

## Infants and Children - Acute Management of Asthma

**Summary** Clinical Practice Guidelines for the acute treatment of infants and children with asthma.

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**Branch contact**

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**Distributed to** Public Health System, Divisions of General Practice, Government Medical Officers, NSW Ambulance Service, Ministry of Health, Private Hospitals and Day Procedure Centres, Tertiary Education Institutes

**Audience**

### Secretary, NSW Health

This Policy Directive may be varied, withdrawn or replaced at any time. Compliance with this directive is mandatory for NSW Health and is a condition of subsidy for public health organisations.

## INFANTS AND CHILDREN: ACUTE MANAGEMENT OF ASTHMA

### PURPOSE

The *Infants and Children: Acute Management of Asthma* Clinical Practice Guideline (attached) has been developed to provide direction to clinicians and is aimed at achieving the best possible paediatric care in all parts of the state.

The Clinical Practice Guideline was prepared for the NSW Department of Health by an expert clinical reference group under the auspice of the state wide Paediatric Clinical Practice Guideline Steering Group.

### MANDATORY REQUIREMENTS

This policy applies to all facilities where paediatric patients are managed. It requires all Health Services to have local guidelines / protocols based on the attached clinical practice guideline in place in all hospitals and facilities likely to be required to assess or manage children with asthma.

The Clinical Practice Guideline reflects what is currently regarded as a safe and appropriate approach to the acute management of asthma in infants and children. However, as in any clinical situation there may be factors which cannot be covered by a single set of guidelines. This document should be used as a guide, rather than as a complete authoritative statement of procedures to be followed in respect of each individual presentation. **It does not replace the need for the application of clinical judgement to each individual presentation.**

### IMPLEMENTATION

Chief Executives must ensure:

- Local protocols are developed based on the *Infants and Children: Acute Management of Asthma* Clinical Practice Guideline.
- Local protocols are in place in all hospitals and facilities likely to be required to assess or manage paediatric patients with asthma.
- Ensure that all staff treating paediatric patients are educated in the use of the locally developed paediatric protocols.

Directors of Clinical Governance are required to inform relevant clinical staff treating paediatric patients of the revised protocols.

### REVISION HISTORY

Version	Approved by	Amendment notes
January 2005 (PD2005_386)	Director-General	New Policy
May 2012 (PD2012_030)	Deputy Director-General Strategic Development	Second Edition
September 2012 (PD2012_056)	Deputy Director-General Population Health	Third Edition

### ATTACHMENT

1. Infants and Children: Acute Management of Asthma – Clinical Practice Guideline.

Infants and children:  
Acute Management of Asthma  
third edition

**CLINICAL PRACTICE GUIDELINES**



**NSW HEALTH**

NSW MINISTRY OF HEALTH  
73 Miller Street  
North Sydney NSW 2060  
Tel. (02) 9391 9000  
Fax. (02) 9391 9101  
[www.health.nsw.gov.au](http://www.health.nsw.gov.au)

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This Clinical Practice Guideline booklet is extracted from the PD2012\_056 and as a result, this booklet may be varied, withdrawn or replaced at any time. Compliance with the information in this booklet is mandatory for NSW Health.

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For further copies of this document please contact:

The Better Health Centre  
PO Box 672  
NORTH RYDE 2113  
Tel. (02) 9887 5450  
Fax. (02) 9887 5452

Further copies of this document can be downloaded  
from the NSW Health website: [www.health.nsw.gov.au](http://www.health.nsw.gov.au)

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# Introduction

These Guidelines are aimed at achieving the best possible paediatric care in all parts of the State. The document should not be seen as a stringent set of rules to be applied without the clinical input and discretion of the managing professionals. Each patient should be individually evaluated and a decision made as to appropriate management in order to achieve the best clinical outcome.

Field, M.J. & Lohr, K.N. (1990) define clinical practice guidelines as:

‘systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.’ (Field MJ, Lohr KN (Eds). Clinical Practice Guidelines: Directions for a New Program, Institute of Medicine, Washington, DC: National Academy Press)

It should be noted that this document reflects what is currently regarded as a safe and appropriate approach to care. However, as in any clinical situation there may be factors which cannot be covered by a single set of guidelines and therefore this document should be used as a guide rather than as an authoritative statement of procedures to be followed in respect of each individual presentation. It does not

replace the need for the application of clinical judgment to each individual presentation.

This document represents basic clinical practice guidelines for the acute management of asthma in infants and children. Further information may be required in practice; suitable widely available references are included in Appendix Two.

Each Local Health District is responsible for ensuring that local protocols based on these guidelines are developed. Local Health Districts are also responsible for ensuring that all staff treating paediatric patients are educated in the use of the locally developed paediatric guidelines and protocols.

