Clinical Guideline

Management of Acute Asthma in Children

Policy developed by: SA Child Health Clinical Network
Approved by SA Health Safety & Strategic Governance Committee on: 1 July 2013
Next review due: 31 May 2016

Summary
The Management of Acute Asthma in Children Clinical Guideline is primarily aimed at medical staff working in any of primary care, local, regional, general or tertiary hospitals, however may be utilised or guide the care provided by other clinicians such as nurses. The information is current at the time of publication and provides a minimum standard for the assessment (including investigations) and management of acute asthma; it does not replace or remove clinical judgement or the professional care and duty necessary for each specific case.

Keywords
Wheeze, cyanosis, respiration, inhaler, cough, bronchodilators, pulmonary function, trigger, respiratory distress, pulse oximetry, clinical guideline

Policy history
Is this a new policy? Y
Does this policy amend or update an existing policy? Y
Does this policy replace an existing policy? Y
If so, which policies?
Management of Acute Asthma in Children, WCH Guideline

Applies to
All Health Networks
CALHN, SALHN, NALHN, CHSALHN, WCHN, SAAS

Staff impact
All Clinical, Medical, Nursing, Allied Health, Emergency, Dental, Mental Health, Pathology

PDS reference
CG095

Version control and change history

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<th>Version</th>
<th>Date from</th>
<th>Date to</th>
<th>Amendment</th>
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<td>1.0</td>
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<td>2.0</td>
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Management of acute asthma in children

May 2013
Disclaimer
The South Australian Paediatric Clinical Guidelines have been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach.

Information in this guideline is current at the time of publication.

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Although the clinical material offered in this guideline provides a minimum standard it does not replace or remove clinical judgement or the professional care and duty necessary for each specific patient case. Where care deviates from that indicated in the guideline contemporaneous documentation with explanation should be provided.

This guideline does not address all the elements of guideline practice and assumes that the individual clinicians are responsible to:

- discuss care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes the use of interpreter services where necessary,
- advise consumers of their choice and ensure informed consent is obtained,
- provide care within scope of practice, meet all legislative requirements and maintain standards of professional conduct and
- document all care in accordance with mandatory and local requirements.

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Endorsed by South Australian Paediatric Clinical Guidelines Reference Committee
South Australian Child Health Clinical Network
Contact: South Australian Paediatric Clinical Guidelines Reference Committee: cywhs.paediatricclinicalguidelines@health.sa.gov.au
### Assessment and management summary for acute asthma

