KEY TO EVIDENCE STATEMENTS AND GRADES OF RECOMMENDATIONS

LEVELS OF EVIDENCE

1++  |  High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias
1+   |  Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
1 -  |  Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2++  |  High quality systematic reviews of case control or cohort studies
     |  High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+   |  Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2 -  |  Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3    |  Non-analytic studies, eg case reports, case series
4    |  Expert opinion

GRADES OF RECOMMENDATION

Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

A    |  At least one meta-analysis, systematic review of RCTs, or RCT rated as 1++ and directly applicable to the target population; or
     |  A body of evidence consisting principally of studies rated as 1 -, directly applicable to the target population, and demonstrating overall consistency of results
B    |  A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or
     |  Extrapolated evidence from studies rated as 1++ or 1+
C    |  A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or
     |  Extrapolated evidence from studies rated as 2++
D    |  Evidence level 3 or 4; or
     |  Extrapolated evidence from studies rated as 2-

GOOD PRACTICE POINTS

☑️  Recommended best practice based on the clinical experience of the guideline development group

Green  |  Applies only to adults
Yellow |  Applies to all children
Red    |  Applies to children 5-12
Blue   |  Applies to children under 5
Black  |  General
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 FEV₁ 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.

- In children with an **intermediate probability** of asthma who can perform spirometry and have evidence of airways obstruction, assess the change in FEV₁ or PEF in response to an inhaled bronchodilator (reversibility) and/or the response to 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.
Clinical assessment

HIGH PROBABILITY
diagnosis of asthma likely

INTERMEDIATE PROBABILITY
diagnosis uncertain or poor response to asthma treatment

LOW PROBABILITY
other diagnosis likely

Trial of asthma treatment

Consider tests of lung function* and atopy

Response?

Yes

No

Assess compliance and inhaler technique. Consider further investigation and/or referral

Response?

Yes

No

Further investigation. Consider referral

Continue treatment

Consider referral

Investigate/treat other condition

Consider tests of lung function* and atopy

+VE

-VE

* 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.

**SPIROMETRY**

- 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 FEV₁ 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

Presentation with suspected asthma

Clinical assessment including spirometry (or PEF if spirometry not available)

HIGH PROBABILITY
diagnosis of asthma likely

INTERMEDIATE PROBABILITY
diagnosis uncertain

LOW PROBABILITY
other diagnosis likely

FEV₁/FVC < 0.7

Trial of treatment

Response?

Yes No

Continue treatment Assess compliance and inhaler technique. Consider further investigation and/or referral

FEV₁/FVC > 0.7

Investigate/treat other condition

Response?

No Yes

Further investigation. Consider referral Continue treatment

Applies only to adults Applies to all children Applies to children 5-12 Applies to children under 5 General
### 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.

<table>
<thead>
<tr>
<th>PROSPECTS FOR THE PRIMARY PREVENTION OF ASTHMA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research Findings</strong></td>
</tr>
<tr>
<td><strong>Recommendation</strong></td>
</tr>
<tr>
<td>Allergen avoidance</td>
</tr>
<tr>
<td>Evidence of protective effect in relation to early asthma.</td>
</tr>
<tr>
<td>Trials of modified milk formulae have not included sufficiently long follow up to establish whether there is any impact on asthma.</td>
</tr>
<tr>
<td>There is limited, variable quality evidence investigating the potential preventative effect of fish oil, selenium and vitamin E intake during pregnancy.</td>
</tr>
<tr>
<td>More studies are required to establish whether immunotherapy might have a role in primary prophylaxis.</td>
</tr>
<tr>
<td>This is a key area for further work with longer follow up to establish outcomes in relation to asthma.</td>
</tr>
<tr>
<td>Studies suggest an association between maternal smoking and an increased risk of infant wheeze.</td>
</tr>
</tbody>
</table>

### DIETARY MANIPULATION

<table>
<thead>
<tr>
<th>Research Findings</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish oils and fatty acid</td>
<td>No recommendation for use.</td>
</tr>
<tr>
<td>Results from studies are inconsistent and further research is required.</td>
<td></td>
</tr>
<tr>
<td>Electrolytes</td>
<td>No recommendation can be made at present.</td>
</tr>
<tr>
<td>Limited intervention studies suggest either negligible or minimal effects.</td>
<td></td>
</tr>
<tr>
<td>Weight reduction</td>
<td>C Weight reduction is recommended in obese patients with asthma to promote general health and to improve asthma control.</td>
</tr>
<tr>
<td>Studies show an association between increasing body mass index and symptoms of asthma.</td>
<td></td>
</tr>
</tbody>
</table>
## NON-PHARMACOLOGICAL MANAGEMENT

