Managing acute asthma in children 6–11 years in the ED

Read first

- Definition and classification of asthma exacerbations

Recommendation

Rapidly assess the severity of the acute asthma episode by observation and pulse oximetry.

Table

Immediate treatment of acute asthma in children 6–11 in the ED

	Mild-moderate	Severe	Life-threatening
Description	All of: Can walk, speak whole sentences in one breath (younger children can speak in phrases) SpO_2 (room air) >94%	Any of: Unable to complete sentences in one breath due to breathlessness Use of accessory muscles of neck or intercostal muscles/tracheal tug/subcostal recession during inspiration Obvious respiratory distress SpO_2 (room air) ≤94%	Any of: Reduced consciousness/collapse, exhaustion Cyanosis Poor respiratory effort SpO_2 (room air) <90% Poor respiratory effort, soft/absent breath sounds
Immediate treatment	Give salbutamol 4–12 actuations (100 microg per actuation) via pMDI and spacer (tidal breathing) Repeat salbutamol 4–12 actuations every 20–30 minutes for the first hour, if needed (sooner if needed)	Start bronchodilators: Salbutamol 12 actuations (100 microg per actuation) via pMDI and spacer (tidal breathing). If patient cannot use spacer, give 5 mg nebule via nebuliser. Ipratropium 8 actuations (21 microg/actuation) via pressurised metered-dose inhaler and spacer every 20 minutes for first hour. Start oxygen supplementation if SpO_2 <92% on room air and titrate to target SpO_2 92–96% Repeat bronchodilators 4–6 hourly for 24 hours. If salbutamol delivered via nebuliser, add 500 microg ipratropium to nebulised solution every 20 minutes for first hour. Repeat 4–6 hourly.	Arrange immediate transfer to higher-level care Start bronchodilators: Salbutamol 2 x 5 mg nebules via continuous nebulisation driven by oxygen Ipratropium 500 microg ipratropium added to nebulised solution every 20 minutes for first hour. Maintain SpO_2 92–96% Repeat bronchodilators 4–6 hourly. When dyspnoea improves, consider changing to salbutamol via pMDI plus spacer or intermittent nebuliser

Additional information

pMDI: pressurised metered-dose inhaler; SpO_2: oxygen saturation

Sources & rationale

Recommendation type: Consensus recommendation

References

Shi C, Goodall M, Dumville J, et al. The accuracy of pulse oximetry in measuring oxygen saturation by levels of skin pigmentation: a systematic review and meta-analysis. BMC Med 2022; 20: 267.

Notes

Perform the assessment while preparing to administer salbutamol (and oxygen, if needed).

Pulse oximetry may overestimate oxygen saturation in people with higher levels of skin pigmentation.[Shi 2022]

Recommendation

Start bronchodilator therapy according to severity of the exacerbation.

Table

Immediate treatment of acute asthma in children 6–11 in the ED

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Immediate treatment	Give salbutamol 4–12 actuations (100 microg per actuation) via pMDI and spacer (tidal breathing) Repeat salbutamol 4–12 actuations every 20–30 minutes for the first hour, if needed (sooner if needed)	Start bronchodilators: Salbutamol 12 actuations (100 microg per actuation) via pMDI and spacer (tidal breathing). If patient cannot use spacer, give 5 mg nebule via nebuliser. Ipratropium 8 actuations (21 microg/actuation) via pressurised metered-dose inhaler and spacer every 20 minutes for first hour. Start oxygen supplementation if SpO_2 <92% on room air and titrate to target SpO_2 92–96% Repeat bronchodilators 4–6 hourly for 24 hours. If salbutamol delivered via nebuliser, add 500 microg ipratropium to nebulised solution every 20 minutes for first hour. Repeat 4–6 hourly.	Arrange immediate transfer to higher-level care Start bronchodilators: Salbutamol 2 x 5 mg nebules via continuous nebulisation driven by oxygen Ipratropium 500 microg ipratropium added to nebulised solution every 20 minutes for first hour. Maintain SpO_2 92–96% Repeat bronchodilators 4–6 hourly. When dyspnoea improves, consider changing to salbutamol via pMDI plus spacer or intermittent nebuliser

Additional information

pMDI: pressurised metered-dose inhaler; SpO_2: oxygen saturation

Alert If using a nebuliser, follow your organisation's infection control protocols

Sources & rationale

Recommendation type: Consensus recommendation

Repeated administration of inhaled SABA every 20 minutes for the first hour is effective for rapidly achieving bronchodilation in patients with mild or moderate asthma exacerbations.[GINA 2025]

Salbutamol delivered via a pMDI with spacer is at least as effective as salbutamol delivered via nebuliser in school-aged children with acute asthma who do not require mechanical ventilation.[Cates 2005, Pollock 2017, Ferguson 2006]

The use of nebulisers may increase the risk of viral transmission.[Hui 2009, Biney 2024, Goldstein 2021] Healthcare workers should follow infection control procedures including use of personal protective equipment such as face masks.