<table>
<thead>
<tr>
<th>Severity</th>
<th>Signs of Severity</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mild</strong></td>
<td>Normal mental state</td>
<td><strong>Salbutamol</strong> by MDI/spacer once and review after 20 – 60 minutes &lt;6 years - 6 puffs (600 microgram) ≥6 years - 12 puffs (1200 microgram) Children under 4 years can use a face mask with a spacer</td>
</tr>
<tr>
<td></td>
<td>Subtle or no accessory muscle use/recession</td>
<td><em>For those using Symbicort (budesonide/efomoterol) as combined preventer &amp; reliever (reserved for children over the age of 12 years): give additional inhalations as required by symptoms up to a maximum of 6 additional puffs with a maximum total of 12 inhalations per day (including maintenance doses). If inadequate response, treat using Salbutamol as above</em></td>
</tr>
<tr>
<td></td>
<td>Talking normally</td>
<td>Good response - home on inhaled β₂-agonist (salbutamol or terbutaline) as needed</td>
</tr>
<tr>
<td></td>
<td>SaO₂ usually &gt; 95% in air</td>
<td>Poor response - treat as moderate</td>
</tr>
<tr>
<td></td>
<td>Some accessory muscle use or recession</td>
<td><strong>Consider oral prednisolone</strong> for 1-3 days if on preventer or episode has persisted over several days Give 2mg/kg/day (maximum dose 60mg) for initial dose and 1mg/kg for subsequent doses Use multiples of 5mg for ease of administration</td>
</tr>
<tr>
<td></td>
<td>Tachycardia</td>
<td>Discharge with discharge plan and action plan (see appendix 4)</td>
</tr>
<tr>
<td></td>
<td>Talks in short sentences</td>
<td><strong>Consider referral to hospital</strong> Use SAAS if oxygen requirement or concern regarding possible deterioration Discharge home only if has improved significantly and parents can access medical support if deteriorates Discharge with discharge plan and action plan (see appendix 4)</td>
</tr>
<tr>
<td></td>
<td>SaO₂ usually 92-95% in air</td>
<td><strong>Give oxygen</strong> if SaO₂ is &lt; 93% (if available)</td>
</tr>
<tr>
<td><strong>Moderate</strong></td>
<td>Normal mental state</td>
<td><strong>Salbutamol</strong> by MDI/spacer - 3 doses 20 minutely &lt;6 years - 6 puffs (600 microgram) ≥6 years - 12 puffs (1200 microgram) Children under 4 years can use a face mask with a spacer Review 10-20 min after 3rd dose to decide on further management</td>
</tr>
<tr>
<td></td>
<td>Some accessory muscle use or recession</td>
<td>Oral <em>prednisolone</em> for 3-5 days Give 2mg/kg/day (maximum dose 60mg) for initial dose and 1mg/kg for subsequent doses Use multiples of 5mg for ease of administration</td>
</tr>
<tr>
<td></td>
<td>Tachycardia</td>
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</tr>
<tr>
<td>Severe</td>
<td>Moderate-marked accessory muscle use or recession</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Agitated/distressed</td>
<td>Moderate-marked accessory muscle use or recession</td>
<td></td>
</tr>
<tr>
<td>Tachycardia</td>
<td>Tachycardia</td>
<td></td>
</tr>
<tr>
<td>Talks in single words</td>
<td>Talks in single words</td>
<td></td>
</tr>
<tr>
<td>Note: wheeze is a poor predictor of severity.</td>
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<td></td>
</tr>
<tr>
<td>SaO₂ usually &lt; 92% in air</td>
<td>SaO₂ usually &lt; 92% in air</td>
<td></td>
</tr>
</tbody>
</table>

- **Involve senior help** early (e.g. Consultant, MET team or consider calling for advice [13STAR or local emergency dept])

- **Oxygen** to keep saturations ≥ 93% (if available)

- **Salbutamol** by nebuliser - 3 doses 20 minutely
  - <6 years - 2.5mg nebulised
  - ≥6 years - 5mg nebulised

- Review ongoing requirements every 10-20 minutes after 3rd dose.
  - If improving, reduce frequency, if no change, continue 20 minutely.
  - If deteriorating at any stage treat as critical

- **Ipratropium** (250microgram) via nebuliser 3 times in 1st hour (20 minutely, added to Salbutamol)

- Wean at same rate as Salbutamol and cease once on 1-2hrly

- **Oxygen** to keep saturations ≥ 93% (if available)

- **Prehnisolone**
  - Give 2mg/kg/day (maximum dose 60mg) for initial dose and 1mg/kg for subsequent doses

- Use multiples of 5mg for ease of administration

- If vomiting or cannot take oral medications give IV **hydrocortisone** 4mg/kg 6hrly

- Transfer to hospital via SAAS

- Consider retrieval via MedStar Kids – 13STAR

<table>
<thead>
<tr>
<th>Critical</th>
<th>Confused/drowsy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximal accessory muscle use or recession</td>
<td>Maximal accessory muscle use or recession</td>
</tr>
<tr>
<td>Exhaustion</td>
<td>Exhaustion</td>
</tr>
<tr>
<td>Marked tachycardia</td>
<td>Marked tachycardia</td>
</tr>
<tr>
<td>Unable to talk</td>
<td>Unable to talk</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>Cyanosis</td>
</tr>
</tbody>
</table>

- **Involve Paediatric Specialist help** early (e.g Consultant, PICU, MET team or call for assistance MedStar Kids – 13STAR)

- **High flow oxygen** (10-15L/min). Use a mask with reservoir if available

- Continuous nebulised **Salbutamol** using 4mL of 0.5% nebuliser solution **undiluted**, refilled as required or 5mg nebulas if solution unavailable

