

Discussion

Patients admitted to casualty departments with acutely disturbed behaviour present a major diagnostic challenge. The differential diagnosis includes both primary psychiatric illness and a wide range of organic acute brain syndromes, including substance abuse.

Certain toxic syndromes indicating a specific substance may become familiar to medical staff owing to frequent local abuse. An infusion of *B sauveolens*, regularly used in the Brisbane region, causes a central anticholinergic syndrome with wildly disturbed behaviour, visual hallucinations, and dilated pupils.² There was an initial suspicion that this poison had been ingested by our two patients.

Many infections of the central nervous system may have prominent psychiatric manifestations, leading to initial misdiagnosis, psychopharmacological intervention, and delay in starting appropriate treatment.³⁻⁷

Both the young adult patients described above had pyogenic meningitis. Both developed wildly disturbed behaviour of sudden onset with clouding of consciousness but without other, more typical, features of central nervous infection such as fever or neck rigidity. In each case the primary diagnosis was substance abuse, and initial treatment was given accordingly. An important clue, however, to the true diagnosis in both was the finding of leucocytosis.

Diagnostic lumbar puncture and administration of antibiotics were delayed while cerebral computed tomography was performed. To facilitate this investigation both patients were sedated and ventilated, thus preventing further neurological assessment. There is disagreement among neurologists as to whether

lumbar puncture should proceed without tomography in these circumstances. However, if an immediate scan is available then most would advocate its initial use to minimise the risk of coning.

To avoid potentially disastrous delays in treatment clinicians should be aware that bacterial meningitis can present quite atypically, with the sudden onset of severe behavioural disturbance closely mimicking substance abuse. Previously well patients presenting with acute behavioural disturbance and leucocytosis without clear evidence of substance abuse require urgent lumbar puncture and appropriate antibiotics. If immediate cerebral computed tomography is available it may be used before lumbar puncture, although the patient should be given broad spectrum antibiotics first. This is particularly important should short term ventilation be required, and antibiotic therapy should never be withheld while the results of investigations are awaited.⁸

- 1 Rischbieth RH, Thompson GN, Hamilton-Bruce A, Purdie GH, Peters JH. Acute encephalopathy following petrol sniffing in two Aboriginal patients. *Clin Exp Neurol* 1987;23:191-4.
 - 2 Ellenhorn MJ, Barceloux DG. *Medical toxicology: diagnosis and treatment of human poisoning*. New York: Elsevier, 1988.
 - 3 Oommen KJ, Johnson PC, Ray CG. Herpes simplex type 2 viral encephalitis presenting as psychosis. *Am J Med* 1982;73:445-8.
 - 4 Thienhaus OJ, Khosla N. Meningeal cryptococcus misdiagnosed as a manic episode. *Am J Psychiatry* 1984;141:1459-60.
 - 5 Misra PC, Hay GG. Encephalitis presenting as acute schizophrenia. *BMJ* 1971;i:532-3.
 - 6 Schlitt M, Lakeman FD, Whitley RJ. Psychosis and simplex encephalitis. *South Med J* 1985;78:1347-50.
 - 7 Johannessen DJ, Wilson LG. Mania with cryptococcal meningitis in two AIDS patients. *J Clin Psychiatry* 1988;49:200-1.
 - 8 Greenlee JE. Approach to diagnosis of meningitis, cerebrospinal fluid evaluation. *Infect Dis Clin North Am* 1990;4:583-98.
- (Accepted 1 December 1992)

Guidelines for the management of asthma: a summary

British Thoracic Society and others

In 1990 the *BMJ* published guidelines for the management of asthma in adults, which were the result of initiatives by the British Thoracic Society, the Research Unit of the Royal College of Physicians, the King's Fund Centre, and the National Asthma Campaign. These were produced by a group of respiratory and general physicians and general practitioners and modified after wide circulation and discussion within the British Thoracic Society. They were the first national guidelines for the management of a specific condition in the United Kingdom. These guidelines were intended to be reviewed and revised after two years. Such revision has now taken place and the opportunity has been taken to invite the British Paediatric Association and the British Paediatric Respiratory Group to include guidance for the management of asthma in children. The guidelines have also benefited from the input of the British Association for Accident and Emergency Medicine, the Royal College of Practitioners, and the General Practitioners in Asthma Group.

