THE PRIMARY PREVENTION OF ASTHMA

	Research Findings	Recommendation
<b>Allergen avoidance</b>	There is no consistent evidence of benefit from domestic aeroallergen avoidance.	Insufficient evidence to make a recommendation.
<b>Breastfeeding</b>	Evidence of protective effect in relation to early asthma.	<b>C Breast feeding should be encouraged for its many benefits, and as it may also have a potential protective effect in relation to early asthma.</b>
<b>Modified milk formulae</b>	Trials of modified milk formulae have not included sufficiently long follow up to establish whether there is any impact on asthma.	In the absence of any evidence of benefit from the use of modified infant milk formulae it is not possible to recommend it as a strategy for preventing childhood asthma.
<b>Nutritional supplementation</b>	There is limited, variable quality evidence investigating the potential preventative effect of fish oil, selenium and vitamin E intake during pregnancy.	There is insufficient evidence to make any recommendations on maternal dietary supplementation as an asthma prevention strategy.
<b>Immunotherapy</b>	More studies are required to establish whether immunotherapy might have a role in primary prophylaxis.	No recommendation can be made at present.
<b>Microbial exposure</b>	This is a key area for further work with longer follow up to establish outcomes in relation to asthma.	There is insufficient evidence to indicate that the use of dietary probiotics in pregnancy reduces the incidence of childhood asthma.
<b>Avoidance of tobacco smoke</b>	Studies suggest an association between maternal smoking and an increased risk of infant wheeze.	<b>C Parents and parents-to-be should be advised of the many adverse effects that smoking has on their children including increased wheezing in infancy and increased risk of persistent asthma.</b>
DIETARY MANIPULATION		
	Research Findings	Recommendation
<b>Fish oils and fatty acid</b>	Results from studies are inconsistent and further research is required.	No recommendation for use.
<b>Electrolytes</b>	Limited intervention studies suggest either negligible or minimal effects.	No recommendation can be made at present.
<b>Weight reduction</b>	Studies show an association between increasing body mass index and symptoms of asthma.	<b>C Weight reduction is recommended in obese patients with asthma to promote general health and to improve asthma control.</b>

## NON-PHARMACOLOGICAL MANAGEMENT

### PROSPECTS FOR THE SECONDARY PREVENTION OF ASTHMA

	Research Findings	Recommendation
<b>Air pollution</b>	Studies suggest an association between air pollution and aggravation of existing asthma.	Further research is required on the role of indoor pollutants in relation to asthma.
<b>House dust mites</b>	Measures to decrease house dust mites reduce the numbers of house dust mites, but do not have an effect on asthma severity.	<input checked="" type="checkbox"/> In committed families, multiple approaches to reduce exposure to house dust mite may help.
<b>Pets</b>	There are no controlled trials on the benefits of removing pets from the home. If you haven't got a cat, and you've got asthma, you probably shouldn't get one.	No recommendation can be made at present.
<b>Smoking</b>	Direct or passive exposure to cigarette smoke adversely affects quality of life, lung function, need for rescue medications and long term control with inhaled steroids.	<b>C</b> <b>Parents with asthma should be advised about the dangers to themselves and their children with asthma and offered appropriate support to stop smoking.</b>
<b>Immunotherapy</b>	Allergen specific immunotherapy is beneficial in the management of patients with allergic asthma.	<b>B</b> <b>Immunotherapy can be considered in patients with asthma where a clinically significant allergen cannot be avoided. The potential for severe allergic reactions to the therapy must be fully discussed with patients.</b>