- Nebulised **Ipratropium** (250microgram) 3 times in 1st hour (20 minutely, added to Salbutamol)

- Wean at same rate as Salbutamol and cease once on 1-2hrly

- **Hydrocortisone** 4mg/kg 6hrly IV

- If deteriorating or no improvement, give IV **Magnesium Sulphate** (0.1mmol/kg/dose over 20 to 30minutes, maximum dose 8mmol)
  - **OR**
  - **IV Salbutamol** bolus:
    - 5microgram/kg/min for 1 hour then consider infusion

- Use the medication not given initially if inadequate response

- **In pre-hospital setting** consider **Adrenaline** IM - 10microgram/kg (0.01mL/kg adrenaline 1:1 000). Maximum dose 500microg (0.5 mL)

- Contact MedStar Kids (13STAR) for further advice or retrieval

- Consider **Salbutamol OR Aminophylline** infusions,(See appendix 6)
Important Points

- Children with asthma should have their severity assessed clinically.
- Salbutamol via metered dose inhaler (MDI/puffer) and spacer is the key emergency treatment.
- Corticosteroid therapy should be considered for most exacerbations.
- Long term management should be reviewed during any acute presentation.

Introduction

- Asthma is one of the commonest conditions in childhood. At any point in time 1 in 9 Australian children will have the diagnosis.
- It is one of the commonest causes for presentation to primary care, emergency departments and for admission to hospital.
- The diagnosis of asthma is usually clinical and should be considered in a child with cough, wheeze or difficulty breathing but may be aided by response to bronchodilators and pulmonary function tests.
- Children who present with an acute episode of asthma may also have had recurrent or persistent symptoms for some time. An acute presentation provides an opportunity to review long term management and any problems should be identified and arrangements made for continuing care.

Exclusions

Most children should be managed according to this guideline. The following children may need to be managed differently:

- Patients admitted to ICU with life-threatening asthma.
- Patients under the care of the WCH Respiratory team.
- Patients who have underlying medical conditions which may affect their respiratory status (e.g. other respiratory disease, heart disease, neuromuscular disorders).
- Infants under 1 year of age.

Definitions & Acronyms

MDI – Metered Dose Inhaler
HDU – High Dependency Unit
ICS – Inhaled Corticosteroid
MedStar Kids – South Australian emergency retrieval and advice service. Call 13STAR (137827) 24 hours per day
MET – Medical Emergency Team
PICU – Paediatric intensive care unit
SAAS – South Australian Ambulance Service
WCH – Women’s and Children’s Hospital
Assessment

History
Where appropriate and possible, a pre-printed template for asthma assessments should be used. See appendix 3 for the WCH Paediatric Emergency Department template. The following areas should be covered unless previously recorded:

- Acute presenting history
  - Trigger
  - Treatment already given and response
- Past asthma history
  - When diagnosed
  - Previous admissions including to ICU
  - Known triggers
  - Interval symptoms
  - Smoking exposure
  - Current and past treatment including compliance and devices used
  - Other atopic conditions including food allergies
  - Family history of atopic conditions
- If previously diagnosed
  - Who currently manages the child’s asthma
  - Dates of last review & next planned review
- Standard history as per any other patient
  - Past medical history
  - Family history
  - Immunisations
  - Medications and allergies
  - Psychosocial history
  - Developmental history

Examination
Key points to be noted include:
Degree of respiratory distress (see management table)
  - Respiratory rate - compare to age-appropriate normal ranges (see appendix 2)
  - Use of accessory muscles and recession
  - Posture or position
  - Oxygen saturation if available
  - Ability to talk in phrases, sentences or words
  - Ability to feed
- Any clinical signs of major atelectasis or pneumothorax
- Mental state (alertness and responsiveness)
- Heart rate - compare to age-appropriate normal ranges (see appendix 2). Remember that $\beta_2$-agonists (Salbutamol, Terbutaline, Eformoterol) will increase the heart rate.

Pulse oximetry should be performed if available. A small decrease in oxygen saturations commonly occurs after initial bronchodilator treatment and should be put into the context of the child’s clinical condition and response to treatment. Significant hypoxia is an indicator of more severe asthma.

