

Guidelines for management of asthma in adults: II—acute severe asthma

Statement by the British Thoracic Society, Research Unit of the Royal College of Physicians of London, King's Fund Centre, National Asthma Campaign

In last week's issue guidelines on the management of chronic persistent asthma in adults were published.¹ The present article gives guidance on the management of acute severe asthma in adults and emphasises the importance of objective measurements. It is presented in the form of directions designed to help doctors attending patients with exacerbation of asthma in the home, in the accident and emergency department, and during the later stages of hospital admission. The severity of an attack of acute severe asthma is often underestimated by patients, their relatives, and their doctors. This is largely because of failure to make objective measurements. If not recognised and not treated appropriately such attacks can be fatal.

Aims of management

The aims of management of acute severe asthma are:

- To prevent death
- To restore the patient's clinical condition and lung function to their best possible levels as soon as possible
- To maintain optimal function and prevent early relapse.

Recognition and assessment of acute severe asthma

Potentially life threatening features

The presence of any of the following indicates a severe attack of asthma.

- Increasing wheeze and breathlessness so that the patient is unable to complete sentences in one breath or get up from a chair or bed
- A respiratory rate ≥ 25 breaths/min
- A heart rate persistently ≥ 110 beats/min
- A peak expiratory flow $< 40\%$ of predicted normal or of the best obtainable result if known (< 200 l/min if the best obtainable result is not known)
- An inspiratory fall in systolic blood pressure of ≥ 10 mm Hg.

Imminently life threatening features

The presence of any of the following indicates a very severe attack of asthma.

- A silent chest on auscultation
- Cyanosis
- Bradycardia
- Exhaustion, confusion, or unconsciousness.

Arterial blood gas tensions

Arterial blood gas tensions should always be measured in patients with acute severe asthma who are admitted to hospital. The following are markers of a very severe (or life threatening) attack:

- A normal or high arterial carbon dioxide tension (P_{aCO_2}) in a breathless asthmatic patient
- Severe hypoxia: arterial oxygen tension (P_{aO_2}) < 8 kPa irrespective of treatment with oxygen
- A low pH value.

Peak expiratory flow

Measurements of peak expiratory flow are most easily interpreted when expressed as a percentage of the predicted normal value or of the previous best obtainable value on optimal treatment. In patients in whom neither of these is known decisions have to be taken based on the absolute value recorded, remembering that normal values vary with age, sex, and height (older people, women, and shorter people having a lower normal range). Values expressed as a percentage of the predicted normal are not useful in patients with chronically impaired lung function. Bearing in mind these qualifications, the guidelines presented here express peak expiratory flow as a percentage of the predicted normal value or best value. Absolute values are shown in parentheses to suggest the levels at which action should be taken in patients for whom previous best values are not known.

There are no other investigations that are needed for immediate management.

Patients with a severe (that is, life threatening) attack often do not have distressing symptoms and they do not necessarily have all of the abnormalities in signs and measurements outlined above, but the presence of any of these should alert the doctor.

Immediate treatment

Begin treatment immediately with:

Oxygen—Use the highest concentration available and set a high flow rate. Retention of CO_2 is not aggravated by treatment with oxygen in patients with acute severe asthma; thus masks delivering 24% or 28% oxygen are not appropriate.

High doses of inhaled β_2 agonists—Give an inhaled β_2 agonist (for example, salbutamol 2.5-5 mg or terbutaline 5-10 mg). This may be nebulised with oxygen (in hospital and during transport by ambulance), nebulised with an air compressor (in general practice), or, if both methods are unavailable, given by multiple actuations of a metered dose inhaler into a large spacer device (2-5 mg—that is, 20-50 puffs, five puffs at a time).

High doses of systemic steroids—Give prednisolone 30-60 mg or intravenous hydrocortisone 200 mg, or both, immediately.

Intravenous bronchodilators—If obviously life threatening features are present give intravenous aminophylline (250 mg over 30 minutes) or a β_2 agonist (for example, salbutamol 200 μ g or terbutaline 250 μ g over 10 minutes). A β_2 agonist is preferred if the patient is already taking oral theophylline.

The box gives the criteria for emergency referral to hospital. Use of these guidelines will probably lead to more patients with attacks of asthma being admitted to hospital. Patients not admitted continue to need close supervision over the next few days.