In the interests of patient care it is critical that contemporaneous, accurate and complete documentation is maintained during the course of patient management from arrival to discharge.

**Parental anxiety should not be discounted: it is often of significance even if the child does not appear especially unwell.**

**NOTE:**

**The guidelines are for emergency management in an Emergency Department and not intended to cover intensive care management nor interval management.**

**Weaning of bronchodilator therapy and discharge guidelines for children with acute asthma are both covered in consensus statements from the Children's Hospitals Australasia<sup>1,2</sup>**



# Changes to previous clinical practice guidelines

The following outlines changes to the document:

- The assessment and initial management chart has been redeveloped to incorporate the severity assessment and the treatment of asthma in infants and children
- The acute asthma assessment form has been removed from the document
- The overview in this document is now comprehensive and includes the patterns of asthma in children
- The overview also includes an alert to reconsider the diagnosis if the child is under one year of age, has a high fever or responds poorly to asthma treatment
- New section for Differential Diagnosis
- New section for Warning High Risk of Serious Illness
- New Acute Management section includes the following:
  - course of illness
  - mild asthma, moderate asthma and severe/life threatening asthma
  - tests
  - oxygen administration
  - important nursing issues
  - treatment at home
  - parent education
- Asthma Action Plan (document) has been removed and replaced with evidence base for using asthma action plans and links to plans
- Appendix one (Asthma Resource Pack for Parents and Carers)
- Appendix two (Parent Information Sheet – What is Asthma)
- Appendix three (Asthma Management in Schools and Childcare)
- Appendix four (Basic Asthma Education Checklist)

# Overview

Asthma in children is one of the most common causes for presentation to Emergency Departments and admission to hospital.

The diagnosis of asthma should be considered in a child with cough, wheeze, or difficulty breathing. In an acute asthma episode a wheeze may not be heard. However, a prolonged respiratory phase of expiration tends to be an earlier sign.

Treatment of acute asthma involves more than giving the right doses of bronchodilators and corticosteroid medication at the right time. Children who present with an acute episode of asthma may also have had recurrent or persistent symptoms for some time. An acute presentation with asthma provides an opportunity to identify deficiencies in long-term management such as the need for compliance with treatment, consideration of preventer medication, eliciting any history of and treating as necessary co-existent allergic rhinitis, the requirement for an asthma action plan and asthma education. For acute presentations these problems should be identified and arrangements made for continuing care.

**This guideline is for all children presenting with acute asthma. Reconsider the diagnosis if the child is under one year of age, has a high fever or responds poorly to asthma treatment**

## Patterns of asthma in children

The pattern of asthma determines the need for commencement of preventive therapy in children.

### Infrequent intermittent asthma

This is the most common pattern and includes 70-75% of children with asthma in Australia.

- Children have isolated episodes of asthma lasting from a few days to a week, almost always triggered by an upper respiratory tract infection (URTI).
- Episodes are generally 6 or more weeks apart, almost always with an URTI and children are symptom-free in the interval periods.

## Frequent intermittent asthma

Of children with asthma in Australia 20-25 % have frequent intermittent asthma.

- Children have episodes which often occur at intervals less than 6 weeks.
- Children have minimal or no symptoms between episodes.
- Children with frequent intermittent asthma may benefit from regular preventive therapy usually with a leukotriene antagonist or low-dose (not greater than 200 mcg per day of Fluticasone – or equivalent) inhaled corticosteroids.
- Preventive treatment is commonly required on a seasonal basis.

## Persistent asthma

Of children with asthma in Australia 5-10% have persistent asthma:

- Children have symptoms on most days, including disrupted sleep due to wheeze and cough, early morning shortness of breath and exercise or activity intolerance.
- Require preventer therapy
- Require regular review
- Suggest referral to a paediatrician

## Diagnosis

- A thorough clinical history including a family history of asthma, allergic rhinitis, eczema and smoking.

- The diagnosis of asthma consists of the triad of cough, breathlessness and wheeze.
- The diagnosis of asthma in younger children can be confirmed by observing a definite clinical response to an inhaled bronchodilator.
- In young children presenting with acute wheeze and tachypnoea it is vital to exclude differential diagnoses (see below).
- If cough is a predominant symptom of suspected asthma, a thorough assessment is needed to avoid making an incorrect diagnosis of asthma or instigating inappropriate management.
- Overall asthma management in children requires a thorough assessment to determine the pattern of asthma.
- The severity and pattern of asthma in childhood may vary. For the majority of children in Australia asthma will improve with age.