Peak flow has little use in acute asthma and clinical assessment is the best indicator of severity.
Investigations

Generally no investigations are required in assessing acute asthma.

- **Chest x-ray** – consider in patients presenting with first episode of wheeze, particularly if doubt about diagnosis. Children with known asthma do not require a CXR unless there is a suspicion of pneumothorax or major collapse/consolidation. Some degree of asymmetry of signs is common.

- **Blood tests (including blood gases)** – not routinely required.

- **Nasopharyngeal aspirate for respiratory viruses** – may be taken where identifying a viral pathogen may be useful (e.g. illness not classical of asthma) or for cohorting purposes.

Consider other causes of wheeze (eg. bronchiolitis, viral pneumonitis, aspiration, foreign body aspiration, cardiac failure, congenital airway abnormalities). Many viral lower respiratory infections will respond to bronchodilators as well.

Management

Children should be initially assessed and managed as per the table below.

Assessment and management summary

See summary above.

Medication Doses:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adrenaline (IM)</strong></td>
<td>10microgram/kg (0.01mL/kg adrenaline 1:1 000) (Maximum dose 500microg (0.5 mL))</td>
</tr>
<tr>
<td><strong>Aminophylline (IV)</strong></td>
<td>Loading dose of 5mg/kg (maximum 500mg) over at least 60 minutes followed by an infusion of: &lt;12 years – 1 mg/kg/hour 12 years to adult – 0.5 to 0.7 mg/kg/hour</td>
</tr>
<tr>
<td><strong>Hydrocortisone (IV)</strong></td>
<td>4mg/kg 6hrly (Maximum dose 200mg)</td>
</tr>
<tr>
<td><strong>Ipratropium (Inhaled)</strong></td>
<td>&lt;6 years - 4 puffs via MDI (20microgram/puff) or 250microgram nebulised ≥6 years - 8 puffs via MDI (20microgram/puff) or 250microgram nebulised</td>
</tr>
<tr>
<td><strong>Magnesium Sulphate (IV)</strong></td>
<td>0.1mmol/kg/dose over 20 to 30minutes (Maximum dose 8mmol)</td>
</tr>
<tr>
<td><strong>Prednisolone (Oral)</strong></td>
<td>2mg/kg/day (Maximum dose 60mg) for initial dose and 1mg/kg for subsequent doses. Use multiples of 5mg for ease of administration.</td>
</tr>
<tr>
<td><strong>Salbutamol (Inhaled)</strong></td>
<td>&lt;6 years - 6 puffs (600 microgram) via spacer or 2.5mg nebulised ≥6 years -12 puffs (1200 microgram) via spacer or 5mg nebulised Children under 4 years can use a face mask with a spacer</td>
</tr>
<tr>
<td><strong>Salbutamol continuous nebulisation (Inhaled)</strong></td>
<td>5mg nebulne then refill as required with 5mg neubles or 4mL of 0.5% nebuliser solution, refilled as required</td>
</tr>
<tr>
<td><strong>Salbutamol (IV)</strong></td>
<td>Bolus: 5microgram/kg/min for first hour then consider infusion. Infusion: 1-2 microgram/kg/min</td>
</tr>
</tbody>
</table>
Admission and discharge criteria

**Discharge from Emergency Dept or other acute care setting:**
- Patients may be discharged home if:
  - tolerating 3 hours between bronchodilator doses,
  - normal saturations in air,
  - sensible carers and easy access to medical care in the event of an acute deterioration.
- **Education**
  - All patients & families should have their level of asthma knowledge reviewed and appropriate education given.
  - Ensure that the patient’s/carer’s device technique is correct. Patients and families should go home with written education material including an action and discharge plan. See appendix 2.
- **Discharge medications**
  - Salbutamol initially 3-4 hourly with a weaning plan over the next 3-4 days.
  - Continue oral Prednisolone to finish 3-5 days (no need for a weaning dose for courses less than 14 days).
- Inhaler device and spacer technique should be checked before discharge.
- Advise parents to seek further medical attention should the child’s condition deteriorate or if there is no significant improvement within 48 hours. Parents should be educated on recognising signs of deterioration.
- Advise GP review in 1-2 weeks and, if possible, arrange GP appointment prior to discharge
- In severe asthma, consider specialist referral – see appendix 5.
- Consider preventive treatment if there are frequent acute episodes or interval symptoms between acute episodes (more than one disturbed night per week, difficulty participating in physical activities or bronchodilator use on more than three days per week). See appendix 1.