The revision deals with the management of asthma in both children and adults and covers new treatments not considered in 1990. It also gives clearer descriptions of what represents control of asthma, and it emphasises guided self management. The stepwise approach to managing asthma has been retained and is presented in a way that emphasises the importance of the stepping down of treatment. Mortality and morbidity from asthma are unacceptably high. Many deaths and much unnecessary morbidity have been associated with overreliance on bronchodilators, underuse of inhaled and oral corticosteroids, failure to

make objective measurements of severity, and inadequate supervision. These recommendations promote greater use of inhaled anti-inflammatory drugs (even in patients with apparently mild asthma), objective monitoring of progress of asthma based on the patient's own measurements of peak expiratory flow, and greater participation of the patient or parents in the management of the condition.

The full text of the revision appears this month as a supplement of *Thorax*. The charts published here are a new approach providing the same information in a condensed form designed to provide the busy clinician with a quick but accurate reference guide to asthma management at the point of delivery of care. The six charts cover management of asthma in general practice, in the outpatient department, in the accident and emergency department, and on the wards. These chart guidelines are targeted at doctors and should be seen as a general framework within which most patients with asthma can be managed.

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Chart 1 Management of chronic asthma in adults

- Avoidance of provoking factors where possible
- Patient's involvement and education
- Selection of best inhaler device
- Treatment stepped up as necessary to achieve good control
- Treatment stepped down if control of asthma good

Note
Patients should start treatment at the step most appropriate to the initial severity. A rescue course of prednisolone may be needed at any time and at any step

Prescribe a peak flow meter and monitor response to treatment

Step 1:

Occasional use of relief bronchodilators

Inhaled short acting β agonists "as required" for symptom relief is acceptable. If they are needed more than once daily move to step 2.
Before altering a treatment step ensure that the patient is having the treatment and has a good inhaler technique. Address any fears.

Step 2:

Regular inhaled anti-inflammatory agents

Inhaled short acting β agonists as required
plus:
beclomethasone or budesonide 100-400 μ g twice daily.
Alternatively use cromoglycate or nedocromil sodium, but if control is not achieved start inhaled steroids.

Step 3:

High dose inhaled steroids

Inhaled short acting β agonists as required
plus:
beclomethasone or budesonide increased to 800-2000 μ g daily via a large volume spacer.
Alternatives:
In a few patients who experience problems with high dose inhaled steroids inhaled long acting β agonists or sustained release theophylline may be added to step 2 medication. Cromoglycate or nedocromil may also be tried.

Step 4:

High dose inhaled steroids and regular bronchodilators

Inhaled short acting β agonists as required with inhaled beclomethasone or budesonide (800-2000 μ g daily via a large volume spacer)
plus:
a sequential therapeutic trial of one or more of:
• inhaled long acting β agonists
• sustained release theophylline
• inhaled ipratropium or oxitropium
• long acting β agonist tablets
• high dose inhaled bronchodilators
• cromoglycate or nedocromil

Step 5:

Addition of regular steroid tablets

Inhaled short acting β agonists as required with inhaled beclomethasone or budesonide (800-2000 μ g daily via a large volume spacer) and one or more of the long acting bronchodilators
plus:
regular prednisolone tablets in a single daily dose

Stepping down

Review treatment every three to six months. If control is achieved a stepwise reduction in treatment may be possible.
In patients whose treatment was recently started at step 4 or 5 or included steroid tablets for gaining control of asthma this reduction may take place after a short interval. In other patients with chronic asthma a three to six month period of stability should be shown before slow, stepwise reduction is undertaken.