Oral salbutamol or intravenous salbutamol are not recommended.

Initial treatment with ipratropium in addition to salbutamol markedly reduces hospitalisation rate and improves clinical scores in children with moderate to severe acute asthma.[Castro-Rodriguez 2015, Pollock 2017, Griffiths 2013] However, in a trial conducted in children hospitalised due to acute asthma, the combination of ipratropium and short-acting $beta_2$ agonist was not more effective than short-acting $beta_2$ agonist alone.[Vezina 2014] Ipratropium bromide alone is less effective than salbutamol alone in acute asthma.[Teoh 2012]

The combination of ipratropium and short-acting $beta_2$ agonist appears to be well tolerated in children.[Griffiths 2013]

References

Biney IN, Ari A, Barjaktarevic IZ, et al. Guidance on mitigating the risk of transmitting respiratory infections during nebulization by the COPD Foundation Nebulizer Consortium. Chest 2024; 165: 653-668.

Castro-Rodriguez, J. A., Rodrigo, G. J., Rodriguez-Martinez, C. E.. Principal findings of systematic reviews for chronic treatment in childhood asthma. J Asthma 2015; 52: 1038-45.

Cates CJ, Crilly JA, Rowe BH. Holding chambers (spacers) versus nebulisers for beta-agonist treatment of acute asthma. Cochrane Database Syst Rev. 2006; Issue 2: CD000052.

Ferguson C, Gidwani S. Best evidence topic reports. Delivery of bronchodilators in acute asthma in children. Emerg Med J 2006; 23: 471-27.

Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention, 2025. Available from: **www.ginasthma.org**

Goldstein KM, Ghadimi K, Mystakelis H, et al. Risk of transmitting coronavirus disease 2019 during nebulizer treatment: a systematic review. J Aerosol Med Pulm Drug Deliv. 2021; 34: 155-170.

Griffiths B, Ducharme FM. Combined inhaled anticholinergics and short-acting beta2-agonists for initial treatment of acute asthma in children. Cochrane Database Syst Rev. 2013: CD000060.

Hui DS, Chow BK, Chu LC, et al. Exhaled air and aerosolized droplet dispersion during application of a jet nebulizer. Chest 2009; 135: 648-654.

Pollock M, Sinha IP, Hartling L et al. Inhaled short-acting bronchodilators for managing emergency childhood asthma: an overview of reviews. Allergy 2017; 72: 183-200.

Teoh L, Cates CJ, Hurwitz M, et al. Anticholinergic therapy for acute asthma in children. Cochrane Database Syst Rev 2012; 4: CD003797.

Vezina K, Chauhan BF, Ducharme FM. Inhaled anticholinergics and short-acting beta(2)-agonists versus short-acting beta2-agonists alone for children with acute asthma in hospital. Cochrane Database Syst Rev 2014; Issue 7: CD010283.

Resources

National Asthma Council Australia's video on **how to use a metered dose inhaler (puffer) with a spacer for children**

National Asthma Council Australia's **fact sheet on spacers for pressurised metered-dose inhalers**

Notes

Tidal breathing method:

1. Connect spacer to pMDI and tell patient to seal lips firmly around spacer mouthpiece.

2. Release 1 actuation of salbutamol into the spacer.

3. Tell the child to breathe in and out for four breaths while keeping lips sealed around mouthpiece.

4. Release 1 more actuation of salbutamol into the spacer and repeat until all required actuations delivered.

If the child cannot seal their lips tightly around the spacer mouthpiece, use a tightly fitting mask connected to the spacer mouthpiece.

If the child cannot breathe through a spacer using either the mouthpiece or a mask, use a nebuliser with mask.

The tidal breathing technique should only be used while the patient is too breathless to use the standard single-breath technique. Once breathing improves, consider switching to single-breath technique.

Recommendation

If oxygen saturation <92% while breathing room air, start oxygen supplementation and titrate saturation to target 92–96%.

Follow your organisation's protocols and guidelines for oxygen supplementation in children.

There is very little evidence available to inform recommendations for oxygen saturation targets in children with asthma. Recommended targets differ between major Australian paediatric teaching hospitals.

Sources & rationale

Recommendation type: Consensus recommendation

Notes

Local policy for oxygen supplementation thresholds and targets may differ.

Recommendation

Complete the assessment when feasible after starting salbutamol and oxygen (if required).