### COMPLEMENTARY AND ALTERNATIVE MEDICINES

	Research Findings	Recommendation
<b>Acupuncture</b>	Research studies have not demonstrated a clinically valuable benefit and no significant benefits in relation to lung function.	Insufficient evidence to make a recommendation.
<b>Buteyko technique</b>	The Buteyko breathing technique specifically focuses on control of hyperventilation. Trials suggest benefits in terms of reduced symptoms and bronchodilator usage but no effect on lung function.	<b>B</b> <b>Buteyko breathing technique may be considered to help patients to control the symptoms of asthma.</b>
<b>Family therapy</b>	May be a useful adjunct to medication in children with asthma.	<input checked="" type="checkbox"/> In difficult childhood asthma, there may be a role for family therapy as an adjunct to pharmacotherapy.
<b>Herbal and Chinese Medicines</b>	Trials report variable benefits.	Insufficient evidence to make a recommendation.
<b>Homeopathy</b>	Studies looking at individualised homeopathy are needed.	Insufficient evidence to make a recommendation.
<b>Hypnosis and relaxation therapies</b>	No evidence of efficacy. Muscle relaxation could conceivably benefit lung function in patients with asthma.	Larger blinded trials are needed before a recommendation can be made.
<b>Ionisers</b>	Air ionisers are of no benefit in reducing symptoms.	<b>A</b> <b>Air ionisers are not recommended for the treatment of asthma.</b>