Outcome of steps 1-3: control of asthma

- Minimal (ideally no) chronic symptoms, including nocturnal symptoms
- Minimal (infrequent) exacerbations
- Minimal need for relieving bronchodilators
- No limitations on activities including exercise
- Circadian variation in peak expiratory flow (PEF) <20%
- PEF $\geq$ 80% of predicted or best
- Minimal (or no) adverse effects from medicine

Outcome of steps 4 and 5: best results possible

- Least possible symptoms
- Least possible need for relieving bronchodilators
- Least possible limitation of activity
- Least possible variation in PEF
- Best PEF
- Least adverse effects from medicine

Notes for this chart

can be found in the supplement to *Thorax*, Vol 48, March 1993



Adapted from poster designed by Business Design Group

Chart 2 Management of chronic asthma in children

- Avoidance of provoking factors where possible
- Working towards a self management plan
- Selection of best inhaler device

Note
Patients should start treatment at the step most appropriate to the initial severity. A rescue course of prednisolone may be needed at any step (maximum daily dose 40 mg).

Prescribe a peak flow meter and monitor response to treatment where appropriate.

Step 1:

Occasional use of relief bronchodilators

Short acting β agonists "as required" for symptom relief but not more than once daily. Before altering a treatment step ensure that the patient is having the treatment, the inhaler is appropriate, and inhaler technique is good. Address any concerns or fears.

Step 2:

Regular inhaled anti-inflammatory agents

Intermittent inhaled short acting β agonists as required
plus: cromoglycate as powder (20 mg thrice daily) or via metered dose inhaler and large volume spacer (10 mg thrice daily).

Step 3:

Inhaled steroids

Inhaled short acting β agonists as required
plus: beclomethasone or budesonide 50–200 μ g twice daily. Consider a 5 day course of soluble prednisolone 1–2 mg/kg/day or a temporary increase in inhaled steroids (double dose) for stabilisation.

Step 4:

High dose inhaled steroids

Inhaled short acting β agonists as required
plus: beclomethasone or budesonide increased to 400–800 μ g daily via a large volume spacer or dry powder device. Consider a short prednisolone course. Consider adding regular twice daily long acting β agonist.

Step 5:

a: High dose inhaled steroids and bronchodilators

Inhaled steroids (800 μ g daily) and other treatment as in step 4. Slow release xanthines or nebulised β agonists

b: Addition of regular steroid tablets

As in step 5a with the addition of alternate day low dose (5–10 mg) prednisolone. Consider regular ipratropium or subcutaneous infusion of a β agonist.

Stepping down

Regularly review the need for treatment. In older children use a peak flow record to assess the speed of withdrawal. Stop regular anti-inflammatory treatment after 6–12 months of few or no symptoms. If symptoms are seasonal consider stopping anti-inflammatory drugs at the end of the season.

Notes for this chart can be found in the supplement to *Thorax*, vol 48, March 1993



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Acute severe asthma in adults

Recognition and assessment in hospital

Features of acute severe asthma

- Can't complete sentences in one breath
- Respirations ≥ 25 breaths/min
- Pulse ≥ 110 beats/min
- Peak expiratory flow (PEF) $\leq 50\%$ of predicted or best

Life threatening features

- PEF $< 33\%$ of predicted or best
- Silent chest, cyanosis, or feeble respiratory effort
- Bradycardia or hypotension
- Exhaustion, confusion, or coma

If a patient has *any* of these features, then measure arterial blood gases.

Markers of a very severe, life threatening attack:

- Normal (5–6 kPa, 36–45 mm Hg) or high P_{aCO_2}
- Severe hypoxia: $P_{aO_2} < 8$ kPa (60 mm Hg) irrespective of treatment with oxygen
- A low pH (or high H^+)

No other investigations are needed for immediate management.

Caution:

Patients with severe or life threatening attacks may not be distressed and may not have all these abnormalities. The presence of any should alert the doctor.