### PROSPECTS FOR THE SECONDARY PREVENTION OF ASTHMA

<table>
<thead>
<tr>
<th>Research Findings</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air pollution</strong></td>
<td>Studies suggest an association between air pollution and aggravation of existing asthma.</td>
</tr>
<tr>
<td><strong>House dust mites</strong></td>
<td>Measures to decrease house dust mites reduce the numbers of house dust mites, but do not have an effect on asthma severity.</td>
</tr>
<tr>
<td><strong>Pets</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Smoking</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Immunotherapy</strong></td>
<td>Allergen specific immunotherapy is beneficial in the management of patients with allergic asthma.</td>
</tr>
</tbody>
</table>

### COMPLEMENTARY AND ALTERNATIVE MEDICINES

<table>
<thead>
<tr>
<th>Research Findings</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acupuncture</strong></td>
<td>Research studies have not demonstrated a clinically valuable benefit and no significant benefits in relation to lung function.</td>
</tr>
<tr>
<td><strong>Buteyko technique</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Family therapy</strong></td>
<td>May be a useful adjunct to medication in children with asthma.</td>
</tr>
<tr>
<td><strong>Herbal and Chinese Medicines</strong></td>
<td>Trials report variable benefits.</td>
</tr>
<tr>
<td><strong>Homeopathy</strong></td>
<td>Studies looking at individualised homeopathy are needed.</td>
</tr>
<tr>
<td><strong>Hypnosis and relaxation therapies</strong></td>
<td>No evidence of efficacy. Muscle relaxation could conceivably benefit lung function in patients with asthma.</td>
</tr>
<tr>
<td><strong>Ionisers</strong></td>
<td>Air ionisers are of no benefit in reducing symptoms.</td>
</tr>
<tr>
<td><strong>Physical exercise therapy</strong></td>
<td>Studies suggest that such interventions make one fitter, but there is no effect on asthma</td>
</tr>
</tbody>
</table>
PHARMACOLOGICAL MANAGEMENT

The aim of asthma management is control of the disease. 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 $FEV_1$ and/or PEF >80% predicted or best)
with minimal side effects

All doses of inhaled steroids refer to beclometasone (BDP) given via CFC-MDIs (metered dose inhaler). Although now almost phased out, this is the device used in most of the evidence base that supports current asthma management. Adjustment to dose should be made for other devices and corticosteroid molecules.

COMBINATION INHALERS

In adult patients at step 3 who are poorly controlled, the use of budenoside/formoterol in a single inhaler as rescue medication instead of a short-acting $\beta_2$ agonist, in addition to its regular use as a controller treatment, is an effective treatment option. Before instituting this management careful patient education is required.

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.

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 the following therapies:
  - leukotriene receptor antagonists
  - long-acting $\beta_2$ agonists
  - chromones
  - oral $\beta_2$ agonists
  - theophyllines

- Immediately prior to exercise, inhaled short-acting $\beta_2$ agonists are the drug of choice.
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 1**
Mild intermittent asthma

Add inhaled short-acting \( \beta_2 \) agonist as required

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

**STEP 2**
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 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 3**
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 4**
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 5**
Continuous or frequent use of oral steroids

* BDP or equivalent

**SUMMARY OF STEPWISE MANAGEMENT IN ADULTS**

- Applies to all adults
- Applies to children 5-12
- Applies to children under 5
- General
- Applies only to 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 1**
Mild intermittent asthma

**Inhaled short-acting β₂ agonist as required**

Add inhaled steroid 200-400 mcg/day* (other preventer drug if inhaled steroid cannot be used) 200 mcg is an appropriate starting dose for many patients

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

**STEP 2**
Regular preventer therapy

1. Add inhaled long-acting β₂ 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 steroid dose to 400 mcg/day* (if not already on this dose)
   - no response to LABA - stop LABA and increase inhaled steroid to 400 mcg/day.* If control still inadequate, institute trial of other therapies, leukotriene receptor antagonist or SR theophylline

**STEP 3**
Initial add-on therapy

Increase inhaled steroid up to 800 mcg/day*

**STEP 4**
Persistent poor control

Use daily steroid tablet in lowest dose providing adequate control

Maintain high dose inhaled steroid at 800 mcg/day*

Refer to respiratory paediatrician

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

* BDP or equivalent

**SYMPTOMS vs TREATMENT**

- **Applies to all adults**
- **Applies to all children**
- **Applies to children 5-12**
- **Applies to children under 5**
- **General**
- **Applies only to adults**

Summary of stepwise management in children aged 5-12 years
Inhaled short-acting $\beta_2$ agonist as required

**STEP 1**
Mild intermittent asthma

Add inhaled steroid 200-400 mcg/day**
or leukotriene receptor antagonist if inhaled steroid cannot be used.