<b>Physical exercise therapy</b>	Studies suggest that such interventions make one fitter, but there is no effect on asthma	No evidence of specific benefit.

## 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 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 compliance with existing therapies, inhaler technique and eliminate trigger factors.

Until May 2009 all doses of inhaled steroids were referenced against beclometasone (BDP) given via CFC-MDIs. As BDP CFC is now unavailable, the reference inhaled steroid 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 compliance, there is no difference in efficacy in giving inhaled steroid 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 compliance and also have the advantage of guaranteeing that the long-acting  $\beta_2$  agonist is not taken without the inhaled steroids.

Combination inhalers are recommended to:

- guarantee that the long-acting  $\beta_2$  agonist is not taken without inhaled steroid
- 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 steroid. Reduction in inhaled steroid 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 steroids should be reviewed.

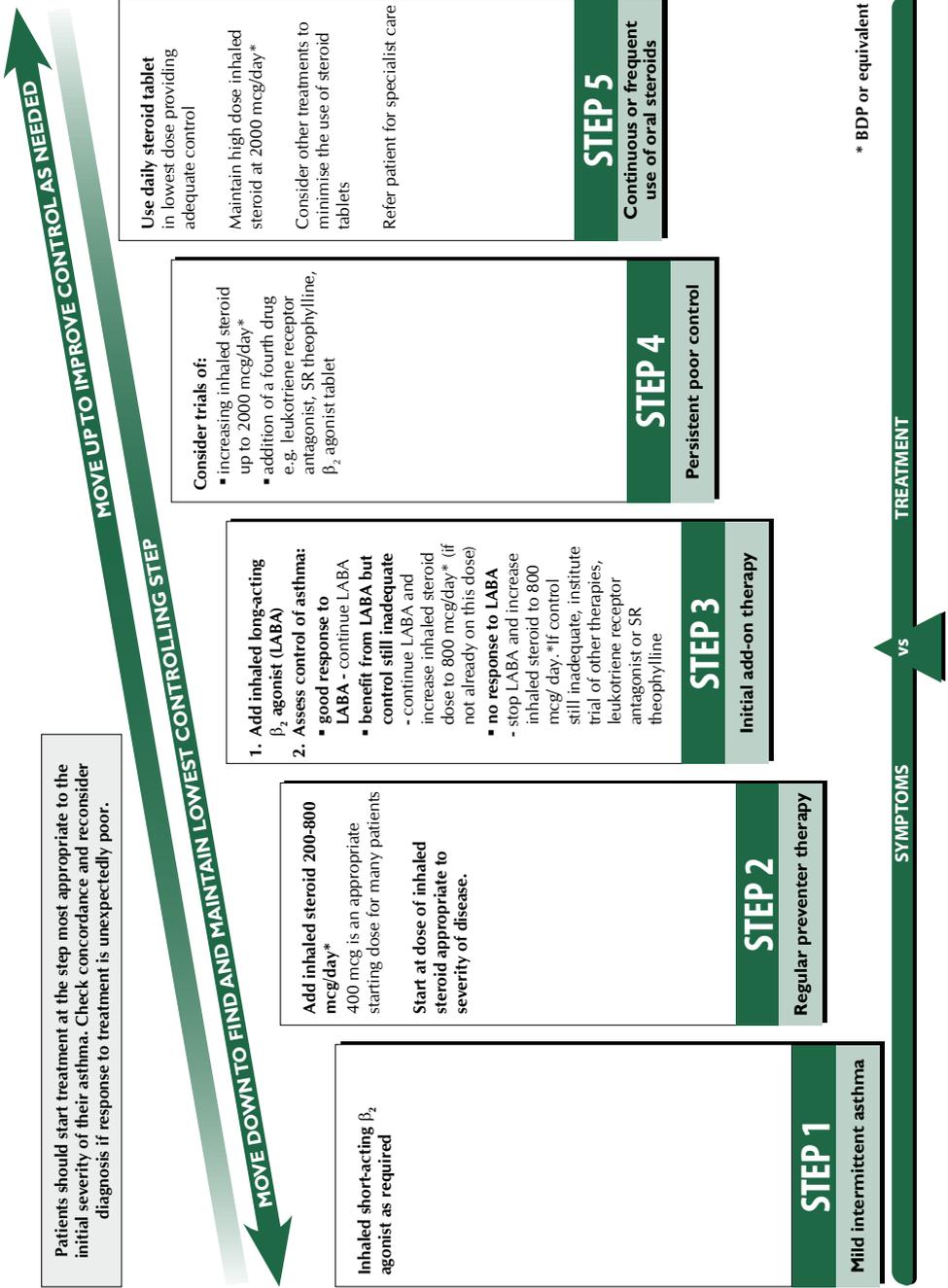
If exercise is a specific problem in patients taking inhaled steroids who are otherwise well controlled, consider adding one of the following therapies:

- |   |   |                                    |
|---|---|------------------------------------|
| A | C | ▪ leukotriene receptor antagonists |
| A | A | ▪ long-acting $\beta_2$ agonists   |
| C | C | ▪ chromones                        |
| 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 concordance 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 steroid at 2000 mcg/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 steroid up to 2000 mcg/day\*
- addition of a fourth drug e.g. leukotriene receptor antagonist, SR theophylline,  $\beta_2$ -agonist tablet

**STEP 3**  
Initial add-on therapy

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

**STEP 2**  
Regular preventer therapy

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

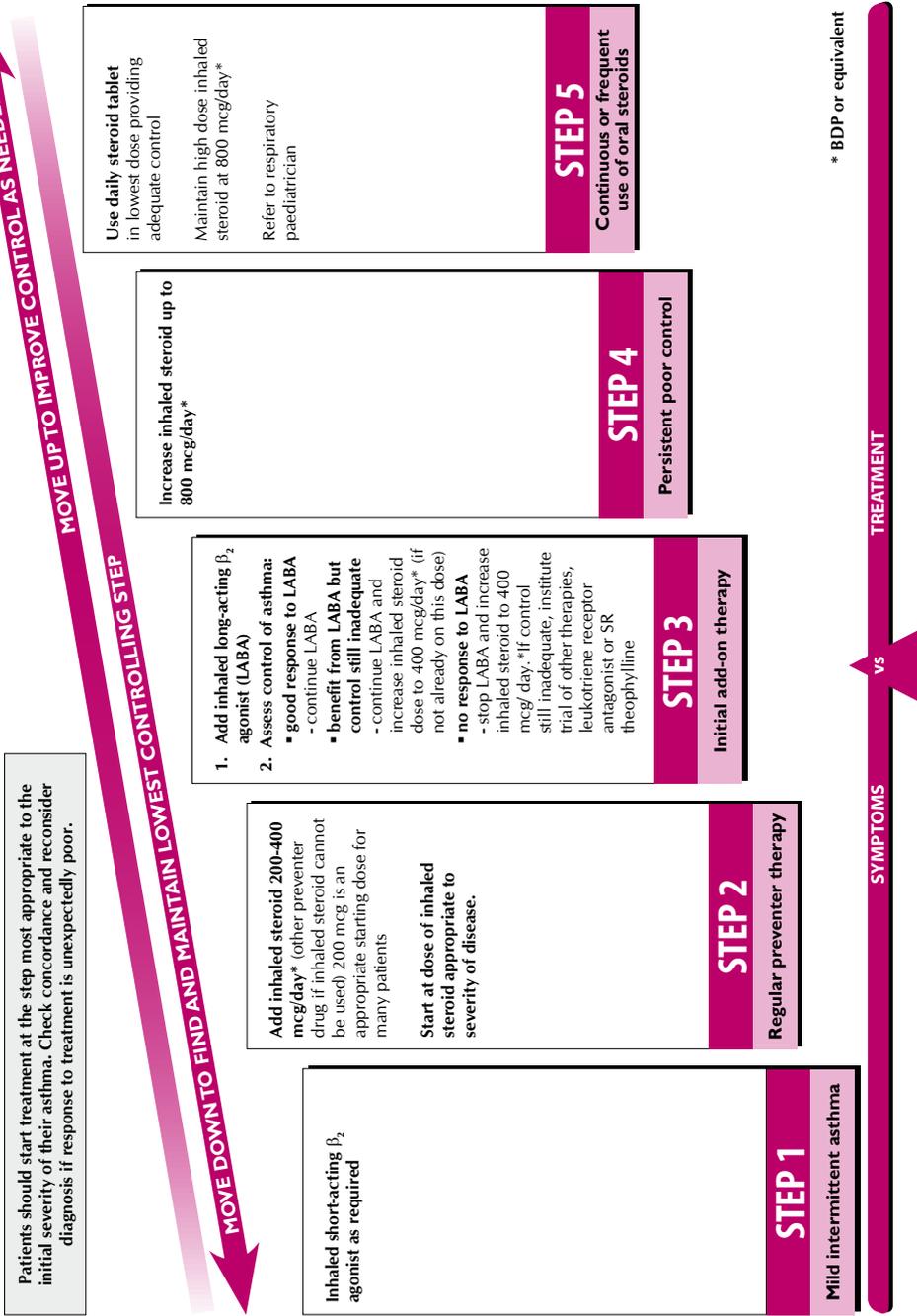
Start at dose of inhaled steroid appropriate to severity of disease.