## Differential diagnosis

A number of other conditions may share some presenting features with asthma. Such conditions include:

- bronchiolitis
- inhaled foreign body
- pneumonia
- transient infant wheezing
- cystic fibrosis




- sinusitis
  - milk aspiration/cough during feeds
  - structural airway abnormality (e.g. laryngomalacia, tracheo-bronchomalacia, vascular ring)
  - cardiac failure associated with congenital heart disease
  - suppurative lung disease
  - recurrent non-specific cough (which is rarely responsive to a bronchodilator)
  - acidosis (including sepsis) may cause tachypnoea and tachycardia
- At least 500 micrograms of inhaled Fluticasone (or equivalent dose) per day. A dose of 500 micrograms a day of inhaled Fluticasone (or equivalent dose) is at the top (flat section) of the dose-response curve in a child.
  - Failure to respond to bronchodilators
  - Multiple courses of oral steroids in the last 12 months

## **WARNING - High risk of serious illness**

- History of brittle asthma
- Previous Paediatric Intensive Care Unit (PICU) admission due to asthma or a previous need for intravenous asthma treatment
- Re-presentation very soon after discharge from hospital
- Recurrent admissions
- Co-existent:
  - Congenital heart disease
  - Chronic lung disease
  - Prematurity
- Already on maximal treatment at home

# Algorithm: Assessment and initial management of acute asthma

Reconsider diagnosis if the child is less than one year, has high fever or responds poorly to Asthma treatment

<b>Initial Severity Assessment</b>			
Treat in the highest category in which any symptom occurs			
Symptoms	Mild Likely to go home	Moderate Possibly be admitted	Severe and Life Threatening Will be admitted or transferred
<b>Oximetry in Air</b>	>94%	90-94%	<90%
<b>Heart rate</b>	Close to normal range for age	Mild-Moderate Tachycardia for age	Marked Tachycardia - beware relative Bradycardia for age
<b>(age appropriate) Ability to talk in:</b>	Sentences or Long vigorous Cry	Phrases or Shortened Cry	Words / Weak Cry or Unable to Speak / Cry
<b>Accessory Muscle Use</b>	None	Mild to Moderate	Moderate to Severe
<b>Altered Consciousness</b>	Alert Age Appropriate	Easily Engaged Age Appropriate	Be concerned if Agitated or Drowsy or Confused
<b>Cyanosis in air</b>	None	None	Any Cyanosis is very concerning
<b>Treatment</b>			
<b>Oxygen</b>	No	To maintain SaO2 >94%	To maintain SaO2 >94% Consider High flow Oxygen
<b>Salbutamol 100 micrograms Metered Dose Inhaler(MDI) &amp; Spacer</b>	<6 years <b>6 x</b> puffs stat ≥6 years <b>12 x</b> puffs stat <b>review frequently and repeat when required</b>	<6 years <b>6 x</b> puffs ≥6 years <b>12 x</b> puffs <b>Give 20 minutely x 3 then repeat as required</b>	<b>Severe – see page 10</b> <6 years <b>6 x</b> puffs ≥6 years <b>12 x</b> puffs <b>Give 20 minutely x 3</b> with Ipratropium Reassess
<b>Salbutamol Nebulised</b>	Not recommended	Not recommended	<b>OR</b> <b>Life Threatening</b> - Continuous nebulised Salbutamol ( <b>5mg/mL undiluted</b> ) with Ipratropium (3 doses as below) until improvement <b>Reassess</b> <b>Yes - 20 minutely x 3</b> <6 years - 4 puffs MDI or 250mcg Neb Ipratropium ≥6 years - 8 puffs MDI or 500mcg Neb Ipratropium
<b>Ipratropium (Atrovent) 20 micrograms</b> (3 doses always together with Salbutamol)	No	Consider <b>20 minutely x 3</b> <6 years - 4 puffs MDI ≥6 years - 8 puffs MDI	<b>Immediate Senior Review -Consult PICU (via NETS if outside a children's hospital)</b> If no or poor response to Nebulised Salbutamol, contact <b>senior help or PICU via (NETS 1300 36 2500) for discussion regarding retrieval</b>
<b>No or Poor response to Treatment</b>	Check diagnosis and treat as per Moderate	Check diagnosis and treat as per Severe and Life Threatening	
<b>If contemplating giving any of IV Salbutamol, IV Aminophylline or IV Magnesium Sulphate</b>	Not applicable	Not applicable	
<b>Systemic corticosteroids</b>	Consider Oral Prednisone 1-2mg/kg depending on history and response to treatment	Oral Prednisone 1-2mg/kg	Hydrocortisone IV 4mg/kg or Methylprednisone IV 1mg/kg
<b>Investigations</b>	Nil (routine) required	Nil routine required Consider Chest X-ray if focal signs	Consider Blood Gases, Chest X-ray and UEC
<b>Observation &amp; Review</b>	Observations (HR, RR and O2 Sats) pre and post treatment – minimum hourly for 3 hours. MO review prior to discharge	Continuous observations (HR, RR and O2 Sats). Observations pre and post treatment –initially Q 30min then MO review within 1 hour	Continuous cardiorespiratory monitoring (HR, RR and O2 Sats) Regular medical review
<b>Disposition</b>	Home if Salbutamol requirement >3hourly See 'Discharge Criteria'	Observe for 3 hours after last dose. If not suitable for discharge then – Admit or Transfer. Otherwise home.	Admit to Level 4 facility or above if improving or retrieve to Paediatric ICU (call NETS)