**Admission criteria (this may require transfer to a hospital with paediatric facilities):**
- Bronchodilator requirement more frequently than 3 hourly,
- Oxygen requirement,
- Other factors make discharge unsafe (e.g. social issues, lack of understanding, lack of ability to represent if worsens).

**Consider admission to HDU/PICU/MedStar Kids retrieval:**
- Signs of critical asthma severity,
- requiring continuous nebulisers for >1 hour without improvement,
- requiring Salbutamol more frequently than every 30 minutes after 2 hours,
- hypoxia despite maximal oxygen or raised CO₂.

**Inpatient management**
Review regularly as dictated by degree of severity.
**Weaning Salbutamol:**
- Wean by extending time between doses by 30-60 mins aiming for 3 hours or greater between doses.
- A medical review is required if a patient deteriorates or requires more frequent Salbutamol than previously.

Preventive treatment should be commenced if there are interval symptoms between acute episodes (more than one disturbed night per week, difficulty participating in physical activities, or bronchodilator use on more than three days per week). It should be considered if there are frequent acute episodes. See appendix 1.

If commencing preventive treatment emphasise the importance of ongoing review and arrange follow up if none is in place.

Careful attention must be paid to the delivery system chosen. Where using a puffer, spacer devices should be used at all ages. A well-sealing face mask should be used in younger children (usually < 4 years) but children over 4 years should use the mouthpiece on the spacer. Consider Turbuhalers and Accuhalers in older children and adolescents.

All patients admitted with life threatening asthma (severe enough to require ICU admission) should be reviewed by a Paediatric Respiratory Physician.

**Education**
- All patients & families should have their level of asthma knowledge reviewed and appropriate education given.
- Ensure that the patient's/carer's device technique is correct.
- If parents/carers smoke, ensure they are aware of the importance of a non-smoking environment and offer information on quitting if possible.
- Patients and families should go home with written education material including an action and discharge plan. See appendix 4.

**Discharge from hospital**
- Patients can be safely discharged if they are stable after 2 consecutive 3 hour periods between Salbutamol doses.
- Discharge medications:
  - Salbutamol usually 3-4 hourly with a weaning plan over the next 3-4 days.
  - Continue oral Prednisolone to finish 3-5 days (no need for a weaning dose for courses less than 14 days).
  - Preventer if required.

- Arrange follow up - GPs can manage the majority of patients with asthma. Follow up within the next 7 to 10 days is suggested and ideally, an appointment should be made prior to leaving the ward.
- Consider preventive treatment if there are frequent acute episodes or interval symptoms between acute episodes (more than one disturbed night per week, difficulty participating in physical activities or bronchodilator use on more than three days per week). See appendix 1.
- Consider specialist referral for patients with severe or difficult to control asthma. See appendix 5.
- Patients with the following should be considered for referral to an asthma educator or a community asthma nurse:
  - Newly diagnosed asthma
  - Poorly controlled asthma
  - Severe asthma e.g. requiring PICU
Compliance issues
Concerns regarding home management
Patients from a non-English speaking background

- Encourage SA Ambulance cover.

References
The South Australian statewide guideline on the management of acute asthma is based on the British Thoracic Society & Scottish Intercollegiate Guidelines Network, British Guideline on the Management of Asthma, Revised June 2009.

No additional literature searches were conducted.