**STEP 1**  
Mild intermittent asthma

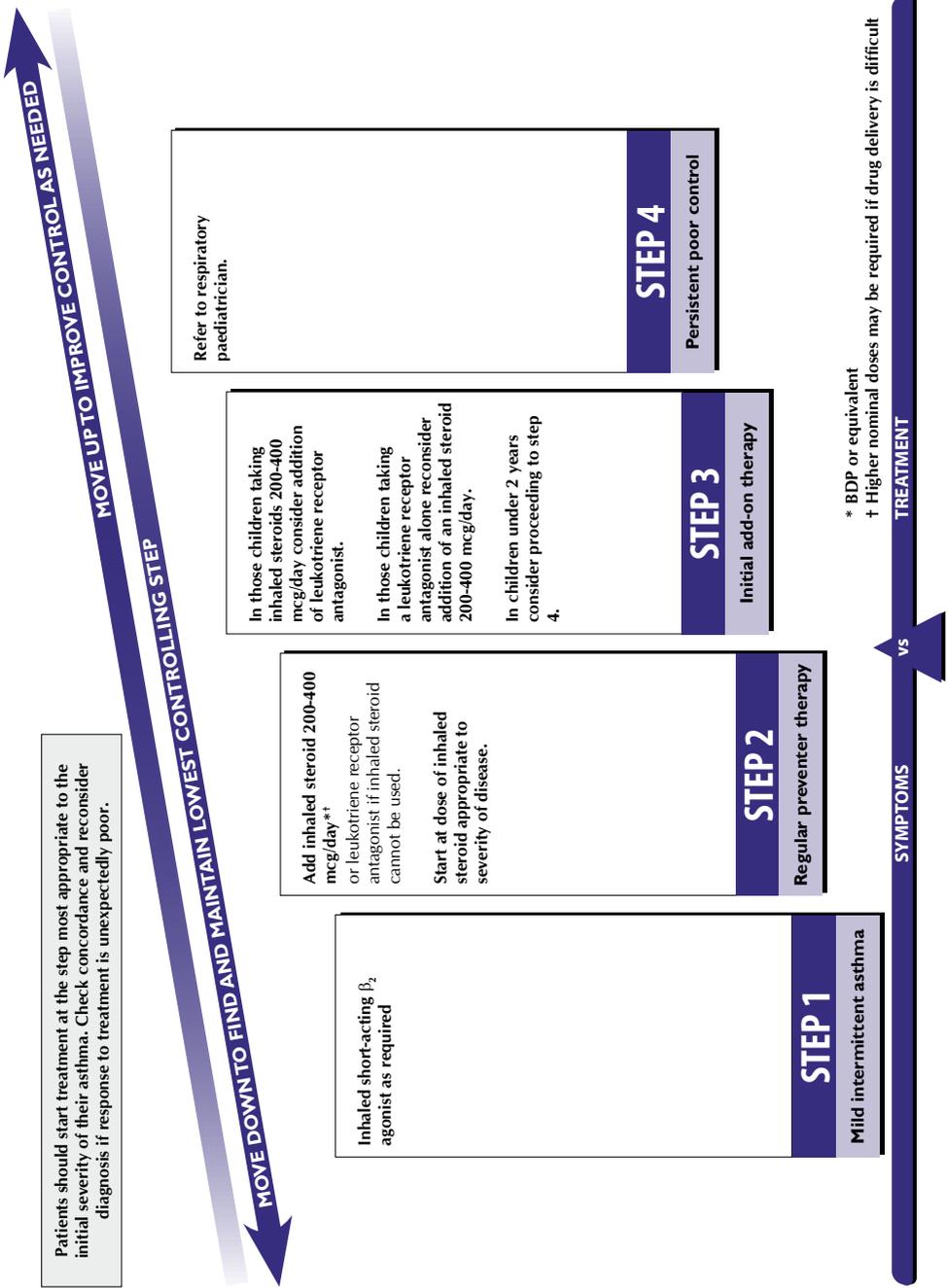
Inhaled short-acting  $\beta_2$  agonist as required

\* BDP or equivalent

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



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.

### $\beta_2$ AGONIST DELIVERY

#### ACUTE ASTHMA

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

#### STABLE ASTHMA

- 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 STEROIDS 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.

#### CFC PROPELLANT PMDI VS HFA PROPELLANT PMDI

- A** **A** **A**
- Salbutamol HFA can be substituted for salbutamol CFC at 1:1 dosing.
  - HFA BDP pMDI (Qvar) may be substituted for CFC BDP pMDI at 1:2 dosing. This ratio does not apply to reformulated HFA BDP pMDIs.
  - Fluticasone HFA can be substituted for fluticasone CFC at 1:1 dosing.

#### 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 an inhaler device assessed by a competent health care professional
  - The medication needs to be titrated against clinical response to ensure optimum efficacy
  - Reassess inhaler technique as part of structured clinical review.

#### INHALER DEVICES IN CHILDREN UNDER 5

In young (0-5 years) children, little or no evidence is available on which to base recommendations.

- In children aged 0-5 years, pMDI and spacer are the preferred method of delivery of  $\beta_2$  agonists or inhaled steroids. 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** Health care professionals must be aware that patients with severe asthma and one or more adverse psychosocial factors are at risk of death.

- ☑
  - Keep patients who have had near fatal asthma or brittle asthma under specialist supervision indefinitely
  - A respiratory specialist should follow up patients admitted with severe asthma for at least one year after the admission

### INITIAL ASSESSMENT

#### MODERATE EXACERBATION

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

#### ACUTE SEVERE

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

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

#### NEAR FATAL

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), tachypnea, 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 (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 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>

Revised  
2009

## MANAGEMENT OF ACUTE ASTHMA IN ADULTS

### CRITERIA FOR ADMISSION

- B** Admit patients with any feature of a life threatening or near fatal attack.
- B** Admit patients with any feature of a severe 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 asthma to maintain an SpO<sub>2</sub> level of of 94-98%. Lack of pulse oximetry should not prevent the use of oxygen.
- A** In hospital, ambulance and primary care, nebulised  $\beta_2$  agonist bronchodilators should be driven by oxygen.
- C** The absence of supplemental oxygen should not prevent nebulised therapy being given if indicated.