A list of participants is given at the end of this paper

Correspondence to:
British Thoracic Society,
1 St Andrew's Place,
London NW1 4LB.

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Criteria for emergency referral to hospital

- Any life threatening features
- Any features of a severe attack that persist after initial treatment
- Peak expiratory flow 15-30 minutes after nebulisation is <40% of predicted or best result (<200 l/min)
A lower threshold for admission is appropriate in patients:
 - Seen in the afternoon or evening rather than earlier in the day
 - With recent onset of nocturnal symptoms or worsening of symptoms
 - Who have had previous severe attacks, especially if the onset was rapid
 - In whom there is concern over their assessment of severity of symptoms
 - In whom there is concern over their social circumstances or relatives' ability to respond appropriately

Subsequent management

Continuation of treatment

- (1) Ensure that a nurse or doctor stays with the patient for at least 15 minutes and certainly until clear improvement is seen.
- (2) Continue giving oxygen.
- (3) Continue giving high doses of steroids: oral prednisolone 30-60 mg daily (or intravenous hydrocortisone 200 mg every six hours in patients who are seriously ill or vomiting).
- (4) If the patient's condition is improving continue giving nebulised β_2 agonist every four hours.
- (5) If the patient's condition has not improved after 15-30 minutes repeat nebulisation and add ipratropium bromide 0.5 mg to the nebuliser solution.
- (6) If progress is still unsatisfactory consider giving aminophylline or a parenteral β_2 agonist:
 - (i) Aminophylline infusion (0.5-0.9 mg/kg/h). If the weight of the patient is unknown doses can be estimated depending on the patient's size (small patients—600-1000 mg/24 h; medium size patients—900-1500 mg/24 h; large patients—1100-1900 mg/24 h). No loading dose is required unless the patient's condition is deteriorating. Lower doses may be needed in patients with liver disease or heart failure and in those taking cimetidine, ciprofloxacin, or erythromycin. Higher doses are appropriate in smokers.
 - (ii) Salbutamol or terbutaline infusion (12.5 μ g/min; range 3-20 μ g/min). The rate of infusion should be adjusted according to the responses of the peak expiratory flow and heart rate.

Further investigations in hospital

- Arrange for chest radiography to show pneumothorax, consolidation, or pulmonary oedema.
- Arrange for measurement of plasma electrolyte and urea concentrations, a blood count, and, in older patients, electrocardiography.

Monitoring of treatment

- (1) Repeat measurement of peak expiratory flow 15-30 minutes after starting treatment and as required. Measure and record the rate before and after the patient has taken nebulised or inhaled β_2 agonist (at least four times daily) throughout admission.
- (2) Repeat measurement of blood gas tensions within two hours of starting treatment if (a) the initial PaO_2 is <8 kPa unless the oxygen saturation measured subsequently is >90%; (b) the initial Paco_2 was normal or raised; or (c) the patient's condition deteriorates. Measure them again if patient's condition has not improved at 4-6 hours.

- (3) Measure and record the heart rate.
- (4) Measure the serum theophylline concentration if aminophylline is continued for more than 24 hours (aim at a concentration of 56-111 μ mol/l).
- (5) Measure serum potassium and blood glucose concentrations.

Unhelpful treatment

- Sedatives are absolutely contraindicated outside the intensive care unit
- Antibiotics are not indicated unless there is evidence of a bacterial infection
- Percussive physiotherapy is contraindicated.

Indications for intensive care

Patients with features of life threatening asthma require intensive monitoring by experienced staff. If there are no beds available on a properly staffed medical ward this may be available only in an intensive care unit. Patients with the following features always require intensive care.

- Hypoxia (PaO_2 <8 kPa) despite receiving 60% inspired oxygen
- Hypercapnia (Paco_2 >6 kPa)
- Onset of exhaustion
- Confusion or drowsiness
- Unconsciousness
- Respiratory arrest.

Indications for intermittent positive pressure ventilation

Not all patients admitted to the intensive care unit need ventilation, but those with worsening hypoxia or hypercapnia, drowsiness, or unconsciousness, and those who have had a respiratory arrest require intermittent positive pressure ventilation.