1 Immediate treatment

- Oxygen —40–60% (CO_2 retention is not aggravated by oxygen therapy in asthma)
- Salbutamol 5 mg or terbutaline 10 mg via an oxygen driven nebuliser
- Prednisolone tablets 30–60 mg or intravenous hydrocortisone 200 mg, or both, if very ill
- No sedatives of any kind
- Chest radiograph to exclude pneumothorax

IF LIFE THREATENING FEATURES ARE PRESENT:

- Add ipratropium 0.5 mg to the nebulised β agonist
- Give intravenous aminophylline 250 mg over 20 minutes or salbutamol or terbutaline 250 μ g over 10 minutes. Do not give bolus aminophylline to patients already taking oral theophyllines

2 Subsequent management

IF PATIENT IS IMPROVING CONTINUE:

- 40–60% oxygen
- Prednisolone 30–60 mg daily or intravenous hydrocortisone 200 mg every 6 hours
- Nebulised β agonist 4 hourly

IF PATIENT IS NOT IMPROVING AFTER 15–30 MINUTES:

- Continue oxygen and steroids
- Give nebulised β agonist more frequently, up to every 15–30 minutes
- Add ipratropium 0.5 mg to nebuliser and repeat 6 hourly until patient is improving

IF PATIENT IS STILL NOT IMPROVING GIVE:

- Aminophylline infusion (small patient 750 mg/24 hours, large patient 1500 mg/24 hours); monitor blood concentrations if it is continued for over 24 hours
- Salbutamol or terbutaline infusion as an alternative to aminophylline

3 Monitoring treatment

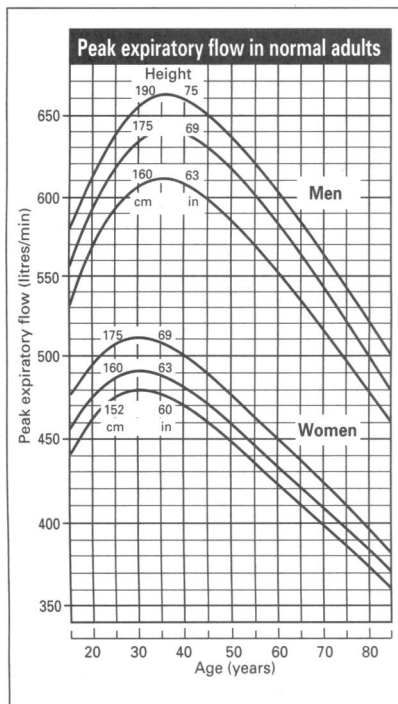
- Repeat measurement of PEF 15–30 minutes after starting treatment
- Oximetry: maintain $SpO_2 > 92\%$
- Repeat blood gas measurements within 2 hours of starting treatment if
 - initial $P_{aO_2} < 8$ kPa (60 mm Hg) unless subsequent $SpO_2 > 92\%$
 - P_{aCO_2} was normal or raised
 - patient deteriorates
- Chart PEF before and after giving nebulised or inhaled β agonists and at least 4 times daily throughout hospital stay

4 Transfer patient to the intensive care unit accompanied by a doctor prepared to intubate if there is:

- Deteriorating PEF, worsening or persisting hypoxia, or hypercapnia
- Exhaustion, feeble respirations, confusion, or drowsiness
- Coma or respiratory arrest

5 When discharged from hospital patients should have:

- Been on discharge medication for 24 hours and have had inhaler technique checked and recorded
- PEF $> 75\%$ of predicted or best and PEF diurnal variability $< 25\%$ unless discharge is agreed with respiratory physician
- Treatment with oral and inhaled steroids in addition to bronchodilators
- Own PEF meter and written self management plan
- GP follow up arranged within 1 week
- Follow up appointment in respiratory clinic within 4 weeks



From: Gregg I, Nunn AJ. BMJ 1989; 298: 1068–70



Adapted from poster designed by Business Design Group

Acute severe asthma in children

Recognition of acute severe asthma

- Too breathless to talk
- Too breathless to feed
- Respirations ≥ 50 breaths/min
- Pulse ≥ 140 beats/min
- PEF $\leq 50\%$ predicted or best

Life threatening features

- PEF $< 33\%$ predicted or best
- Cyanosis, a silent chest, or poor respiratory effort
- Fatigue or exhaustion
- Agitation or reduced level of consciousness

No other investigations are needed for immediate management.