#### $\beta_2$ AGONIST BRONCHODILATORS

- A** Use high dose inhaled  $\beta_2$  agonists as first line agents in 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 acute asthma with life threatening features the nebulised route (oxygen-driven) is recommended.

- A** In patients with severe asthma that is poorly responsive to an initial bolus dose of  $\beta_2$  agonist, consider continuous nebulisation with an appropriate nebuliser.

#### STEROID THERAPY

- A** Give steroids in adequate doses in all cases of acute asthma.

- Continue prednisolone 40-50 mg daily for at least five days or until recovery.

#### 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.

#### OTHER THERAPIES

- B** Consider giving a single dose of IV magnesium sulphate for patients with:
- acute severe asthma who have not had a good initial response to inhaled bronchodilator therapy
  - life threatening or near fatal asthma.

- IV 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.

#### REFERRAL TO INTENSIVE CARE

Refer any patient:

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

Revised  
2009

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

### ACUTE SEVERE

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

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

### LIFE THREATENING

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

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

## CRITERIA FOR ADMISSION

β<sub>2</sub> agonists should be given as first line treatment. Increase β<sub>2</sub> agonist dose by two puffs every two minutes according to response up to ten puffs.

Children with acute asthma in primary care who have not improved after receiving up to 10 puffs of β<sub>2</sub> agonist should be referred to hospital. Further doses of bronchodilator should be given as necessary whilst awaiting transfer

- Treat children transported to hospital by ambulance with oxygen and nebulised β<sub>2</sub> agonists during the journey.

Paramedics attending to children with acute asthma should administer nebulised salbutamol 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 for children with SpO<sub>2</sub> < 92% on 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 asthma do not appear distressed.

## 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.

### β<sub>2</sub> AGONIST BRONCHODILATORS

**A**

- Inhaled β<sub>2</sub> agonists are the first line treatment for acute asthma
- A pMDI + spacer is the preferred option in mild to moderate asthma.

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

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

Discontinue long-acting β<sub>2</sub> agonists when short-acting β<sub>2</sub> agonists are required more often than four-hourly.

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

### STEROID THERAPY

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

- ☑ Use a dose of 20 mg prednisolone for children aged 2 to 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 IV steroids
- 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. Weaning is unnecessary unless the course of steroids exceeds 14 days.

### OTHER THERAPIES

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

- ☑ Repeated doses of ipratropium bromide should be given early to treat children poorly responsive to  $\beta_2$  agonists.

**A** **C** Aminophylline is not recommended in children with mild to moderate acute asthma  
Consider aminophylline in an HDU or PICU setting for children with severe or life threatening bronchospasm unresponsive to maximal doses of bronchodilators plus steroids.

- ☑ Do not give antibiotics routinely in the management of acute childhood asthma.

## 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
- The differential diagnosis of symptoms includes:
  - aspiration pneumonitis
  - pneumonia
  - bronchiolitis
  - tracheomalacia
  - complications of underlying conditions such as congenital anomalies and cystic fibrosis
- Prematurity and low birth weight are risk factors for recurrent wheezing

## TREATMENT OF ACUTE ASTHMA

### $\beta_2$ AGONIST BRONCHODILATORS

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

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

### STEROID THERAPY

**B** Consider steroid tablets in infants early in the management of moderate to severe episodes of acute asthma 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.

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

## 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 cardio-respiratory 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 a careful clinical assessment.