Other guidelines reviewed:
- NSW Asthma Guideline - NSW Department of Health 2004
- Starship Paediatric Health Clinical Practice Guidelines - Management of acute asthma and Management of life-threatening asthma (content reproduced with the permission of Dr Raewyn Gavin)
- Royal Children’s Hospital guideline - Asthma (Acute) Guideline (content reproduced with the permission of Dr Mike South)

Other information sources:
- Royal Children’s Hospital Paediatric Pharmacopoeia 13th Edition - accessed online
- Rowe BH, Bretzlaff J, Bourdon C, Bota G, Blitz S, Camargo CA. Magnesium sulfate for treating exacerbations of acute asthma in the emergency department. Cochrane Database of Systematic Reviews 2000, Issue 1
- Sunit Singhi, Joseph L. Mathew and Paul Torzillo What is the role of subcutaneous adrenaline in the management of acute asthma? International Child Health Review Collaboration
- Women’s and Children’s Hospital IV Salbutamol guidelines – WCH Pharmacy Dept 12/6/09
- Women’s and Children’s Hospital IV Aminophylline guidelines – WCH Pharmacy Dept 30/05/08
- Australian Medicines Handbook – 2010
- British National Formulary for Children - 2010-2011

Information for parents
Asthma Foundation SA
The Asthma Foundation SA offers a range of programs and services, and conducts information sessions for people with asthma and their carers.

Breathe Better Information Line 1800 645 130
www.asthmasa.org.au

An Asthma SA Asthma Control Pack should ideally be given to each patient at diagnosis. They can be ordered from the website.

See www.wch.sa.gov.au/asthma_action for handouts on device use and spacer care.

National asthma council website - www.nationalasthma.org.au
QuitSA - www.quitsa.org.au

SAAS membership - www.saambulance.com.au (see products and services)

**Companion documents**
Dept of Education and Child Development Healthcare forms including asthma specific forms and medication authority. Medical Director compatible forms can be downloaded.
Appendix 1 - Approach to preventive therapy in children

Initial therapy (according to severity)*

Oral montelukast

or

Low dose ICS

Stop montelukast and start low dose ICS

If control not achieved

If control not achieved

If control not achieved

Increase ICS dose

Add long-acting beta2 agonist or
Add montelukast or
Increase ICS dose

Increase ICS to maximal dose

*ICS recommended as first line therapy for children with moderate or severe asthma

**Indicative inhaled corticosteroid (ICS) equivalents (per day)**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciclesonide (Alvesco)</td>
<td>&lt; 160 mcg</td>
<td>≥ 160 mcg</td>
</tr>
<tr>
<td>Beclomethasone dipropionate (Qvar)</td>
<td>&lt; 200 mcg</td>
<td>≥ 200 mcg</td>
</tr>
<tr>
<td>Fluticasone propionate (Flixotide)</td>
<td>&lt; 200 mcg</td>
<td>≥ 200 mcg</td>
</tr>
<tr>
<td>Budesonide (Pulmicort)</td>
<td>&lt; 400 mcg</td>
<td>≥ 400 mcg</td>
</tr>
</tbody>
</table>

Appendix 2 - Paediatric normal ranges

Respiratory Rate (at rest)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Respiratory rate (breaths/minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>30-40</td>
</tr>
<tr>
<td>1-2</td>
<td>25-35</td>
</tr>
<tr>
<td>2-5</td>
<td>25-30</td>
</tr>
<tr>
<td>5-12</td>
<td>20-25</td>
</tr>
<tr>
<td>&gt;12</td>
<td>15-20</td>
</tr>
</tbody>
</table>

Heart Rate (at rest)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Heart rate (beats/minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>110-160</td>
</tr>
<tr>
<td>1-2</td>
<td>100-150</td>
</tr>
<tr>
<td>2-5</td>
<td>95-140</td>
</tr>
<tr>
<td>5-12</td>
<td>80-120</td>
</tr>
<tr>
<td>&gt;12</td>
<td>60-100</td>
</tr>
</tbody>
</table>
Appendix 4 - Discharge pack

- See www.asthmasa.org.au or www.nationalasthma.org.au for various other written action plans
- See www.wch.sa.gov.au/asthma_action for handouts on device use and spacer care.
- Discharge plan (fill in the grey blank spaces or use the drop down boxes)
- Dept of Education and Child Development healthcare plans
- WCHN Asthma Parent and Carer Information booklet
Appendix 5 – Public paediatric specialist referral centres