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

**STEP 2**
Regular preventer therapy

In those children taking inhaled steroids 200-400 mcg/day consider addition of leukotriene receptor antagonist.

In those children taking a leukotriene receptor antagonist alone reconsider addition of an inhaled steroid 200-400 mcg/day.

In children under 2 years consider proceeding to step 4.

**STEP 3**
Initial add-on therapy

In those children taking inhaled steroids 200-400 mcg/day consider addition of a leukotriene receptor antagonist.

In those children taking a leukotriene receptor antagonist alone reconsider addition of an inhaled steroid 200-400 mcg/day.

In children under 2 years consider proceeding to step 4.

**STEP 4**
Persistent poor control

Refer to respiratory paediatrician.

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.

Summary of stepwise management in children less than 5 years

* BDP or equivalent

† Higher nominal doses may be required if drug delivery is difficult
### 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.

#### β2 AGONIST DELIVERY

**ACUTE ASTHMA**

- 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**

- 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

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

#### CFC PROPELLANT PMDI VS HFA PROPELLANT PMDI

- 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 β2 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

<table>
<thead>
<tr>
<th>B</th>
<th>Health care professionals must be aware that patients with severe asthma and one or more adverse psychosocial factors are at risk of death.</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>- Keep patients who have had near fatal asthma or brittle asthma under specialist supervision indefinitely</td>
</tr>
<tr>
<td></td>
<td>- A respiratory specialist should follow up patients admitted with severe asthma for at least one year after the admission</td>
</tr>
</tbody>
</table>

### 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 ≥25/min
  - heart rate ≥110/min
- inability to complete sentences in one breath

#### LIFE TREATHERING

In a patient with severe asthma any one of:
- PEF <33% best or predicted
- SpO2 <92%
- PaO2 <8 kPa
- normal PaCO2 (4.6-6.0 kPa)
- silent chest
- cyanosis
- feeble respiratory effort
- bradycardia, arrhythmia, hypotension
- exhaustion, confusion, coma

#### NEAR FATAL

Raised PaCO2 and/or requiring mechanical ventilation with raised inflation pressures

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Severe breathlessness (including too breathless to complete sentences in one breath), tachypnea, tachycardia, silent chest, cyanosis or collapse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None of these singly or together is specific and their absence does not exclude a severe attack</td>
</tr>
</tbody>
</table>

| PEF or FEV₁ | PEF or FEV₁ 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 |

| Pulse oximetry | Oxygen saturation (SpO₂) 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 SpO₂ ≥92% |

| Blood gases (ABG) | Patients with SpO₂<92% or other features of life threatening asthma require ABG measurement |

<table>
<thead>
<tr>
<th>Chest X-ray</th>
<th>Chest X-ray is not routinely recommended in the absence of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- suspected pneumomediastinum or pneumothorax</td>
</tr>
<tr>
<td></td>
<td>- suspected consolidation</td>
</tr>
<tr>
<td></td>
<td>- life threatening asthma</td>
</tr>
<tr>
<td></td>
<td>- failure to respond to treatment satisfactorily</td>
</tr>
<tr>
<td></td>
<td>- requirement for ventilation</td>
</tr>
</tbody>
</table>
### CRITERIA FOR ADMISSION

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>B</td>
<td>Admit patients with any feature of a life threatening or near fatal attack.</td>
</tr>
<tr>
<td>B</td>
<td>Admit patients with any feature of a severe attack persisting after initial treatment.</td>
</tr>
<tr>
<td>C</td>
<td>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.</td>
</tr>
</tbody>
</table>

### OXYGEN

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Give high flow oxygen to all patients with acute severe asthma.</td>
</tr>
<tr>
<td>A</td>
<td>In hospital, ambulance and primary care, nebulised $\beta_2$ agonist bronchodilators should be driven by oxygen.</td>
</tr>
<tr>
<td>A</td>
<td>Outside hospital, high dose $\beta_2$ agonist bronchodilators may be delivered via large volume spacers or nebulisers.</td>
</tr>
<tr>
<td>C</td>
<td>The absence of supplemental oxygen should not prevent nebulised therapy being given if indicated.</td>
</tr>
</tbody>
</table>

### $\beta_2$ AGONIST BRONCHODILATORS

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>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.</td>
</tr>
<tr>
<td>✓</td>
<td>In acute asthma with life threatening features the nebulised route (oxygen-driven) is recommended.</td>
</tr>
<tr>
<td>A</td>
<td>In severe asthma (PEF or FEV$_1&lt;$50% best or predicted) and asthma that is poorly responsive to an initial bolus dose of $\beta_2$ agonist, consider continuous nebulisation.</td>
</tr>
</tbody>
</table>