Management during recovery in hospital and after discharge

Duration of hospital admission

Patients should not normally be discharged until their symptoms have cleared and lung function has stabilised or returned to its normal or best level. This might be recognised by a peak expiratory flow of >75% of the predicted or of their best level, a diurnal variability of <25% (diurnal variability is equal to the highest peak expiratory flow minus the lowest peak expiratory flow divided by the highest peak expiratory flow and multiplied by 100 in each 24 hours), and no nocturnal symptoms. If these criteria are not met the patient should be seen during the admission by a chest physician.

Changes in treatment before discharge

Treatment with inhaled steroids must be started at least 48 hours before discharge. Nebulisers should be replaced by standard inhaler devices 24-48 hours before discharge unless the patient requires a nebuliser at home. The inhaler technique should be checked and performance recorded. If necessary alternative inhaler devices should be used. In patients requiring oral xanthines blood theophylline concentrations should be monitored.

Drugs on discharge from hospital

- All patients should be discharged taking:
- Oral steroids (prednisolone 20-40 mg daily) for one to three weeks (or longer in some patients with chronic asthma) according to a written action plan
 - An inhaled anti-inflammatory drug (usually a steroid)
 - Inhaled or nebulised β_2 agonists
 - Oral theophylline, or long acting oral β_2 agonists, or inhaled ipratropium if required.

All patients should continue taking inhaled steroids and inhaled β_2 agonists until the first outpatient hospital visit. Oral steroids can be stopped before this but must never be stopped, nor the dose tailed, if the asthma is worsening.

Investigation of the circumstances of admission

It is important to address the following questions, which relate to avoidable factors:

- Was there an avoidable precipitating cause?
- Was this a catastrophic sudden attack or was there a period of recognisable deterioration before the "acute" attack?
- Did the patient (or relatives) react appropriately when the asthma got worse?
- Was the patient complying with regular treatment, and, if not, can anything be done to help?
- Was medical management appropriate?

Peak flow meter and self management plan

Ideally all patients should have a peak expiratory flow meter (these are now prescribable) and be taught how to use it and how to act on the results. The admission to hospital provides an opportunity to educate patients about their asthma and train them to respond to changes in symptoms and peak flow. They should know at what values of peak expiratory flow to increase their treatment, call their doctor, or readmit themselves to hospital. All patients should have a written self management plan.

Contact with general practitioner

Good communication with the patient's general practitioner is essential. Discharge letters are best delivered by hand. They should include the peak expiratory flow on admission and at discharge (recorded on the patient's meter) and details of treatment to be continued at home. Sometimes contact by telephone is important.

