

Acute severe childhood asthma

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Asthma is the most common chronic disease of South African children, affecting 10-20% of the population. Correct treatment of chronic asthma with regular anti-inflammatory controller therapy prevents symptoms, asthma exacerbations, hospitalisation and mortality.

Modern treatment of asthma focuses on an assessment of asthma control in order to enable the child to lead a normal life by:

- Growing and developing normally
- Attending school regularly
- Sleeping well at night
- Participating in sport and activities
- Staying out of hospital.

With good controller treatment, less acute attacks of severe asthma will take place. However, to ensure fewer hospitalisations and less mortality, optimal treatment of acute attacks by families and health care professionals is critical.

Prompt treatment of acute severe asthma is very important. Asthma is a preventable cause of childhood death. Parents and children must know exactly what to do when an acute attack occurs, and when to seek medical attention. This is very important if the child is using a home nebuliser as many parents continue to administer dose after dose of bronchodilator medication that does not provide oxygen. Failure to improve after a single dose of bronchodilator, or a peak flow reading that is 30% below the expected level, are indications for hospital admission.

All children who have life-threatening asthma, or those with oxygen saturations < 94%, should receive high-flow oxygen via a mask or nasal prong oxygen to obtain saturations ≥ 95%. Other indicators of a severe attack include tachycardia (bradycardia preterminally), tachypnoea, volume of wheezing (silent chest due to no/minimal air entry), decreased level of consciousness or agitation, use of accessory respiration muscles, pulsus paradoxus and inability to talk or feed due to breathlessness.

Inhaled short-acting β_2 -agonists should be started as early as possible in an exacerbation. The bronchodilator may be given by means of a nebuliser, or with a metered dose inhaler and spacer combination. A metered dose inhaler given via a spacer is more effective, as well as more cost-effective than the nebuliser, provided that the patient is not acutely dyspnoeic, and that the medication is given in an adequate dosage. A usual dose of salbutamol via a nebuliser is 1.25-2.5 mg, and each dose of salbutamol via a metered dose inhaler is only 100 μ g, so more puffs than usual of the metered dose inhaler are required to achieve an equivalent, or superior clinical effect, to a nebuliser (at doses that are still lower than that given via the nebuliser).

For very mild symptoms two to four puffs of a short-acting β_2 -agonist actuated into the spacer may be sufficient, but for mild-moderate asthma exacerbations (attacks) a higher dose is required. For children below four years old, six puffs may be recommended, but children who are older than four should receive 10 puffs for asthma attacks. The puffs should not be actuated all at once, but at intervals of about 10 seconds between puffs, and at least five breaths of tidal breathing should follow each actuation (Figure 1).

If the acute asthma attack is severe or life-threatening, the short-acting β_2 -agonist should be administered at intervals of 20-30 minutes by means of an oxygen-driven nebulizer. Ipratropium bromide should be added if there is a poor response to the initial doses of β_2 agonist, or on initial commencement of therapy if the attack is severe or life-threatening (Figure 2).

Systemic corticosteroids should be administered early in the acute exacerbation. The oral route is the preferred route of administration of corticosteroids. Oral prednisone or prednisolone (1-2 mg/kg) should be given for three to five days. There is no need to taper the dose. Intravenous alternatives include hydrocortisone, methylprednisolone and dexamethasone.