# Acute severity assessment

## Course of illness

The course of illness in childhood asthma is variable. Take into consideration the child's pattern of asthma, potential and identified trigger factors and their overall asthma medication management.

## Mild asthma – likely to go home

### Signs and symptoms

- oximetry in room air >94%
- able to talk in sentences (if normally able) or have a long vigorous cry
- no accessory muscle use
- alert and orientated

### Management

- no supplemental oxygen needed
- manage with salbutamol, Metered Dose Inhaler (MDI) and spacer.
  - salbutamol 100 micrograms. Give 6 puffs (children under 6 years) or 12 puffs (children 6 years and over). Repeat as necessary

## Monitoring and disposition

- consider oral prednisone (1-2mg/kg)
- observations pre and post treatment, minimum hourly for 3 hours.

## Moderate asthma – may be admitted to hospital or may improve and go home

### Signs and symptoms

- oximetry in room air 90 – 94%
- mild to moderate tachycardia for age
- able to talk in phrases (if normally able) or have a shortened cry
- mild to moderate accessory muscle use

### Management

- may need supplemental oxygen
- manage with salbutamol and ipratropium, MDI and spacer
  - salbutamol 100 micrograms. Give 6 puffs (children under 6 years) or 12 puffs (children 6 years and over)

- consider ipratropium<sup>3,4</sup> 20 micrograms 4 puffs (children under 6 years) or 8 puffs (children 6 years and over) every 20 minutes together with the 3 doses of salbutamol
- oral prednisone (1-2mg/kg)

## Monitoring and disposition

- continuous heart rate and oxygen saturation monitoring, observations pre & post treatment
- observe for 3 hours after last dose and if fine discharge after a further dose of therapy. Admit if not able to last 3 hours between doses.

**Severe and life threatening asthma – will be admitted +/- transferred to a higher level facility. Call for senior help locally. Consult PICU via NETS. If considered life threatening start with nebulisers, otherwise try spacers but switch to nebulisers if not improving**

## Signs and symptoms

- oximetry in room air <90%
- marked tachycardia but beware relative bradycardia for age
- able to talk in words (if normally able) with weak cry or unable to speak or cry

- moderate to severe accessory muscle use
- any of agitated, drowsy or confused is very concerning (indicates life threatening)

## Management

- supplemental oxygen
- manage with salbutamol and ipratropium, MDI and spacer
- salbutamol 100 micrograms  
Give 6 puffs (children under 6 years) or 12 puffs (children 6 years and over)
- consider ipratropium<sup>3,4</sup> 20 micrograms 4 puffs (children under 6 years) or 8 puffs (children 6 years and over) every 20 minutes together with the 3 doses of salbutamol
- if unable to manage MDI and spacer, treatment needs to be instigated via nebuliser. If still a poor response consider consultation with PICU and/or NETS.
- suggest intravenous steroids (for dosage see Page 8)
- consider blood gases and or chest x-ray (see over page in "tests")

## Monitoring and disposition

- continuous cardio-respiratory and oxygen saturation monitoring

- IV salbutamol, IV magnesium sulphate, IV aminophylline and non invasive ventilatory support (eg Continuous Positive Airway Pressure) may be considered in consultation with a PICU (contactable via NETS).
- admission or transfer to appropriate facility with staff and equipment to monitor, recognise and respond to changes in severity

Steroid dosage should be based on clinical response and reviews (usually up to 3 days is sufficient)

## Tests

No routine tests are needed for mild or moderate asthma. In life threatening asthma consider venous blood gases (a raised carbon dioxide indicates life-threatening fatigue), lactate and/or chest x-ray

- differential air-entry may indicate a pneumothorax
- another diagnosis (e.g. pneumonia or foreign body) should be considered if there is a failed response to bronchodilators

## Oxygen administration

Oxygen, in a humidified form, should be administered whenever hypoxia is suspected and the child has respiratory distress manifested by:

- marked tachycardia or a bradycardia

- dyspnoea, tachypnoea, bradypnoea, apnoea
- pallor, cyanosis
- lethargy or restlessness
- use of accessory muscles: nasal flaring, intercostal or sternal recession
- tracheal tug

Oxygen may be given via:

- nasal prongs (maximum flow rate 2 litres per minute)
- simple facemask (flow rate 6 to 10 litres per minute)
- non-rebreather facemask (flow rate > 10 litres per minute). May provide higher concentration of FiO<sub>2</sub> (> 60%) than is able to be provided with a standard face mask.