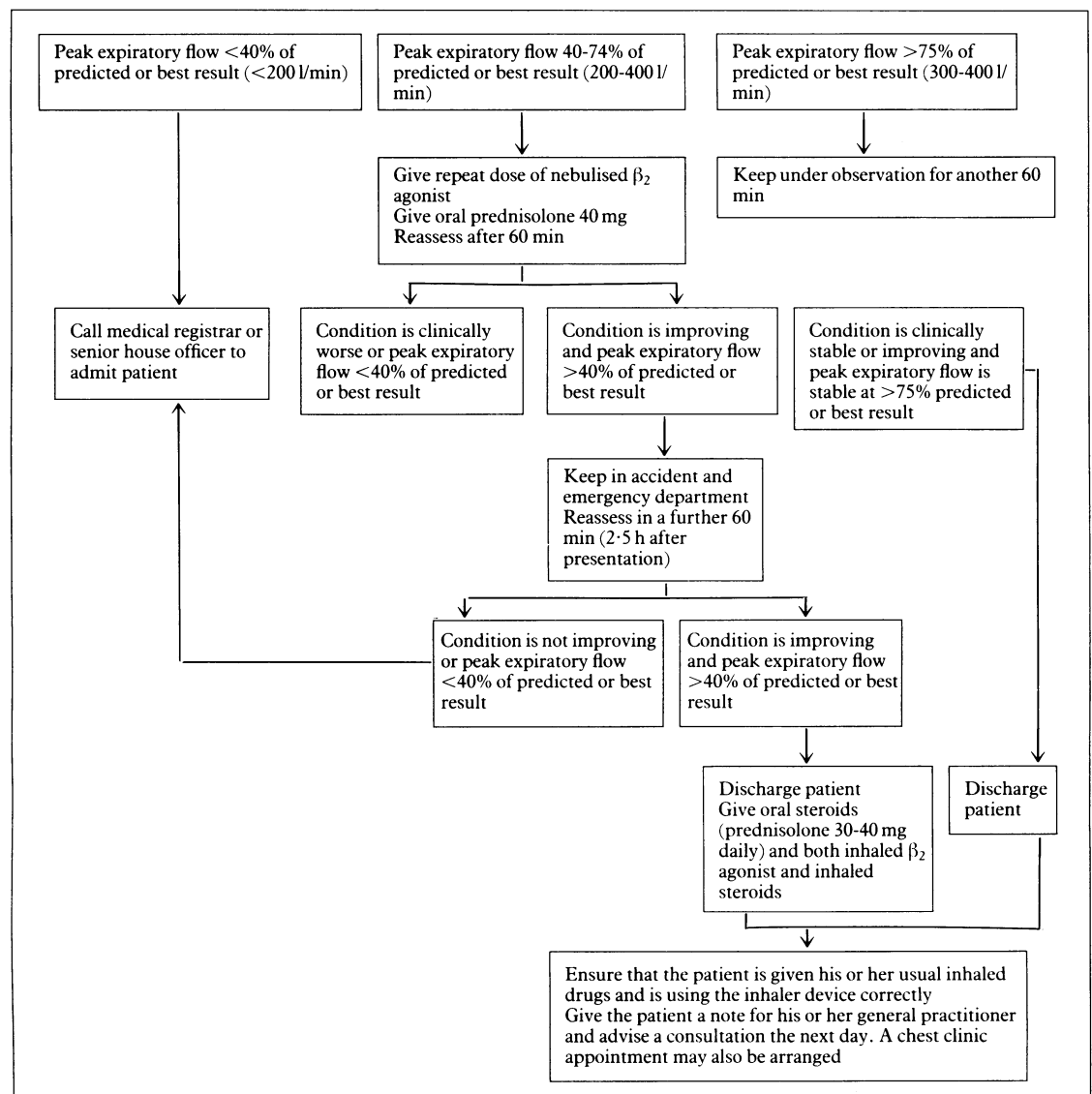
Follow up arrangements

All patients require follow up. They should see their general practitioner within a week of discharge. Hospital follow up should be by a chest physician, and the initial outpatient appointment should be within a month. Further management to enable the patient to lead a normal life and to prevent further severe attacks should follow that outlined in last week's issue for patients with chronic persistent asthma.¹

Management of patients presenting to an accident and emergency department

Patients with asthma who present to an accident and emergency department may have asthma of any severity from very mild to extremely severe. They should be assessed soon after arrival. If the department is very busy and supervision of the patient cannot be guaranteed the medical registrar or senior house officer should be called at an early stage. The following guidance applies:

Management of patients with asthma presenting to accident and emergency department



If features of an acute severe attack are present recognise, assess, and manage the patient as outlined above and call the medical registrar or senior house officer to admit the patient. If the patient is unconscious or confused call the anaesthetist at the same time and arrange admission to the intensive care unit; ensure uninterrupted administration of high flow oxygen; and do not attempt intubation until the most expert available doctor (ideally an anaesthetist) is present.

If no features of an acute severe attack are present measure the peak expiratory flow and proceed as summarised in the figure. If the rate is <40% of the predicted value or of the patient's best result treat the patient as for a severe attack. In all other patients give inhaled or nebulised β_2 agonist (see above for doses), and 30 minutes later measure the peak expiratory flow again (see box).

Before discharge determine why the patient attended the accident and emergency department. Such patients usually need extra care in their follow up. Ideally, contact the patient's general practitioner by telephone as soon as possible during surgery hours.

Management of catastrophic sudden severe (brittle) asthma

In patients with catastrophic sudden severe (brittle) asthma an attack of asthma becomes severe within minutes or a few hours, with little instability of asthma in the preceding days. Such patients are rare but are at great risk of sudden death. They are best handled by a management plan that is mutually agreed on by the patient, the general practitioner, and the consultant.

