

# Management of acute asthma in children

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*This CME contribution has been reprinted with permission from a guideline for the Management of Acute Asthma in Children (October 2003) prepared by The New Traditions team (Chris Cowley, Bernie Verheul and Dr Dave Graham). The guideline is the result of a collaborative effort by primary and secondary health providers in the Waikato region to develop a useful tool for practitioners. It represents current best practice.*

The aim of the guideline is to provide comprehensive advice on asthma management in both primary and secondary care that will be of use to all health professionals involved in the care of children with asthma.

The complete guideline comprises:

- A wallchart on the management of acute asthma in children (included in this paper).
- A wallchart on nurse initiated management of acute asthma in children.
- An assessment record.
- Nurse standing orders (Prednisone, Salbutamol, Oxygen).
- Frequently asked questions (included in this paper).
- Education and Information Resources.

The Guideline Packs can be ordered by contacting the Waikato Asthma Society and additional wallcharts can be ordered separately.

Compilation of these guidelines was supported by First Health, Pinnacle, and Waikato Asthma Society with contributions from a large number of individuals from the Waikato region.

The NZFP gratefully acknowledges permission to reproduce some extracts from the Guideline Pack to make these available all primary care practitioners.

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Box 1. Key messages of the guideline:

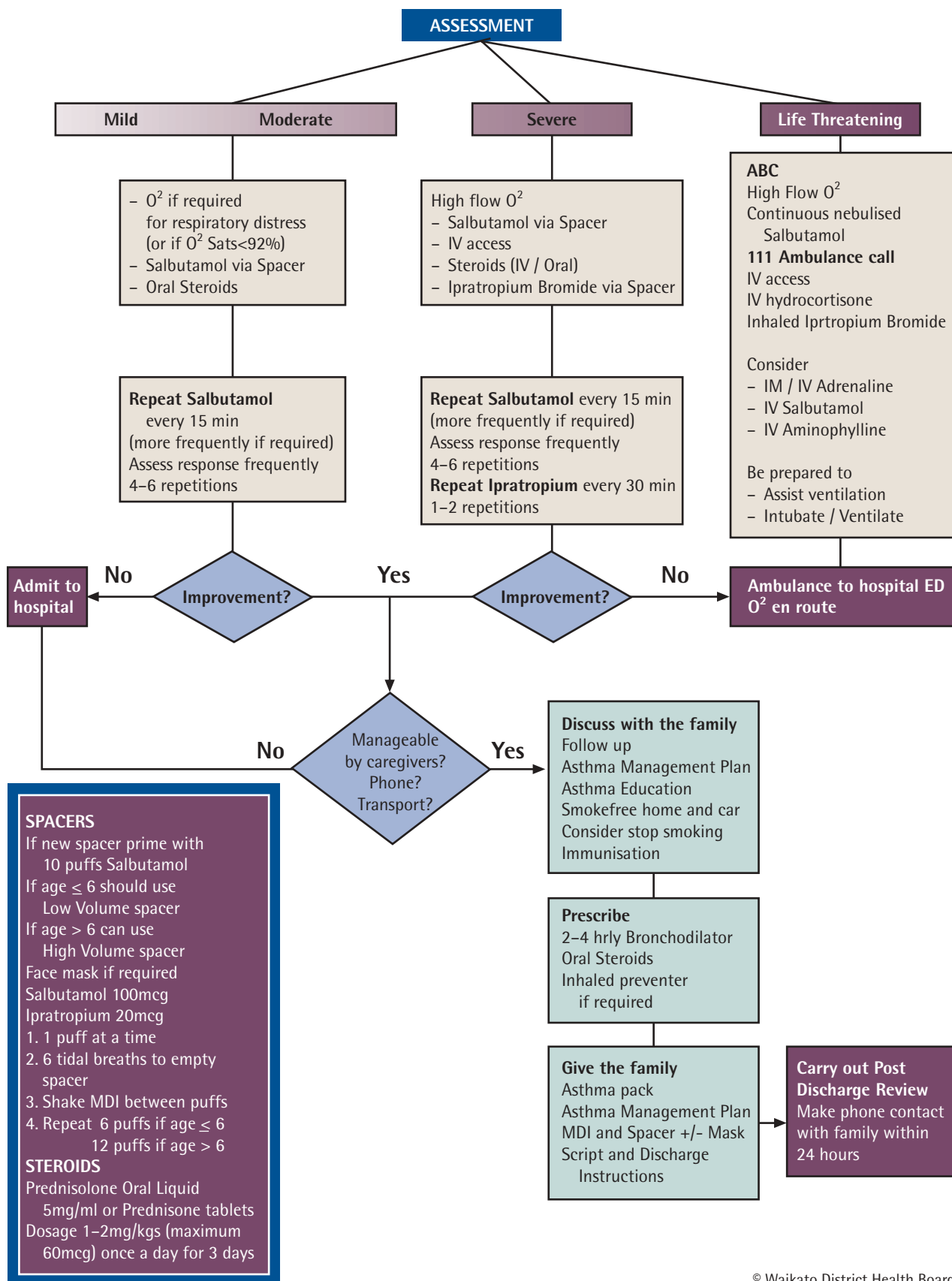
Use of Spacers	<ul style="list-style-type: none"> <li>• Spacers are at least as effective as nebulisers</li> <li>• Parents/ caregivers can do it</li> <li>• Overall less nursing load</li> <li>• Cheaper than nebulisers</li> <li>• Less hospital admissions</li> </ul>
Use of oral prednisone early in exacerbation of asthma	<ul style="list-style-type: none"> <li>• Most effective step in reducing admissions</li> <li>• Shortens duration of attack</li> </ul>
Nurse Initiated Management	<ul style="list-style-type: none"> <li>• Can begin treatment quicker</li> <li>• Empowers nurses</li> <li>• Empowers parents</li> </ul>
Enhancing opportunistic paediatric practice	<ul style="list-style-type: none"> <li>• Provide asthma education</li> <li>• Offer opportunistic immunisation</li> <li>• Offer smokefree opportunity</li> </ul>