Blood gas estimations are rarely helpful in deciding initial management in children.

Caution:

Children with severe attacks may not appear distressed; assessment in the very young may be difficult. The presence of any of these features should alert the doctor.

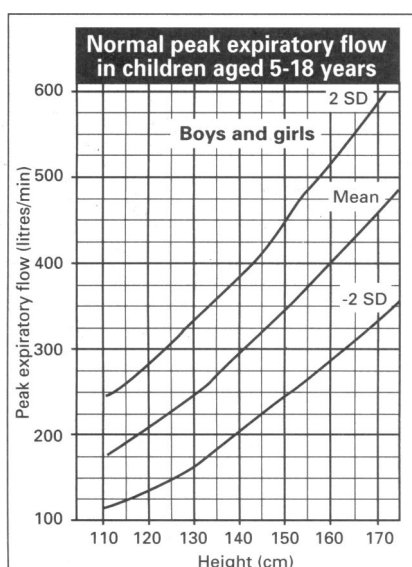
Management of a severe asthma attack

1 Immediate treatment

- High flow oxygen via face mask
- Salbutamol 5 mg or terbutaline 10 mg via an oxygen driven nebuliser (half doses in very young children)
- Prednisolone 1-2 mg/kg body weight orally (maximum 40 mg)

IF LIFE THREATENING FEATURES ARE PRESENT:

- Give intravenous aminophylline 5 mg/kg over 20 minutes followed by maintenance infusion, 1 mg/kg/h; omit the loading dose if child is already receiving oral theophyllines



From: Godfrey S, et al. Br J Dis Chest 1970; 64: 15-24

- Give intravenous hydrocortisone 100 mg 6 hourly
- Add ipratropium 0.25 mg to nebulised β agonist (0.125 mg in very young children)
- Pulse oximetry is helpful in assessing response to treatment. An $\text{SaO}_2 \leq 92\%$ may indicate the need for chest radiography.

2 Subsequent management

IF PATIENT IS IMPROVING CONTINUE:

- High flow oxygen
- Prednisolone 1-2 mg/kg daily (maximum 40 mg/day)
- Nebulised β agonist 4 hourly

IF PATIENT IS NOT IMPROVING AFTER 15-30 MINUTES:

- Continue oxygen and steroids
- Give nebulised β agonist more frequently, up to every 30 minutes
- Add ipratropium to nebuliser and repeat 6 hourly until improvement starts

IF PATIENT IS STILL NOT IMPROVING GIVE:

- Aminophylline infusion (1 mg/kg/h); monitor blood concentrations if continued for over 24 hours

3 Monitoring treatment

- Repeat PEF measurement 15-30 minutes after starting treatment (if appropriate)
- Oximetry: maintain $\text{SaO}_2 > 92\%$
- Chart PEF if appropriate before and after the child inhales β agonists and at least 4 times daily throughout hospital stay

4 Transfer to the intensive care unit accompanied by a doctor prepared to intubate if there is:

- Deteriorating PEF or worsening or persistent hypoxia or hypercapnia
- Exhaustion, feeble respirations, confusion, or drowsiness
- Coma or respiratory arrest

5 When discharged from hospital patients should have:

- Been on discharge medication for 24 hours and have had inhaler technique checked and recorded
- If recorded, PEF $> 75\%$ of predicted or best and PEF diurnal variability $< 25\%$
- Treatment with soluble steroid tablets and inhaled steroids in addition to bronchodilators
- Own PEF meter and if appropriate self management plan or written instructions for parents
- GP follow up arranged within 1 week
- Follow up appointment in clinic within 4 weeks



Adapted from poster designed by Business Design Group

Chart 5

Acute severe asthma in adults in general practice

Many deaths from asthma are preventable: delay can be fatal

Factors include:

- Doctors failing to assess severity by objective measurement
- Patients or relatives failing to appreciate severity
- Underuse of corticosteroids

Regard each emergency consultation as for acute severe asthma until it is shown otherwise.