Mild-moderate asthma management

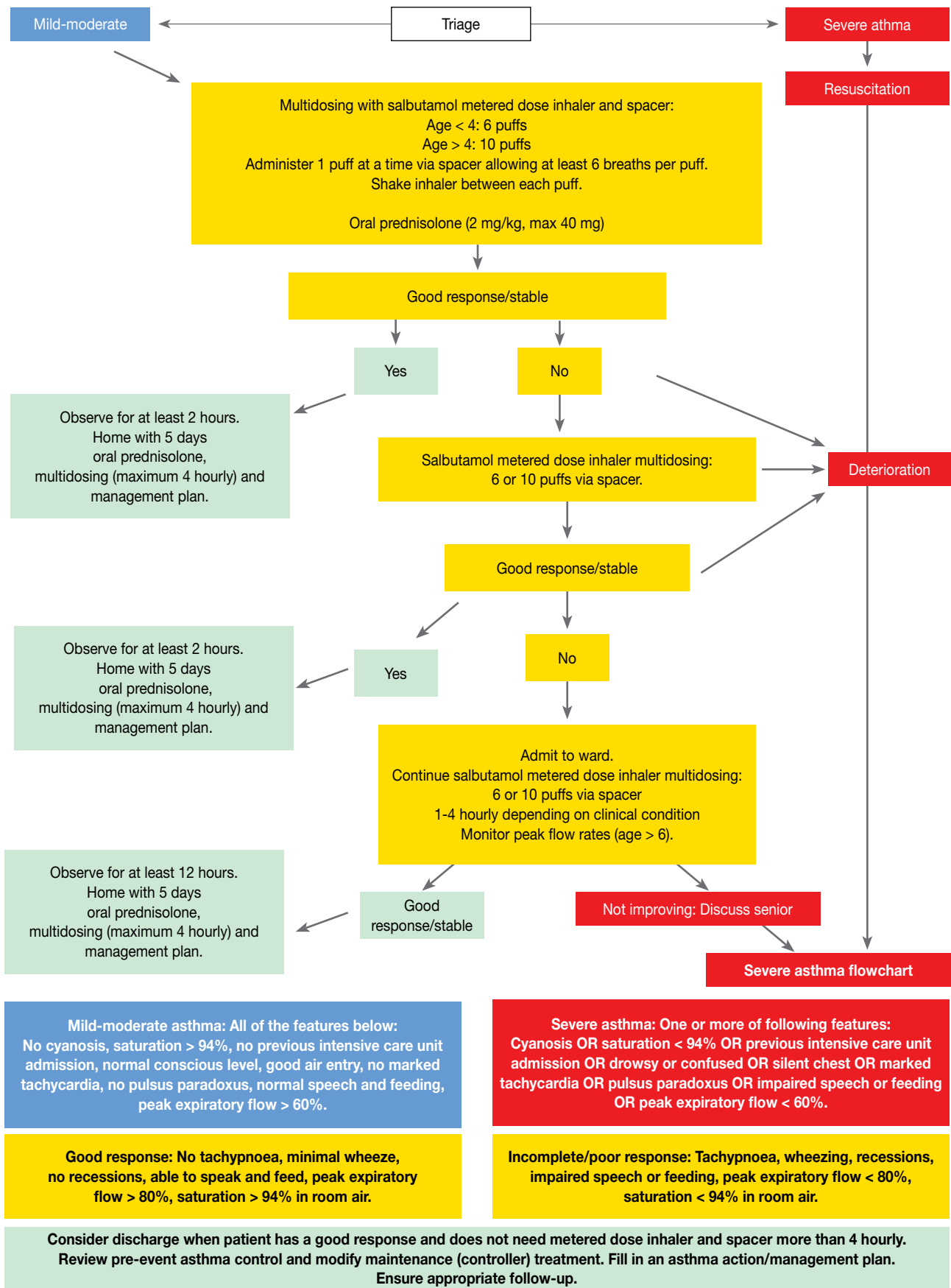
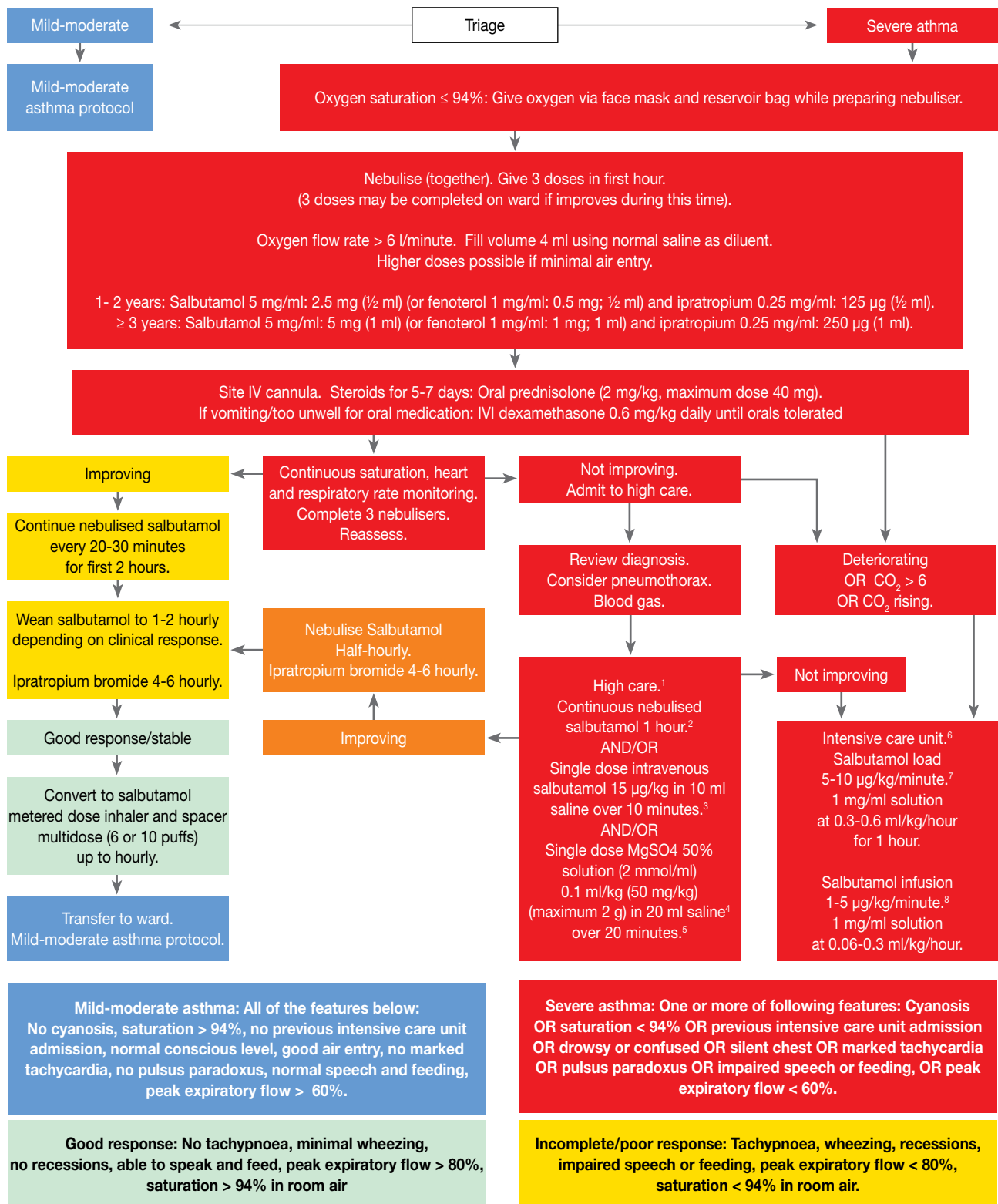