<b>Questionnaires</b>	<ul style="list-style-type: none"> <li>▪ The asthma control questionnaire has been validated for children up to 16 years.</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

	Research finding	Recommendation
<b>Tobacco smoking and environmental exposure to tobacco smoke (ETS)</b>	Passive and active smoking are significantly risk factors for asthma and wheezing in adolescents.	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> 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.</li> <li><input checked="" type="checkbox"/> 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.</li> </ul>
<b>Complementary and alternative medicine (CAM)</b>	CAM use in adolescents with asthma appears to be widespread and may be a marker for non-adherence	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Healthcare professionals should be aware that CAM use is common in adolescents and should ask about its use.</li> </ul>

## 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.

	Research finding	Recommendation
Inhaler devices	Adolescents may be competent at using their inhaler devices, but their adherence to treatment may be affected by other factors such as preference.	<ul style="list-style-type: none"><li><input checked="" type="checkbox"/> Adolescent preference for inhaler device should be taken into consideration as a factor in improving adherence to treatment.</li><li><input checked="" type="checkbox"/> 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.</li><li><input checked="" type="checkbox"/> Consider prescribing a more portable device (as an alternative to a pMDI with spacer) for delivering bronchodilators when away from home.</li></ul>

## 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 23).

- 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

### Schools as a setting for healthcare delivery and asthma education

**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 thought of as a process and not just the event of transfer to adult services. It should begin early, be planned and 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 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 in 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 can affect pregnancy outcomes

Revised  
2009

**D** Women with asthma should be advised of the importance of 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

Revised  
2009

**B** Use short acting  $\beta_2$  agonists as normal during pregnancy.

**C**

- Use long acting  $\beta_2$  agonists as normal
- Use inhaled steroids as normal
- Use oral and intravenous theophyllines as normal.

**C** Use steroid tablets as normal when indicated for severe asthma. Steroid tablets should never be withheld because of pregnancy.

Revised  
2009

**D** Leukotriene antagonists may be continued in women who have demonstrated significant improvement in asthma control with these agents prior to pregnancy not achievable with other medications.

## ACUTE ASTHMA IN PREGNANCY

Revised  
2009

**C** Give drug therapy for acute asthma as for the non-pregnant patient, including systemic steroids and magnesium sulphate.

Revised  
2009

**D**

- Acute severe asthma in pregnancy is an emergency and should be treated vigorously in hospital
- Deliver high flow oxygen immediately to maintain saturation 94-98%.

Revised  
2009

- Continuous fetal monitoring is recommended for severe acute 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>2</sub> $\alpha$  with extreme caution because of the risk of inducing bronchoconstriction.

- Advise women:
  - that acute asthma 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 acute severe asthma, reserve caesarean section for the usual obstetric indications.

## DRUG THERAPY IN BREASTFEEDING MOTHERS

**C**

- Encourage women with asthma to breast feed
- Use asthma medications as normal during lactation.

## 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
  - identification of the mechanism of persisting symptoms and assessment of adherence with 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 THAT CONTRIBUTE TO DIFFICULT ASTHMA

#### POOR ADHERENCE

- C** Poor adherence with maintenance therapy should be considered as a possible mechanism in 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.

## ORGANISATION AND DELIVERY OF CARE

### ROUTINE PRIMARY CARE

- A** All people with asthma should have access to primary care services delivered by doctors and nurses with appropriate training in asthma management.

### STRUCTURED REVIEW

- B** Consider carrying out routine reviews by telephone for people with asthma.

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

- C**
- General practices should maintain a register of people with asthma
  - Clinical review should be structured and utilise a standard recording system

- B** Feedback of audit data to clinicians should link guidelines recommendations to management of individual patients.

### PATIENT SUBGROUPS

- D** Healthcare professionals who provide asthma care should have heightened awareness of the complex needs of ethnic minorities, socially disadvantaged group, adolescents, the elderly and those with communication difficulties.

### ACUTE EXACERBATIONS

- C** Manage hospital inpatients in specialist rather than general units.

- B** Clinicians in primary and secondary care should treat asthma according to recommended guidelines.

- A** Discharge from hospital or ED should be a planned, supervised event which includes self-management planning. It may safely take place as soon as clinical improvement is apparent.