Table 1. Initial Assessment of Severity of Acute Asthma in Children.

Symptoms	Mild	Moderate	*Severe and life-threatening
Altered consciousness	No	No	Agitated Confused/ Drowsy
Accessory muscle use/recession	No	Minimal	Moderate Severe
Talks in	Sentences	Phrases	Words Unable to speak
Respiratory Rate	Normal	Increased	Very High/ Very Low
Pulse Rate	<100	100–200	>200 Beware the silent chest/ bradycardia
Wheeze Intensity	Variable	Moderate-loud	Often quiet
Central Cyanosis	Absent	Absent	Likely to be present
If available, Oximetry on Presentation (SaO <sub>2</sub> )	>94%	94–90%	<90%

\* Any of these features indicates that the episode is severe. The absence of any feature does not exclude a severe attack.

Table 2. Management of acute asthma in children.



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## Box 2. Frequently asked questions.

**Why Spacers rather than Nebulisers?**

- Spacer-delivered bronchodilators are at least as effective as nebuliser driven bronchodilators.
- Spacer-delivered systems in childhood acute asthma are associated with reduced Emergency Department (ED) stay, and with reduced hospital admissions.
- Using spacer-delivered systems in acute childhood asthma creates the opportunity for families to learn the appropriate and effective use of this system, for both symptomatic and preventative medication delivery.
- Routine use of spacer-driven bronchodilators in childhood acute asthma reduces perceived community need for nebuliser-driven medications in acute childhood asthma.

Cates BJ, Rowe BH, Bara A. Holding chambers versus nebulisers for beta-agonist treatment of asthma (Cochrane Review). In: The Cochrane Library, Issue 1, 2003. Oxford: Update Software.

**Prednisone/prednisolone – why?**

- Use of oral corticosteroids (OCS) within one hour of presentation to an ED significantly reduces the need for hospital admission in patients with acute asthma.
- A short course of corticosteroids following assessment for an acute exacerbation of asthma significantly reduces the number of relapses to additional care and decreases beta-agonist use without apparent increase in side effects.