## Important nursing issues

Changes in a child's acute illness can be subtle. For this reason, wherever possible nurses caring for children with moderate or severe asthma should have experience in the monitoring and treatment of acutely ill children. Signs of deterioration include:

- increased work of breathing – subcostal or intercostal recession  
tracheal tug, increased respiratory rate
- worsening tachycardia or bradycardia
- increasing fatigue
- irritability, agitation or behavioural difficulties
- changes in speech and activity levels



- decreased interaction with parents
- decreased protest

## Discharge criteria

Children with acute asthma should be considered ready for discharge when clinically stable on three-hourly bronchodilator.

Clinical signs (heart rate, respiratory rate and overall improvement) are the primary criteria for discharge. Oxygen saturation is not the primary criterion for discharge as it remains unclear as to what is a “satisfactory” oxygen saturation level (for discharge).

At the time of discharge all patients/parents should receive

- a discharge summary
- discharge medications (including a spacer)
- an Asthma Action Plan (including post-discharge reducing medication plan)
- information outlining follow up arrangements
- contact details for an emergency (eg GP / hospital / ambulance)

## Treatment at home

This is often possible and preferable with mild asthma. Requirements include:

- appropriately informed, competent parent/s who can recognise signs of deterioration

- an Asthma Action Plan plus a decreasing medication plan
- out-of-hours access to help, telephone and transport
- an involved general practitioner
- providing parents with an asthma fact sheet and / or asthma resource pack

## Parent education

Admission to hospital is an opportunity for the provision of asthma education and also to review parental, and where appropriate the child’s, asthma knowledge, skills and confidence, including a review of the child’s inhaler technique. Smoking cessation advice should be given to parents, carers and children where appropriate<sup>5</sup>. Asthma education is the responsibility of all health professionals. Asthma education should commence as soon as possible to avoid unnecessary delays to discharge. This process should involve medical and nursing staff on the ward with support from an Asthma Educator where available. The education received must be consistent. Some children and their families will require a review by an Asthma Educator but not all children with asthma need to be seen by an Asthma Educator. If this process does not occur during admission referrals should be made through localised processes for Asthma Educator follow-up (Refer to Appendix Four)

# Asthma action plan for young people

An Asthma Action Plan is an individualised plan for the management of exacerbations. As health professionals we work with families to enable children and their families to understand the disease, the rationale for treatment, how to recognise deterioration and how to implement their Asthma Action Plan. The provision of clear written instructions to patients is good clinical practice<sup>6</sup>. There is evidence to suggest that a symptom-based Asthma Action Plan is superior to a peak flow Asthma Action Plan for preventing acute care visits although there is insufficient data to firmly conclude whether the observed superiority is conferred by greater adherence to the monitoring strategy, earlier identification of onset of deteriorations, higher threshold for presentation to acute care settings, or the specific treatment recommendations<sup>7</sup>.

Peak flow measurements are effort dependent. However, children with asthma are often unable and unwilling to provide maximal effort.

Programs which enable adults to adjust their medication using a written action plan appear to be more effective than other forms of asthma self-management.

The following links are for Asthma Action Plans:

The Children's Hospital at Westmead  
[http://www.chw.edu.au/parents/factsheets/pdf/asthma\\_action\\_plan.pdf](http://www.chw.edu.au/parents/factsheets/pdf/asthma_action_plan.pdf)

Sydney Children's Hospital  
[http://www.chw.edu.au/parents/factsheets/pdf/asthma\\_action\\_plan.pdf](http://www.chw.edu.au/parents/factsheets/pdf/asthma_action_plan.pdf)

John Hunter Children's Hospital  
<http://www.kaleidoscope.org.au/docs/Info/AsthmaAP.pdf>

The National Asthma Council  
[http://www.nationalasthma.org.au/images/stories/manage/pdf/2008\\_nac\\_waap\\_colour.pdf](http://www.nationalasthma.org.au/images/stories/manage/pdf/2008_nac_waap_colour.pdf)

The Royal Children's Hospital Melbourne  
<http://www.rch.org.au/clinicalguide/forms/asthmaPlan.cfm>

# Appendix 1 – Asthma resource pack for parents and carers

This resource pack has been developed by Sydney Children’s Hospital, The Children’s Hospital at Westmead and John Hunter Children’s Hospital, using current and best practice asthma information, to help you manage your child’s asthma. The information is for educational purposes only and does not replace individual medical advice. The Asthma Resource Pack can be accessed from all three of the Children’s Hospital’s Websites and can be printed as a whole pack or in individual sections. The Asthma Resource Pack is also available in Arabic, Vietnamese and Chinese languages.

