

ASTHMA IN CHILDREN: TREATMENT

Drug treatment at home

Management of childhood asthma at home	
Symptoms	Drugs
Intermittent associated mainly with respiratory infections	Intermittent: salbutamol, terbutaline, or ipratropium bromide
Frequent, triggered by infection, allergy, exercise, physical and emotional factors	Continuous: cromoglycate, theophylline, or ketotifen + Intermittent: bronchodilators
Failure to respond to above or severe persistent wheezing	Continuous: beclomethasone or budesonide + bronchodilators ± theophylline

Drug treatment is very effective in most asthmatic children but much depends on the family understanding the problem and on their compliance with drug administration. There are several booklets and one comic which can be used to help with explanation. The choice of drugs is based on the overall severity of the asthma. As the child grows older the asthma may improve or become worse so treatment needs to be reviewed regularly.

Children with mild asthma need only intermittent treatment with β adrenergic bronchodilators. These should be given whenever the child develops symptoms of a viral respiratory infection and before vigorous exercise, preferably by inhalation.

Children with moderate or severe asthma need drugs which prevent wheezing. Cromoglycate and slow release theophyllines are equally effective, and there is no benefit from giving both drugs together. Cromoglycate is completely safe but it has to be taken three or four times each day and the powder makes some children cough. Slow release theophylline preparations can be taken twice or even once daily, but side effects are relatively common. Children show a wide variation in their rate of theophylline metabolism and in general need larger doses relative to body weight than adults. It is advisable at the start of treatment with oral theophyllines to measure blood concentrations; the dose needed to achieve the therapeutic range of 10-20 mg/l varies from 16 to 30 mg/kg/24 hours.

The results of in vitro studies with ketotifen are impressive, and clinical trials have shown that it does have some protective effect. Its place in the management of childhood asthma is, however, still not clearly established.

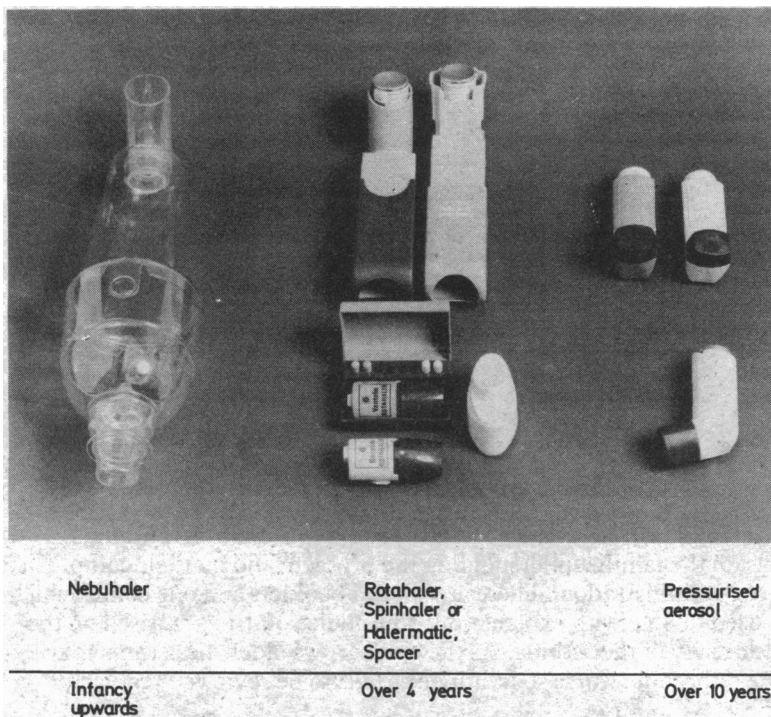
Inhaled steroids are more powerful prophylactic agents than either inhaled cromoglycate or oral theophylline. Budesonide is a slightly more potent anti-inflammatory drug in vitro than beclomethasone but it remains to be seen whether this difference is clinically important. Both can be given twice daily with good effect. Cromoglycate combined with beclomethasone is no better than beclomethasone alone. Nevertheless, steroids potentiate the effect of bronchodilators, and children on inhaled steroids do benefit from the concurrent use of either continuous β adrenergic drugs or oral theophylline.

Occasionally oral prednisolone may have to be used continuously, in which case it should be given as a single dose on alternate days to reduce the risk of serious side effects such as growth suppression. Children taking prophylactic drugs should always have available a fast acting bronchodilator to treat acute attacks.



The second illustration comes from "Winner" designed by Roland Clark and distributed by Sandoz.