- A** All people attending hospital with acute exacerbations of asthma should be reviewed by a clinician with particular expertise in asthma management, preferably within 30 days.

## PATIENT EDUCATION

### ASTHMA ACTION PLANS

**Written personalised action plans as part of self-management education have been shown to improve health outcomes for people with asthma**

### SELF-MANAGEMENT IN PRACTICE

The 'Be in Control' asthma action plan from Asthma UK can be downloaded direct from their website: [www.asthma.org.uk/control](http://www.asthma.org.uk/control)  
It can also be obtained by contacting Asthma UK directly 0800 121 6255.

- A hospital admission represents a window of opportunity to review self-management skills. No patient should leave hospital without a written personalised action plan and the benefit may be greatest at first admission.
  - An acute consultation offers the opportunity to determine what action the patient has already taken to deal with the exacerbation. 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 self-management in the event of their asthma deteriorating
  - Brief simple education linked to patient goals is most likely to be acceptable to patients.

- A**
  - **Patients with asthma should be offered self-management education that focuses on individual needs, and be reinforced by a written personalised action plan**
  - **Prior to discharge, in-patients should receive written personalised action plans, given by clinicians with expertise in asthma management.**

**A** **Introduce personalised action plans as part of a structured educational discussion.**

**B** **Initiatives which encourage regular, structured review explicitly incorporating self management education should be used to increase ownership of personalised action plans.**

## CONCORDANCE AND COMPLIANCE

Provide simple, verbal and written instructions and information on drug treatment for patients and carers.

Computer repeat-prescribing systems provide a useful index of compliance.

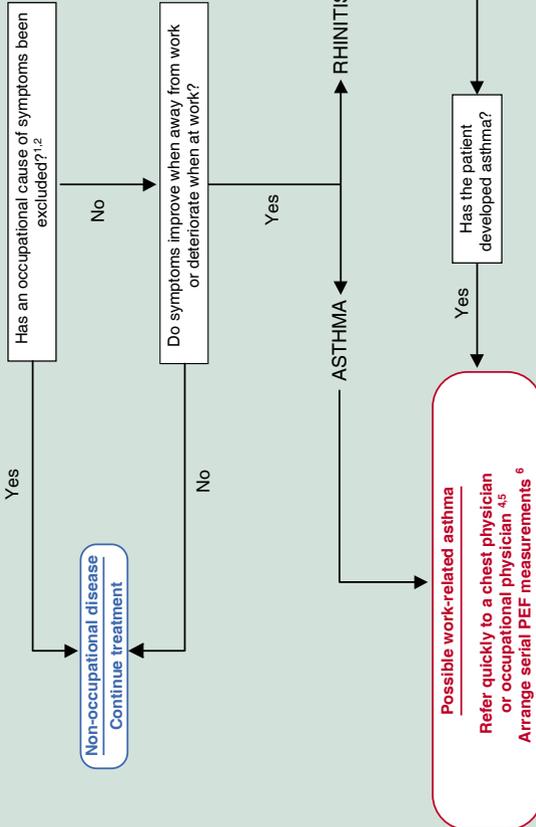
## PRACTICAL TIPS FOR IMPROVING COMPLIANCE

- *Ask open-ended questions like "If we could make one thing better for your asthma what would it be?" This may help to elicit a more patient-centred agenda*
- *Make it clear you are listening and responding to the patient's concerns and goals*
- *Reinforce practical information and negotiated treatment plans with written instruction*
- *Consider reminder strategies*
- *Recall patients who miss appointments*

## 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)

© British Occupational Health Research Foundation, 6 St Andrews Place, Regents Park, London NW1 4LB

**British Thoracic Society,**  
17 Doughty Street, London WC1N 2PL  
[www.brit-thoracic.org.uk](http://www.brit-thoracic.org.uk)

**Scottish Intercollegiate Guidelines Network**  
Elliott House, 8 -10 Hillside Crescent, Edinburgh EH7 5EA  
[www.sign.ac.uk](http://www.sign.ac.uk)