The Asthma Resource Pack includes:

- Introduction and Discharge Checklist
- Contact List for Further Information
- What is Asthma?
- Asthma in Young Children
- Assessing the Severity of your Child’s Asthma Attack
- Responding to Asthma Symptoms
- Asthma Trigger Factors

- Asthma Medications Commonly Used For Children
- Additional Asthma Medications
- Giving Your Child Asthma Medications
- Using a Puffer and Spacer Device
- Cleaning Spacer Devices and Puffers
- Using Other Asthma Inhalation Devices
- Helpful Tips for Managing Your Child’s Asthma
- Asthma Action Plan for Children and Young People (Example Only)
- Daily Asthma Symptom Diary – (Blank Copy)
- Child / Student Asthma First Aid Information Record - (Blank Copy - for use by preschools, kindergartens, before & after school care and vacation care facilities, as well as schools.)

<http://kidshealth.schn.health.nsw.gov.au/sites/kidshealth.schn.health.nsw.gov.au/files/fact-sheets/pdf/children039s-asthma-resource-pack-parents-and-carers.pdf>

# Appendix 2 – Parent information sheet - What is asthma?

A “What is Asthma” Fact Sheet has been jointly developed by staff from all of the The Children’s Hospital at Westmead, Sydney Children’s Hospital and JHCH / Kaleidoscope Hunter Children’s Health Network

The “What is Asthma” Fact Sheet is available at:

<http://kidshealth.schn.health.nsw.gov.au/fact-sheets/chest-lungs/what-asthma>

<http://kidshealth.schn.health.nsw.gov.au/sites/kidshealth.schn.health.nsw.gov.au/files/fact-sheets/pdf/what-asthma.pdf>

This document was reviewed on 4 August 2010.

Disclaimer: This fact sheet is for educational purposes only. Please consult with your doctor or other health professional to make sure this information is right for your child.

# Appendix 3 – Asthma management in schools and childcare

It is important that parents provide schools and childcare staff with detailed information about their child's asthma management as well as instructions to follow for an acute asthma attack. Various student and childcare asthma records have been developed specifically for this use, with parents either electing to follow the **Asthma First Aid Protocol** ([http://www.asthmafoundation.org.au/asthma\\_first\\_aid.aspx](http://www.asthmafoundation.org.au/asthma_first_aid.aspx)) or attaching their child's individual **Asthma Action Plan** as their preferred asthma first aid instructions.

The National Asthma Council and Asthma Foundations have adopted the **Asthma First Aid Protocol** as being the standard asthma first aid procedure to follow in a community setting, based on the guidelines set by the Thoracic Society of Australia & New Zealand. This safe and easy to follow "4 x 4 x 4" asthma first aid protocol allows for a **gradual dose accumulation** of salbutamol to a maximum of 12 puffs. It is the Asthma First Aid Protocol that school and childcare staff members are trained to follow by the various emergency asthma management programs e.g. Asthma Friendly School Program, and is effective for the majority of children experiencing an acute asthma attack in a community setting.

For those children who have severe, persistent, or troublesome asthma, requiring specific daily or frequent management intervention, the child's **Asthma Action Plan** may be more appropriate for school or childcare use. It differs from the asthma first aid protocol in that it is individualised for each child to incorporate graduated steps to follow for day to day asthma symptom management, leading to management for an acute episode, which may include the "4 x 4 x 4" protocol, or more intensive asthma first aid instructions. As the Asthma Action Plan requires a more subjective assessment of asthma symptoms, it is important that parents discuss their child's Asthma Action Plan with school and childcare staff so that instructions are clear and well understood. A copy of the Asthma Action Plan should be given to the staff.

# Appendix 4 – Basic asthma education checklist

## Asthma Signs and Symptoms

- Explain that asthma is an inflammatory condition. Airway changes that occur are tightening of the smooth muscle, inflammation and mucus production
- Discuss how to identify and monitor the signs and symptoms of asthma (cough, breathlessness, prolonged expiratory phase and wheeze)
- Discuss the differences between mild, moderate and severe acute episode of asthma versus the interval (background) pattern of asthma
- Discuss the common trigger factors in childhood asthma
- Discuss factors which can make asthma more difficult to treat (allergic rhinitis / sinusitis)

## 1. Role of Reliever, Oral Steroids and Preventer Medications

- Discuss the role of reliever/oral steroids medications (acute management) and preventer medications (interval management)

- Discuss the frequency of use and doses for acute and if applicable interval medication management. If currently taking or starting a preventer medication, to reinforce the need for long-term adherence to preventive therapy
- Discuss the actions, potential side effects and need for spacer.