Rowe BH, Spooner CH, Ducharme FM, Bretzlaff JA, Bota GW. Early emergency department treatment of acute asthma with systemic corticosteroids (Cochrane Review). In: The Cochrane Library, Issue 1, 2003. Oxford: Update Software

Rachelefsky G. Treating Exacerbations of Asthma in Children: The Role of Systemic Corticosteroids. *Pediatrics* 2003;112 (2):382–397

**Oral Steroid dosage and duration**

- The Rachelefsky evidence based review recommends oral corticosteroids, 1–2mg/kg/day, for three days. The British evidence based guideline recommends 3 day duration. That paper has an age-based dosage (20mg for two to five year olds, 30–40mg for children over five years), rather than a weight-based dosage.

Rachelefsky G. Treating Exacerbations of Asthma in Children: The Role of Systemic Corticosteroids. *Pediatrics* 2003; 112 (2) 382–397

Guidelines on the management of asthma. Statement by the British Thoracic Society, the British Paediatric Association, the Research Unit of the Royal College of Physicians of London, the King's Fund Centre, the National Asthma Campaign, the Royal College of General Practitioners, the General Practitioners in Asthma Group, the British Association of Accident and

Emergency Medicine, and the British Paediatric Respiratory Group. *Thorax* 1993; 48(suppl 2): s1–24

**Why Redipred?**

- Younger children tolerate prednisolone when they can't swallow prednisone tablets, and can't cope with the taste of prednisone crushed tablets or elixir.

**What about IV Salbutamol?**

- Evidence is lacking to support the use of IV B<sub>2</sub> agonists for patients with severe acute asthma. The clinical benefit appears questionable, with potential clinical risk. These drugs should be given by inhalation. No subgroups were identified in which the IV route should be considered. IV B<sub>2</sub> agonists should be reserved for those patients in whom inhalation therapy is not feasible, or in the context of a controlled clinical trial.

Travers A, Jones AP, Kelly K, Barker SJ, Camargo CA Jr., Rowe BH. Intravenous beta2-agonists for acute asthma in the emergency department. In: The Cochrane Library, Issue 1, 2003. Oxford: Update Software.

Travers AT, Rowe BH, Barker SJ, Jones AP, Camargo CA Jr. The effectiveness of IV B<sub>2</sub>-agonists in treating patients with acute asthma in the Emergency Department. *Chest* 2002; 1200–1207

**What about Ipratropium Bromide?**

- The available evidence does not support the routine use of ipratropium in acute exacerbations of asthma in children. For children with severe asthma, adding multiple doses of anticholinergics to B<sub>2</sub> agonists appears safe, improves lung function and would avoid hospital admission in one of 12 such treated patients. Although multiple doses should be preferred to single doses of anticholinergics, the available evidence only supports their use in school-aged children with severe asthma exacerbation.

Plotnick LH, Ducharme FM. Combined inhaled anticholinergics and beta2-agonists for initial treatment of acute asthma in children (Cochrane Review). In: The Cochrane Library, Issue 1, 2003. Oxford: Update Software.

**What about immunisations?**

- Any acute illness presentation is appropriate for opportunistic immunisation. Opportunistic immunisation is accepted by families to whom it is offered.

Ross G. Opportunistic 'catch-up' immunisation at entrant school medicals: parental attitudes and uptake. *Public Health* 1992 Mar; 106 (2), pp.143–8.

Centers for Disease Control. Adult immunization: knowledge, attitudes, and practices: DeKalb and Fulton Counties, Georgia, 1988. *MMWR* 37:657–61.

Immunisation state of young children admitted to hospital and effectiveness of a ward based opportunistic immunisation policy. *BMJ* 1991 Jan 5; 302 (6767), pp 31–3.

Drociuk D. Reasons reported by medicare beneficiaries for not receiving influenza and pneumococcal vaccinations: United States, 1996. *MMWR* 48: 556–8.

Gyorkos TW, Tannenbaum TN, Abrahamowicz M, et al. Evaluation of the effectiveness of immunization delivery methods. *Can J Public Health* 85(Suppl 1):S14–30.

### What about influenza vaccine for asthmatics?

- Children with severe asthma are eligible for influenza vaccination, however there is not enough evidence to assess the benefits and risks of influenza vaccination for people with asthma.

Cates CJ, Jefferson TO, Bara AI, Rowe BH. Vaccines for preventing influenza in people with asthma (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2003. Oxford: Update Software.