Assess and record:

- Symptoms and response to self treatment
- Heart and respiratory rates
- Peak expiratory flow (PEF)

Caution:

Patients with severe or life threatening attacks may not be distressed and may not have all these abnormalities. The presence of any should alert the doctor.

Uncontrolled asthma

ASSESSMENT

- Speech normal
- Pulse <110 beats/min
- Respiration <25 breaths/min
- PEF >50% predicted or best

MANAGEMENT

Treat at home but response to treatment **MUST** be assessed before you leave

TREATMENT

Nebulised salbutamol 5 mg or terbutaline 10 mg

MONITOR RESPONSE 15-30 MIN AFTER NEBULISER

- If PEF >50–75% predicted or best
- Give prednisolone 30–60 mg
- Step up usual treatment

or

- If PEF >75% predicted or best
- Step up usual treatment

FOLLOW UP

- Monitor symptoms and PEF on PEF chart
- Self management plan
- Surgery review ≤48 hours
- Modify treatment at review according to guidelines for chronic persistent asthma

CRITERIA FOR HOSPITAL ADMISSION

- Any life threatening features
- Any features of acute severe asthma present after initial treatment, especially PEF <33%

LOWER THE THRESHOLD FOR ADMISSION IF:

Attack is in afternoon or evening, recent nocturnal symptoms etc, recent hospital admission, previous severe attacks, patient unable to assess own condition, concern over social circumstances

Acute severe asthma

ASSESSMENT

- Can't complete sentences
- Pulse ≥110 beats/min
- Respiration ≥25 breaths/min
- PEF ≤50% of predicted or best

MANAGEMENT

Seriously consider admission if more than one feature above present

TREATMENT

- Oxygen 40–60% if available
- Nebulised salbutamol 5 mg or terbutaline 10 mg
- Prednisolone 30–60 mg or intravenous hydrocortisone 200 mg

MONITOR RESPONSE 15–30 MIN AFTER NEBULISER

If any signs of acute severe asthma persist

- Arrange admission
- Repeat nebulised β agonist plus ipratropium 0.5 mg or give subcutaneous terbutaline or give intravenous aminophylline (slowly) while awaiting ambulance

or

if good response to first nebulised treatment (symptoms improved, respiration and pulse settling, and PEF >50%):

- Step up usual treatment and continue prednisolone

FOLLOW UP

- Monitoring of symptoms and PEF
- Self management plan
- Surgery review ≤24 hours

Modify treatment at review according to guidelines for chronic persistent asthma

Life threatening asthma

ASSESSMENT

- Silent chest
- Cyanosis
- Bradycardia or exhaustion
- PEF < 33% of predicted or best

MANAGEMENT

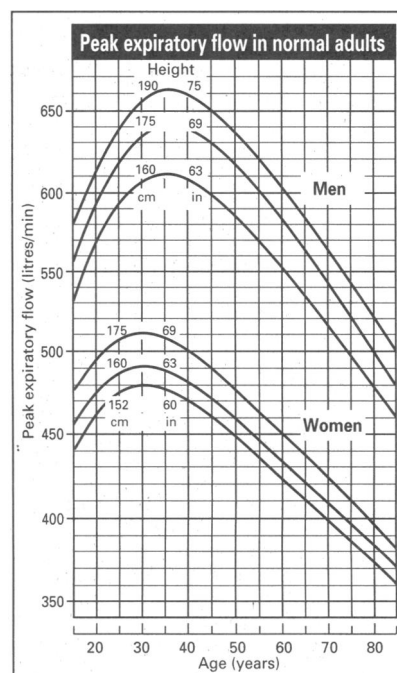
Arrange immediate **ADMISSION**

TREATMENT

- Prednisolone 30–60 mg or intravenous hydrocortisone 200 mg immediately
- Oxygen driven nebuliser in ambulance
- Nebulised β agonist and ipratropium or subcutaneous terbutaline or intravenous aminophylline (250 mg slowly)