## 2. Use and checking technique of Inhalation devices

- Spacer and puffer education is essential
- If required, education on alternative devices (dry powder or autohaler for older children only)
- Demonstrate and check technique with device (use one device for all medications)
- Discuss cleaning and care of inhalation device and spacer

### 3. Discharge Planning

- Discuss the use of the Reducing Medication with use of a “Weaning Plan” on discharge
- Provide an Asthma Action Plan for future asthma management (how to monitor and manage acute and interval asthma)
- Suggest follow-up with Local Family Doctor within 3-5 days of discharge
- Inform if follow-up is required with a Paediatrician and/or Respiratory Specialist

#### Optional:

- Referral to local Asthma Education Service and/or appropriate Paediatric Outreach Service
- Provide a copy of The “*Children’s Asthma Resource Pack for Parents and Carers*” found at:  
<http://kidshealth.schn.health.nsw.gov.au/sites/kidshealth.schn.health.nsw.gov.au/files/fact-sheets/pdf/children039s-asthma-resource-pack-parents-and-carers.pdf>

- Smoking Cessation Intervention- Car and Home Smoke Free Brochure, QUIT Pack and QUIT Line 131 848 or <http://www.13quit.org.au/>
- Optional to discuss and/or to give parent/s information on the Community Programs such as Asthma Child and Adolescent Program at <http://www.asthmaaustralia.org.au/cgi-bin/wrapper.pl?c1=acaap>
- Provide multilingual fact sheets where appropriate from Asthma Victoria at [www.asthma.org.au](http://www.asthma.org.au)
- Refer to the Asthma Foundation First Aid Plan [http://www.asthmafoundation.org.au/asthma\\_first\\_aid.aspx](http://www.asthmafoundation.org.au/asthma_first_aid.aspx)

# Appendix 5 – Environmental tobacco smoke

Tobacco smoke contains over 4,000 chemicals and the effects on your child's health can be very serious. When a person smokes near a child, (s)he is exposed to passive smoking (breathing in smoke from other peoples' cigarettes). The smoke that the child inhales is commonly known as Environmental Tobacco Smoke (ETS). There are two forms of ETS firstly main stream smoke is breathed out by a smoker, and secondly side stream smoke is from the burning end of a cigarette. The side stream smoke tends to remain in a room longer than mainstream smoke and also contains many cancer causing substances.

## For children, exposure to ETS can result in:

- a higher risk of having asthma symptoms before the age of 5 years
- an increase in asthma attacks and an increase in the severity of those attacks
- an increase in the number of days a child has symptoms (ie will cough)
- respiratory infections such as bronchiolitis
- middle ear infections
- sudden infant death syndrome.

## What you can do...

**The most important thing you can do for the the health of your child is to stop smoking.**

Help is available for you from:

NSW QUIT Line - 13 QUIT (13 7848)  
[www.13quit.org.au](http://www.13quit.org.au)

- **A free, confidential telephone service designed to help smokers to quit smoking.**
- **Open 24 hours a day, 7 days a week for recorded information and to order a Quit Kit.**

OR

**Talk with your doctor, paediatrician, specialist, asthma educator for further information on how to quit smoking and how to keep both your car and home smoke free.**

If you are a smoker and not ready to give up smoking and if your friends and family smoke around your child:

- Make both your car and home smoke free:
  - do not smoke in your car.



- ask people who smoke to go outside. Remember opening windows and doors will not protect your child from ETS.
- wear additional clothing then remove it after smoking and wash your hands before returning to your child.
- display signs and or stickers that your home and car is a smoke free zone.
- Avoid taking your child to places where people smoke.
- It is important that women do not smoke when pregnant or breastfeeding.

From 1st July 2009 smoking in a car with a child under the age of 16 years incurs a \$250 on the spot fine.

# Appendix 6 – Evidence base for recommendations

## Assess severity of acute asthma

The table summarising the assessment of the severity of an acute episode of asthma is based on the consensus opinion of Australasian pediatric respiratory physicians. A similar version appears in the National asthma handbook<sup>8</sup>.

Oxygen saturation is a poor predictor of the need for hospitalisation, high oxygen saturation is a good predictor of not needing hospitalisation<sup>9</sup>.