Inhalers

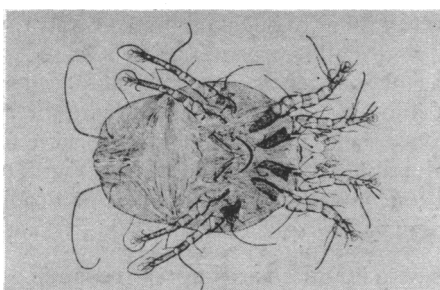


Inhaled treatment is preferable to oral treatment because the optimal effect can be achieved with a smaller dose. There are many inhalers available, and the choice will depend on the age of the child. In general children under the age of 4 cannot manage a deep inspiratory manoeuvre so inhaled treatment can be given only during tidal breathing.

Nebulisers powered by air compressors are being used increasingly to give drugs to young children. Cromoglycate solution via the nebuliser is as effective as powdered cromoglycate given by the Spinhaler. Beclomethasone is relatively insoluble and there is some doubt about its efficacy when given through a nebuliser. Nebulised β adrenergic drugs are very effective for acute wheezing and their judicious use at home may sometimes avoid the need for hospital admission. Very severe asthma will not respond to bronchodilators alone, however, and parents should be advised to seek medical advice immediately if an attack does not improve after one dose of a nebulised bronchodilator.

The Nebuhaler, which incorporates a plastic cone spacer and a one way valve, can also be used in children under 4 to administer β adrenergic bronchodilators and inhaled steroids. Most children over the age of 4 years can master the Rotahaler and Spinhaler or Halermatic. Hardly any children under the age of 10 years can use an unmodified pressurised aerosol properly when wheezy.

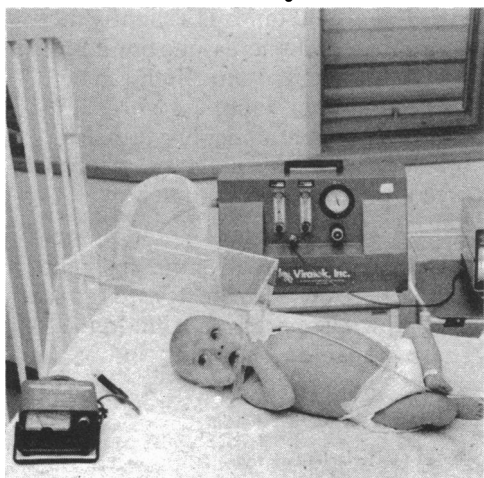
Antigen avoidance and hyposensitisation



Eighty per cent of asthmatic children react to the house dust mite on skin testing. Measures taken to eradicate the mite from the bedroom might be expected to improve nocturnal wheezing, but the results of controlled trials in children have been disappointing. This may be because even the most stringent measures only incompletely or transiently remove the mites.

Hyposensitisation with mite extracts in carefully selected children results in a modest clinical improvement. This form of treatment is painful and has potentially adverse effects, so it should be reserved for children with proved allergy who cannot be controlled adequately with drug treatment. The evidence of beneficial effect from pollen hyposensitisation is inconclusive and there are no controlled trials with other inhalant allergens.

Asthma in infancy



Wheezing in infancy is difficult to manage because of the poor response to bronchodilator drugs. Oral β adrenergic stimulants and theophyllines are unlikely to give benefit. The most important aspect of management is to establish whether the baby is thriving and if so to reassure the parents. A baby with prolonged wheezing dating from soon after birth may need investigation for rare causes. Acute severe wheezing is best managed in hospital, where the mainstay of treatment is adequate hydration and oxygen. Occasionally a baby will respond to nebulised salbutamol or terbutaline, and about one third of wheezy infants can be expected to improve after nebulised ipratropium bromide. Steroids are of no value in acute bronchiolitis but should be used in a baby with established asthma and severe airways obstruction.

Acute severe asthma



Prompt treatment of acute severe asthma is very important. Parents and children must have a clear idea of what to do when an acute asthma attack occurs and should be encouraged to seek medical help early. If an attack does not respond quickly to the child's usual home medication, treatment should be given with nebulised salbutamol or terbutaline. The Nebuhaler is an effective alternative to the nebuliser as a bronchodilator delivery system. Subcutaneous terbutaline 0.005 mg (0.01 ml)/kg is less satisfactory because of distress caused by the injection.