Stay with patient until ambulance arrives

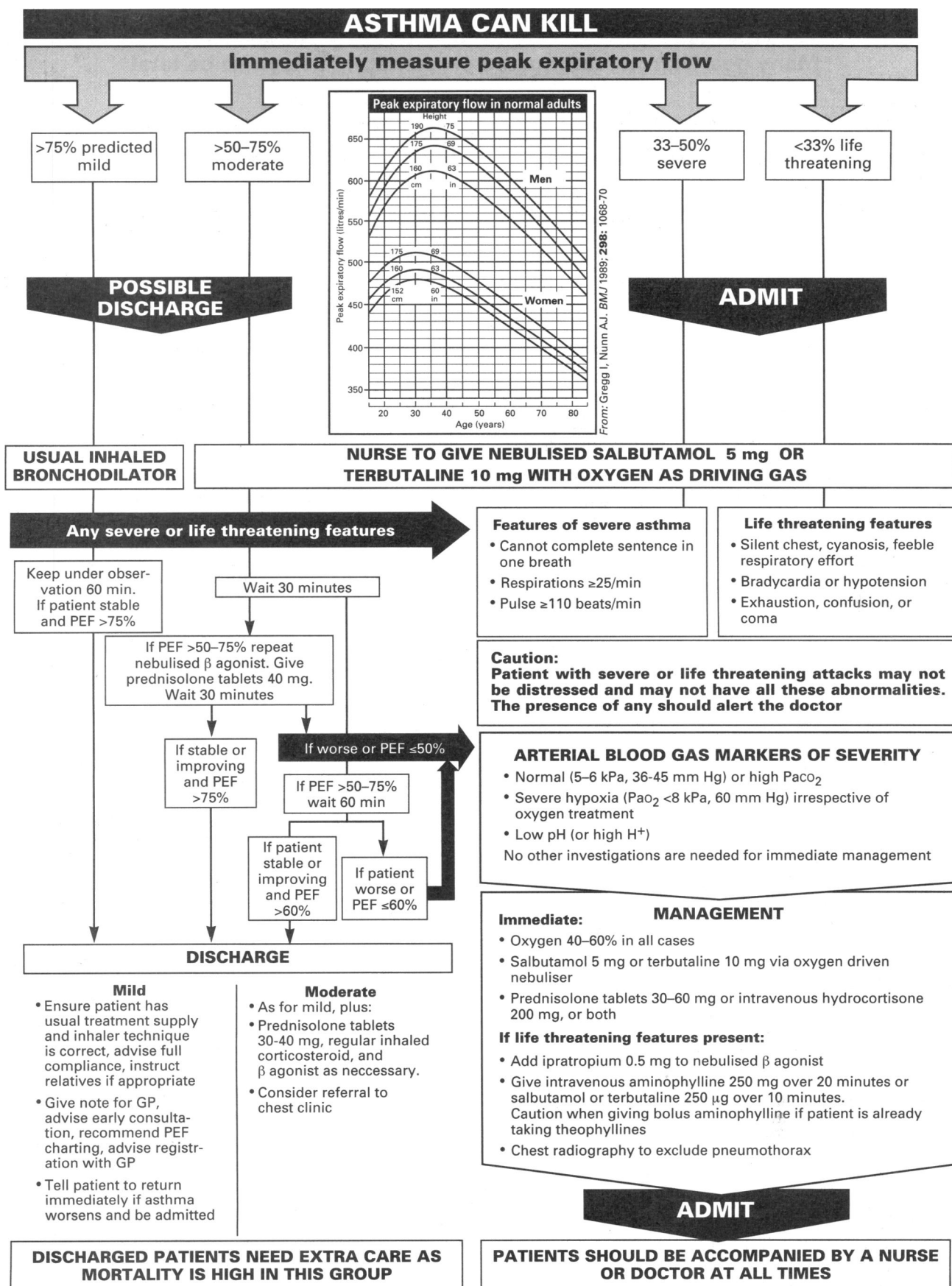
NB If there is no nebuliser give 2 puffs of β agonist via a large volume spacer and repeat 10–20 times



From: Gregg I, Nunn AJ. *BMJ* 1989; 298: 1068-70

Chart 6

Asthma in accident and emergency departments



This chart is appropriate for patients from puberty onwards