Figure 1: Mild-moderate asthma management

Severe asthma management



Notes

- These may be commenced in the emergency department, should there be delay in transfer to the ward, providing the child is closely monitored.
- Continuous nebulised salbutamol can be best achieved by refilling the nebuliser well using a cut feeding tube to prevent any disconnection of continuous oxygen delivery. Refill contents up to 6 ml when 2 ml remains.
- Make up to a total volume of 10 ml and give through syringe driver at 60 ml/hour.
- Make up to a total volume of 20 ml and give through syringe driver at 60 ml/hour.
- If intravenous magnesium has a good effect, a continuous infusion can be continued. Use

MgSO₄ 50% solution (2 mmol/ml) at 0.06 ml/kg/hour (30mg/kg/hour) to keep Mg between 1.5 and 2.3 mmol/l.

- There is no role for aminophylline outside the intensive care unit (ICU). In ICU, it may occasionally have a role to play to prevent intubation if all other measures have failed.
- Load children with salbutamol, even if they have already received the smaller single-dose intravenous salbutamol over 10 minutes.
- A patient must be closely monitored during salbutamol infusion with K⁺ and lactic acidosis measured 6 hourly.

Figure 2: Severe asthma management

Dehydration may occur because of poor fluid intake, sweating, and hyperventilation. Care should be taken not to overhydrate the child. It is best to provide only the normal fluid requirements for the child, usually in the form of a paediatric maintenance solution, or half-Darrow's-dextrose given intravenously.

Further commonly used options include intravenous magnesium sulphate and intravenous salbutamol. Intravenous aminophylline is less commonly given due to the narrow therapeutic range and potential for severe side-effects. The management algorithm can be applied in most hospitals. If there are concerns about response to treatment, the child must be referred to a specialist centre for further management.

No child should be discharged from hospital until recovery is adequate and the peak flow is above 80% of predicted.

Parental education and action plans

As with any long-term disease, the parent and the child should be educated about all aspects of asthma. Parents cannot be expected to follow a routine that involves the regular use of medication over a prolonged period if they do not understand why this is necessary.

It is important to emphasise that children with asthma are able to lead a normal life with appropriate therapy. These children should be encouraged to participate in all sporting activities, particularly swimming. The primary care doctor should not hesitate to call in the specialist, social worker or psychologist if this is required in difficult cases.

An action plan should include instructions for both daily management (medication and environmental control measures) and guidelines on actions to manage worsening asthma. The plan should indicate the signs and symptoms used to recognise loss of asthma control, and what emergency and ongoing actions to take. Written asthma plans are particularly recommended for all patients on Level 2 or 3 therapy, and for those who have had a recent exacerbation, or who have poorly controlled asthma.

The National Asthma Education programme (www.asthma.co.za) provides free patient and doctor educational materials, and runs an asthma certificate course to teach doctors and nurses how to assess asthma, and to educate patients about how to use their medication to achieve optimum asthma control.