### Why nurse initiated management?

- The management of acute childhood asthma, in common with many presentations in primary care, is optimally managed using the team approach. This utilises the different skills of the individual members and the outcome is probably greater than the sum of the individual contributions.
- Practice Nurses with the right competence and skills, particularly when supported by a well researched protocol, are often eager to take on extended roles. Also, they are often regarded as the front line team member most available to deal with the acute unexpected presentations.
- Practice Nurses are the best members of the team to take on the patient education role which is a natural consequence after the acute episode and indeed patient/parent education and advice about subsequent care begins during the acute episode. Many Practice Nurses are already skilled in asthma patient education. After diabetes, it is probably the commonest chronic disease group where Practice Nurses are becoming involved in routine review, monitoring and even running clinics.

Smith PM; Reilly KR; Houston Miller N; DeBusk RF; Taylor CB. Applications of nurse-managed inpatient smoking cessation program. *Nicotine Tob Res* 2002 May; 4(2), pp. 211–22.

Qasim A; Malpass K; O'Gorman DJ; Heber ME. Safety and efficacy of nurse initiated thrombolysis in patients with acute myocardial infarction. *BMJ* 2002 Jun 1; 324 (7349), pp. 1328–31.

Tambimuttu J; Hawley R; Marshall A. Nurse-initiated x-ray of isolated limb fractures in the emergency department: research outcomes and future directions. *Aust Crit Care* 2002 Aug; 15 (3), pp.119–22.

Taylor CB; Miller NH, Herman S; Smith PM; Sobel D; Fisher L; DeBusk RF. A nurse-managed smoking cessation program for hospitalised smokers. *Am J Public Health* 1996 Nov; 86 (11), pp.1557–60.

Taylor CB; Houston-Miller N; Killen JD; De Busk RF. Smoking cessation after acute myocardial infarction: effects of a nurse-managed intervention. *Ann Intern Med* 1990 Jul 15; 113 (2), pp. 118–23.

### Home availability of oral steroids

- The Rachelefsky evidence based review cites a number of papers looking at OCS administration prior to emergency department presentation. Results were mixed, with some papers showing clear benefit and others showing no benefit. The papers were of widely varying methodology, so meta-analysis was not appropriate. Rachelefsky recommends home initiation of OCS, followed by medical review. Overall, it is likely that, at least for selected patients, home availability of OCS for acute asthma exacerbation is appropriate.

Rachelefsky G. Treating Exacerbations of Asthma in Children: The Role of Systemic Corticosteroids. *Pediatrics* 2003; 112 (2) 382–397.

### What about just using regular short acting bronchodilators?

There is little advantage in using short-acting  $B_2$ -agonists regularly without adding oral steroids and potentially some small clinical disadvantage.

Walters EH, Walters J. Inhaled short acting  $B_2$ -agonist use in asthma: regular versus as needed treatment (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2003 Oxford: Update Software

### What about inhaled steroids in acute asthma?

- Introduction of inhaled corticosteroids at the start of a viral URTI or exacerbation of asthma is of no value, either in terms of prevention of exacerbation, or impacting on severity of exacerbation.
- There is insufficient evidence that inhaled corticosteroid therapy results in clinically important changes in lung function or clinical scores in acute asthma. Similarly, there is insufficient evidence that inhaled corticosteroid alone is as effective as (systemic) corticosteroid.
- Doubling dosage of inhaled corticosteroid in children already on inhaled corticosteroids is of no value. There is insufficient evidence that inhaled corticosteroids provides additional benefit when used in combination with standard corticosteroid therapy upon emergency department discharges for acute asthma.

Wilson NM, Silverman M. Treatment of acute, episodic asthma in preschool children using intermittent high dose inhaled

steroids at home. *Archives of Disease in Childhood*. 65(4): 407–10, 1990 Apr.

Svdemyr J, Nyberg E, Asbrink-Nilsson E, Hedlin G. *Acta Paediatrica*. Intermittent treatment with inhaled steroids for deterioration of asthma due to upper respiratory tract infections. *Acta Paediatr*. 1995 Aug; 84(8):884–8.

Connett G, Lenney W. Prevention of viral induced asthma attacks using inhaled budesonide. *Arch. Dis. Child*. Jan 1993; 68: 85–87.