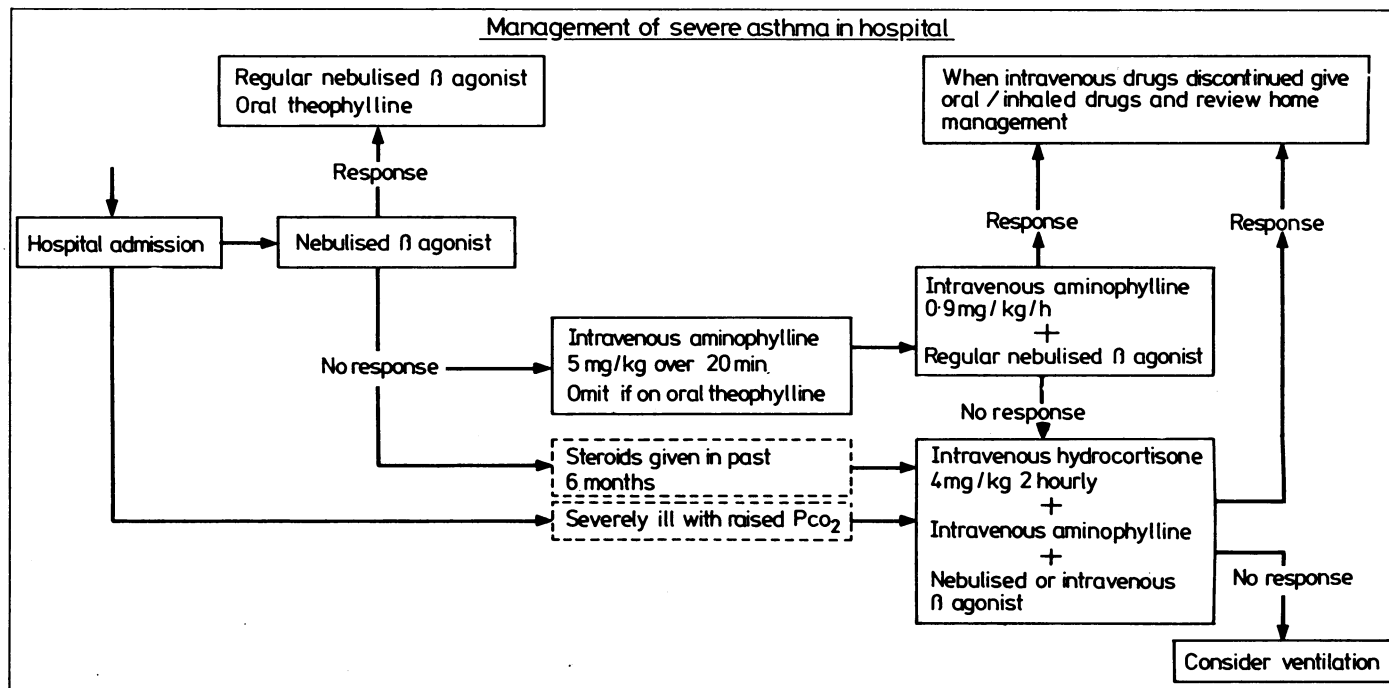
In all children old enough to use a peak flow meter the response to treatment should be documented objectively. Failure to improve after an adequate dose of a nebulised β stimulant or a peak flow rate of less than 25% of expected is an indication for admission to hospital. When the child is

severely ill or has had steroids in the previous six months it is reasonable to give intravenous hydrocortisone (4 mg/kg) immediately. Children under 3 years are the most difficult to assess, but they are particularly at risk of respiratory failure so the threshold for admitting them to hospital should be low. A child who responds well to a nebulised bronchodilator at home will still need to be reviewed a few hours later and almost certainly will require increased treatment for a week or more afterwards.

The principles of assessment and treatment in hospital of children over the age of 18 months are similar to those in adults, though some children recover without the need for systemic steroids. When faced with an intravenous infusion young children sometimes become very distressed and make their asthma worse, in which case it may be better to treat them with nebulised salbutamol and ipratropium bromide and oral steroids. Oxygen is important in treatment but sometimes difficult to give to toddlers. Dehydration occurs because of poor fluid intake, sweating, and, in the early stages, hyperventilation. This must be corrected, but there are potential risks in overhydrating children with severe asthma. Production of antidiuretic hormone may be increased during the attack, and the considerable negative intrathoracic pressures generated by the respiratory efforts may predispose to pulmonary oedema. After correcting dehydration the wisest course is to give normal fluid requirements and measure the plasma and urine osmolality.

A child should not be discharged from hospital until he is taking the treatment he will be taking at home, and on this treatment the peak flow rate should be at least 75% of expected.

Management of severe asthma in hospital



Dr John Price, MRCP, is consultant paediatrician, King's College Hospital, London.