- Women’s and Children’s Hospital - General Medicine and Respiratory outpatients
- Flinders Medical Centre - General Medicine outpatients
- Lyell McEwen Hospital - General Medicine outpatients
- Modbury Hospital
- Mt Gambier Hospital
- Pt Augusta Hospital

There are many private paediatricians in Adelaide and Regional centres.
Appendix 6 - Salbutamol & Aminophylline infusions

Remember if child is improving therapy can be de-escalated at any stage

IV Salbutamol bolus
- Under 2 years - 5 microg/kg over 5 minutes.
- Over 2 years – 15 microg/kg over 5 minutes (Maximum dose 250 micrograms). Give in a minimum volume of 5ml (can be diluted with 0.9% sodium chloride).
- Repeat dose at 15 minutes if still not improving.

Salbutamol Infusion

Dose
5 -10 microgram/kg/min for 1 hour then reduce to 1 - 2 microgram/kg/min

Administration Infuse undiluted via a syringe driver.

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Infusion rate to achieve 1mcg/kg/min (ml/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.6</td>
</tr>
<tr>
<td>15</td>
<td>0.9</td>
</tr>
<tr>
<td>20</td>
<td>1.2</td>
</tr>
<tr>
<td>25</td>
<td>1.5</td>
</tr>
<tr>
<td>30</td>
<td>1.8</td>
</tr>
<tr>
<td>35</td>
<td>2.1</td>
</tr>
<tr>
<td>40</td>
<td>2.4</td>
</tr>
<tr>
<td>45</td>
<td>2.7</td>
</tr>
<tr>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>60</td>
<td>3.6</td>
</tr>
</tbody>
</table>

- NB 0.06 x weight = rate in mL/hr to achieve rate of 1mcg/kg/min
- Dosage adjustment may be required for patients with renal impairment
- If infusion is running at less than 1mL/hr a chaser should be run simultaneously to prevent line occlusion

Compatible fluids
- Glucose 5%
- Glucose / sodium chloride combinations
- Sodium chloride 0.9%

Cautions
Closely monitor ECG, blood pressure, potassium and blood glucose
IV Aminophylline bolus

Dosing:

*Loading or intermittent dose:*
5mg/kg IV (maximum dose 500 mg) over 20-30 minutes
Dilute to 1mg/ml

*NB: Do not give a loading dose if theophylline has been given in the last 24 hours. Check plasma level.*

*Continuous infusion:*
Dilute with compatible fluid and infuse at rate prescribed.
5 mg/kg as a loading dose followed by:
Age <12 years – 1 mg/kg/hour
Age 12 years to adult – 0.5 to 0.7 mg/kg/hour

*Plasma levels should be monitored*

Compatible fluids:
Glucose 5% and 10%
Sodium chloride 0.9%
Glucose / sodium chloride combinations
Compound sodium lactate (Hartmann's)

Caution:
- Rapid IV administration may induce serious CNS and cardiovascular effects
- Mixing Aminophylline with solutions of pH < 8 may cause precipitation

Dose adjustment for obesity:
Use 50th percentile of expected weight for age

Drugs increasing Aminophylline clearance:
- Tobacco
- Phenytoin
- Carbamazepine
- Phenobarbitone

Factors/drugs decreasing Aminophylline clearance:
- Influenza vaccination
- Pulmonary oedema
- Hepatic or renal dysfunction
- Cimetidine
- Erythromycin
- Ciprofloxacin
Appendix 7 - IV Magnesium Sulphate infusion

Dose: 0.1 mmol/kg as a single dose

Dilute to less than 0.8 mmol/mL with compatible fluid.
Administer via a syringe driver over 20 minutes

**Compatible fluids**
- Glucose 5%
- Sodium chloride 0.9%
- Glucose / sodium chloride combinations
- Compound sodium lactate (Hartmann's)

**Caution**
- Rapid infusion may cause hypotension. Monitor blood pressure.
- Monitor magnesium concentrations.
For more information

South Australian Child Health Clinical Network
Level 1, 55 King William Road
North Adelaide SA 5006

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