### STEROID THERAPY

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Give steroids in adequate doses in all cases of acute asthma.</td>
</tr>
<tr>
<td>✓</td>
<td>Continue prednisolone 40-50 mg daily for at least five days or until recovery.</td>
</tr>
</tbody>
</table>

### OTHER THERAPIES

<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>B</td>
<td>Consider giving a single dose of IV magnesium sulphate for patients with:</td>
</tr>
<tr>
<td></td>
<td>• acute severe asthma who have not had a good initial response to inhaled bronchodilator therapy</td>
</tr>
<tr>
<td></td>
<td>• life threatening or near fatal asthma.</td>
</tr>
<tr>
<td>✓</td>
<td>IV magnesium sulphate (1.2-2 g IV infusion over 20 minutes) should only be used following consultation with senior medical staff.</td>
</tr>
<tr>
<td>B</td>
<td>Routine prescription of antibiotics is not indicated for acute asthma.</td>
</tr>
</tbody>
</table>

### IPRATROPIUM BROMIDE

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>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.</td>
</tr>
</tbody>
</table>

### 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 ↓ pH or ↑ $H^+$
  - exhaustion, feeble respiration
  - drowsiness, confusion
  - coma or respiratory arrest
### Management of Acute Asthma in Children Aged Over 2 Years

<table>
<thead>
<tr>
<th>Acute Severe</th>
<th>Life Threatening</th>
</tr>
</thead>
</table>
| - Can’t complete sentences in one breath or too breathless to talk or feed  
- Pulse >120 (>5 years) or >130 (2 to 5 years)  
- Respiration >30 breaths/min (>5 years) or >50 (2 to 5 years) | - Hypotension  
- Exhaustion  
- Confusion  
- Coma  
- Silent chest  
- Cyanosis  
- Poor respiratory effort |

### Criteria for Admission

- Transfer children with severe or life threatening asthma urgently to hospital to receive frequent doses of nebulised β₂ agonists (2.5-5 mg salbutamol or 5-10 mg terbutaline).
- Children with acute asthma in primary care who have not improved after receiving up to 10 puffs of β₂ 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 β₂ agonists during the journey.
- Consider intensive inpatient treatment for children with SpO₂ <92% on air after initial bronchodilator treatment.
- Attempt to measure PEF or FEV₁ in all children aged >5 years.

### Treatment of Acute Asthma

#### Oxygen

- Children with life threatening asthma or SpO₂ <92% should receive high flow oxygen via a tight fitting face mask or nasal cannula at sufficient flow rates to achieve normal saturations.

#### β₂ Agonist Bronchodilators

- Inhaled β₂ agonists are the first line treatment for acute asthma.
- A pMDI + spacer is the preferred option in mild to moderate asthma.
- Individualise drug dosing according to severity and adjust according to the patient’s response.
- The early addition of a bolus dose of IV salbutamol (15 mcg/kg) can be an effective adjunct to treatment in severe cases.
## 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.

### 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.

**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 and steroid tablets.

**A** 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 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.

**D** Offer pre-pregnancy counselling to women with asthma regarding the importance and safety of continuing their asthma medications during pregnancy to ensure good asthma control.

**C** Monitor pregnant women with asthma closely so that any change in course can be matched with an appropriate change in treatment.

**✓** Advise women who smoke about the dangers for themselves and their babies and give appropriate support to stop smoking.

### DRUG THERAPY IN PREGNANCY

**C**
- Use $\beta_2$ 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.

**D** Do not commence leukotriene antagonists during pregnancy. They may be continued in women who have demonstrated, prior to pregnancy, significant improvement not achievable with other medications.

### ACUTE ASTHMA IN PREGNANCY

**C** Give drug therapy for acute asthma as for the non-pregnant patient.

**D**
- Acute severe asthma in pregnancy is an emergency and should be treated vigorously in hospital
- Deliver oxygen immediately to maintain saturation above 95%.

**✓**
- 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.

### MANAGEMENT DURING LABOUR

**C D**
- If anaesthesia is required, regional blockade is preferable to general anaesthesia
- Use prostaglandin F2α 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 form 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 the organisation directly (0845 7 01 02 03)

- 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.

**B**

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

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.

OCCUPATIONAL ASTHMA

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.

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

No

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

Guidelines for the Identification, Management and Prevention of Occupational Asthma • www.bohrf.org.uk/content/asthma.htm

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