Edmonds ML, Camargo CA Jr., Brenner BE, Rowe BH. Inhaled steroids for acute asthma following emergency department discharge (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2003. Oxford: Update Software.

Edmonds ML, Camargo CA Jr, Pollack CV Jr, Rowe BH. Early use of inhaled steroids in the emergency department treatment of acute asthma (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2003. Oxford: Update Software.

### Dose equivalents of bronchodilator 2.5mg to 5mg

- Leversha et al (amongst others) have demonstrated dose equivalence in the paediatric clinical setting of six puffs (600mcg) salbutamol via spacer, with 2.5mg salbutamol via nebuliser. Other (adult) studies have shown equivalence of 5mg salbutamol via nebuliser with as little as four puffs (400mcg) salbutamol via spacer.

Leversha A, Campanella S, Aickin R, et al. Costs and effectiveness of spacer versus nebuliser in young children with moderate and severe acute asthma. *J Pediatr*. 2000;136:498–502.

Treatment of acute severe asthma with inhaled albuterol delivered via jet nebulizer, metered dose inhaler with spacer, or dry powder. *Chest* 1997 Jul; 112 (1) pp. 24–8.

### What about Betnesol?

#### *Safety issues with soluble betamethasone (Betnesol(tm)) in children*

- The importance of changing to prednisolone is that Betnesol(tm) is a potent steroid with a long half-life, and a long duration of adrenal suppression (about four days from a single dose in children). Repeated doses or courses of Betnesol(tm) can produce long-lasting adrenal suppression and are more likely to cause Cushing's features. Prednisone and prednisolone have shorter half-lives and duration of adrenal suppression, which means that 24 hours after a morning dose, the early morning ACTH peak is not fully suppressed. This makes it safer for use in asthma where repeated courses over a year are commonly necessary. (By contrast, in severe viral croup the use of a single dose of potent, rapidly absorbed steroid such as dexamethasone is justified as this is most commonly a once-only disease.)

#### *Compliance issues*

- Some people choose Betnesol(tm) because a single long lasting dose aids compliance. It must be

borne in mind that in families where this is a consideration, non-compliance with preventive care may also be an issue. These children will often require more rescue oral steroid courses, which again is where the safety of such a long-acting steroid is a concern.

Pattemore, P. (Respiratory Paediatrician) Personal Communication.

### What about Standing Orders for nurses?

- A Standing Order is a written instruction issued by a medical practitioner in accordance with the regulations, authorising a class of persons to supply and administer any specified class or description of prescription medicines or controlled drugs, in circumstances which are specified in the instruction, without a prescription.
- Any Standing Order permits or empowers people to supply or administer medicines; it cannot require them to. In every case it will be a matter of professional judgement by the person concerned as to whether he or she does supply or administer the described medicines.
- The requirements for compliance to legislation for Standing Orders include: organisational policy, clear documentation of the process, medicine administration record keeping, audit and review process, competencies. It is the responsibility of each workplace to have these processes in place.
- Further information may be obtained from 'Guidelines for the Development and Operation of Standing Orders', available on the Ministry of Health website: [www.moh.govt.nz](http://www.moh.govt.nz)

Advocate's disease management program reduces readmissions for CHF and asthma. *Perform Improv Advis*. 2003 Mar; 7(3):44–7.

Rhew DC; Glassman PA; Goetz MB; Improving Pneumococcal Vaccine Rates Nurse Protocols Versus Clinical Reminders. *J Gen Intern Med* 1999 June; 14 (6), pp.351–6.

Facilitating influenza and pneumococcal vaccination through standing orders programs *MMWR* 2003 Jan 31;52(4),pp.68–9.

Holliman CJ; Wuerz RC; Vazquez-de Miguel G; Meador SA. Comparison of interventions in prehospital care by standing orders versus interventions ordered by direct (on-line) medical command. *Prehospital Disaster Med* 1994 Oct–Dec; 9(4),pp.202–9.

### Why smoking cessation?

- Any acute illness presentation is appropriate for opportunistic intervention with respect to cigarette smoking. This is even more so with a respiratory illness of childhood where there is increased morbidity associated with passive smoking.

Sutherland G. Smoking: can we really make a difference? *Heart* 2003 May; 89 Suppl 2, pp. ii25–7; discussion ii35–7