National Asthma Council 2006 and updates from NAC website may be accessed at [www.nationalasthma.org.au](http://www.nationalasthma.org.au). Asthma Management Handbook, Melbourne.

## Metered dose inhalers with spacers versus nebulisers

A Cochrane review has shown that metered dose inhalers (MDI) with spacers produce outcomes that are at least equivalent to nebuliser delivery<sup>10, 11</sup>. Holding chambers could have some advantages compared to nebulisers for children with acute asthma including compliance, shorter length of stay in emergency and lower pulse rates<sup>10</sup>. MDI spacer is considered the mainstay

of therapy in adults as well as children<sup>10</sup>. All three NSW Children's Hospital emergency departments use spacers in children with mild or moderate asthma.

## Dose equivalence of metered dose inhalers with spacers versus nebulisers

Equivalent efficacy is obtained with an MDI dose around 1/6 of that used in nebulisation<sup>8</sup>. The National Asthma Council recommends slightly higher doses<sup>8</sup>. Therefore, 4-6 x100 microgram doses via MDI is equivalent to 2.5 mg via nebuliser and 8-12 x100 micrograms via MDI is equivalent to 5 mg nebulised.

National Asthma Council 2006 and updates from NAC website accessed at [www.nationalasthma.org.au](http://www.nationalasthma.org.au) Asthma Management Handbook, Melbourne.

## Steroids

Use of corticosteroids within the first hour for acute asthma in the Emergency Department reduces admission rates, most notably in those with more severe asthma<sup>12</sup>. A short course of corticosteroids in an acute exacerbation of asthma significantly reduces the relapse rate. Further doses of oral steroids are usually not required once the child has improved

sufficiently for discharge<sup>12</sup>. There is insufficient evidence whether inhaled corticosteroids produce significant clinical changes in acute asthma, are as effective as systemic corticosteroids or offer additional benefit in combination with systemic corticosteroids<sup>13</sup>. There is a lack of evidence for the benefits of steroids for preschoolers for viral induced wheeze<sup>14</sup>.

## **Intravenous salbutamol**

Consensus opinion of pediatric respiratory physicians supports administration of intravenous salbutamol when no response to inhaled salbutamol in severe and life-threatening asthma. The data on optimal dose and duration of treatment are limited<sup>15, 16, 17</sup>.

# Appendix 7 – References

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# Appendix 8 – Additional resources

Asthma Management Handbook.  
National Asthma Council 2006.

Asthma NSW

**[www.asthmansw.org.au](http://www.asthmansw.org.au)**

The Asthma Resource Pack for Parents  
and Carers can be accessed at the  
following website:

[http://kidshealth.schn.health.nsw.gov.au/  
sites/kidshealth.schn.health.nsw.gov.au/  
files/fact-sheets/pdf/children039s-asthma-  
resource-packparentsand-carers.pdf](http://kidshealth.schn.health.nsw.gov.au/sites/kidshealth.schn.health.nsw.gov.au/files/fact-sheets/pdf/children039s-asthma-resource-packparentsand-carers.pdf)

# Appendix 9 – Acute asthma clinical expert reference group

Dr Laurence Roddick	Staff Specialist General and Respiratory Medicine, John Hunter Children’s Hospital (Co Chair)
Dr Hiran Selvaduarai	Staff Specialist Respiratory Medicine, Sydney Children’s Hospital Network (Westmead) (Co Chair)
Ms Karyn Fahy	Western Child Health Network Coordinator (Secretariat)
Professor Peter Van Asperen	Head, Department of Respiratory Medicine, Sydney Children’s Hospital Network (Westmead)
Ms Tracey Marshall	Clinical Nurse Consultant Asthma Education, Sydney Children’s Hospital Network (Westmead)
Ms Lin Davis	Area Clinical Nurse Consultant – Rural Trauma, Tamworth Hospital
Ms Catherine Rice	Paediatric Clinical Nurse Consultant – Broken Hill
Dr Matthew Chu	Director Emergency Department, Canterbury Hospital
Dr Stephen Jacobe	Paediatric Intensivist, Sydney Children’s Hospital Network (Westmead)
Dr Matthew O’Meara	Paediatric Emergency Physician, Sydney Children’s Hospital Network (Randwick)
Ms Bernadette Goddard	Paediatric Respiratory & CF Clinical Nurse Consultant, John Hunter Children’s Hospital
Mr Wayne Phillips	Paediatric Clinical Nurse Consultant, Fairfield Hospital
Ms Helen Stevens	Paediatric Clinical Nurse Consultant, Hunter New England Local Health District (Northern Region)
Mr Tomas Ratoni	Paediatric Clinical Nurse Consultant, North Coast Local Health District

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