Patients should be constantly reviewed by a chest physician and carry a Medic-Alert bracelet or equivalent. They must also carry a β_2 agonist and prednisolone at all times and have duplicate supplies of drugs for emergencies to be kept in their handbag, car glove compartment, office, etc. Provision of a resuscitation

box and oxygen cylinder to be kept in the patient's home should be considered.

As soon as an attack starts the patient's management plan might be:

- (1) Call for help.
- (2) Inhale a β_2 agonist at a high dose (for example, 20-50 puffs, or nebulised salbutamol 5 mg, or terbutaline 10 mg).

If this management has been shown to be ineffective on previous occasions a syringe preloaded with adrenaline (Min-I-Jet, 0.5 mg) for subcutaneous injection may be helpful. The patient or relative, or both, must be shown how to use the syringe under supervision (using isotonic saline for practice). The shelf life is limited to six months. No similar β_2 agonist is commercially available.

- (3) Swallow prednisolone 30-60 mg.
- (4) Go to the nearest hospital as previously agreed with the general practitioner.

If such a patient is seen during an attack his or her history may suggest direct admission to the intensive care unit.

*Participants in the development of the guidelines were—*Dr D Costain, Dr B D W Harrison, Professor S T Holgate, Dr A P Hopkins, Dr M R Partridge (members of the organising committee); Professor P J Barnes, and Drs R A L Brewis, C E Bucknall, H R Gribbin, D J Lane, E Neville (who prepared the initial draft statements); and Dr S P Allison, Dr A H Barnett, Professor T J H Clark and Drs C K Connolly, G K Crompton, J Donaldson, C C Evans, A D Ferguson, J A R Friend, S R Hilton, W F Holmes, K Jones, S Kenwright, M W McNicol, R L Page, C F A Pantin, M G Pearson, M Rudolf, A Smith, J E Stark, G O Thomas, Professor M E Turner-Warwick, and Dr C Waive.

1 British Thoracic Society, Research Unit of the Royal College of Physicians of London, King's Fund Centre, National Asthma Campaign. Guidelines for management of asthma in adults: 1—chronic persistent asthma. *Br Med J* 1990;301:651-4.

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Screening children from overseas for infections: Is it justified?

Neela Shabde, Tony Waterston

Abstract

Objectives—To investigate current practice of screening children from abroad for infections after coming to the United Kingdom, and to make recommendations for future practice.

Design—A review of literature and a questionnaire sent to all health authorities and boards in the United Kingdom.

Setting—All health authorities and boards in the United Kingdom.

Subjects—167 Health authorities or boards that completed questionnaires (response rate 80%), 59 of which used a screening programme.

Main outcome measure—Response to questionnaire on policies for screening children for infections on their return from overseas.

Results—12 Of the 59 authorities screened all children and one screened only those from the West Indian subcontinent. 13 Authorities excluded children from school while awaiting results; 58 screened for tuberculosis and four for diphtheria.

Conclusions—There is a wide variation in screening policies around the country with no national consensus. Screening for diphtheria, typhoid, and salmonellosis is hard to justify and is probably not effective. Screening for tuberculosis, however, is

supported by many authorities, is widely practised, and probably is effective. There is a strong case for rationalisation of screening.

Introduction

One of us was introduced dramatically to the "immigrant medical" system shortly after appointment to a community paediatrician post. An angry father telephoned to ask why his daughter, aged 7, had to be excluded from school for a week on the family's return to Britain from Gibraltar, where he had served in the armed forces for two years. He had been told that his daughter had to have a throat swab, stool culture, and Heaf test and await the result before starting school and that this was the standard procedure. He thought the exclusion was unnecessary as the standard of medical care in Gibraltar was exemplary and his daughter was fit.

Local policy was that all children entering the country after more than two months in southern Europe, Africa, or Asia had to undergo routine screening for diphtheria, typhoid, salmonellosis, and tuberculosis. This policy was justified on the grounds that diphtheria and typhoid carriers had been detected and were a risk to the health of the public.

North Tyneside Health Authority, North Shields, NE29 0H6

Neela Shabde, MRCP, senior registrar in community paediatrics

Newcastle General Hospital, Newcastle upon Tyne NE4 6BE

Tony Waterston, MRCP, consultant community paediatrician

Correspondence to: Dr Waterston.

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