Table

Secondary severity assessment of acute asthma in children 6–11 in the ED

	Mild–moderate (all of):	Severe (any of):	Life-threatening (any of):
Consciousness	Alert	N/A	Drowsy or unconscious
Speech	Can finish a sentence in one breath	Can only speak a few words in one breath	Cannot speak
Posture	Can walk, sit up straight, lie flat	Unable to lie flat due to dyspnoea Sitting hunched forward	Collapsed or exhausted
Breathing	Respiratory distress is not severe	Paradoxical chest wall movement or Use of accessory muscles of neck or intercostal muscles or 'tracheal tug' during inspiration or Subcostal recession	Severe respiratory distress or Poor respiratory effort
Skin colour	Normal	N/A	Cyanosis
Respiratory rate	<25 breaths/min	≥25 breaths/min	Bradypnoea (indicates respiratory exhaustion)
Heart rate	<110 beats/min	≥110 beats/min	Cardiac arrhythmia or Bradycardia (may occur just before respiratory arrest)
Chest auscultation	Wheeze or Normal lung sounds	N/A	Silent chest or Reduced air entry
Oxygen saturation	>94%	90–94%	<90% or Clinical cyanosis
Blood gas analysis (adults, if performed)	Not indicated	Not indicated	PaO_2 <60 mmHg $PaCO_2$ >50 mmHg[(a)] $PaCO_2$ within normal range despite low PaO_2 pH <7.35[(b)]
FEV_1	> 50% predicted or personal best	≤50% predicted or personal best	Spirometry not feasible

Additional information

FEV_1: forced expiratory volume in one second measured by spirometry; N/A: Not applicable – may be the same as moderate and does not determine severity category; $PaCO_2$: partial pressure of carbon dioxide in arterial blood; PaO_2: partial pressure of oxygen in arterial blood

a. The presence of hypercapnoea indicates that the patient is tiring and may need ventilatory support

b. Metabolic acidosis may occur with high-dose salbutamol and with increased work of breathing

Perform a physical examination including auscultation, vital signs, repeated pulse oximetry.

Obtain blood gas analysis if patient presented with life-threatening acute asthma or as indicated.

Obtain spirometry when the patient is able to perform the test.

Perform a physical examination including auscultation, vital signs, and repeated pulse oximetry.

Complete a brief history, including:

- reliever taken for this episode before presentation (dose, number of doses, time of last dose)
- current asthma medicines (regular and as-needed, including type of devices used)
- assessment of adherence to inhaled corticosteroids (if prescribed)
- what triggered this episode, if known (e.g. allergies, immediate hypersensitivity, medicines, respiratory infections)
- presence of coexisting conditions
- exposure to environmental smoke/vaping.

Alert Acute asthma is rarely triggered by food allergies, but confirmed food allergy is a risk factor for fatal or life-threatening asthma

Sources & rationale

Recommendation type: Consensus recommendation

The association of asthma and food allergy is a risk factor for fatal and near-fatal allergic reactions to food allergens.[Burks 2012]

References

Burks AW, Tang M, Sicherer S, et al. ICON: food allergy. J Allergy Clin Immunol 2012; 129: 906-920.

Recommendation

Start systemic corticosteroids within 1 hour of presentation (unless exacerbation assessed as mild at initial presentation).

Children 6–11: prednisone/prednisolone 1 mg/kg (maximum 50 mg) orally each morning for 3 days

Alternative: oral dexamethasone: 0.6 mg/kg as a single dose (can be repeated on the following day if needed)

If corticosteroids cannot be given orally, give intravenously:

- hydrocortisone IV 4 mg/kg (maximum 100 mg) every 6 hours on day 1 then reduce (every 12 hours on day 2, once daily on day 3 and, if needed, once daily on days 4–5) or switch to oral prednisolone
- methylprednisolone IV 1 mg/kg (maximum 60 mg) every 6 hours on day 1 then reduce (every 12 hours on day 2, once daily on day 3 and, if needed, once daily on days 4–5) or switch to oral prednisolone.

Sources & rationale

Recommendation type: Consensus recommendation

In school-aged children with acute asthma, systemic corticosteroids given within 1 hour of presentation to an emergency department reduce the need for hospital admission.[Rowe 2001]

After an acute asthma episode, treatment with systemic corticosteroids (intramuscular corticosteroids, oral prednisone/prednisolone, or oral dexamethasone) at discharge from the emergency department reduces the risk of relapse in children.[Castro-Rodriguez 2015, Kirkland 2018]

Doses

In children the majority of studies in children have used 1–2 mg/kg of oral prednisolone (maximum 60 mg) given initially then 1 mg/kg per day. Current evidence does not support the use of higher doses.[Normansell 2016]

In children, a 3-day course of prednisone/prednisolone is generally as effective as a 5-day course.[Chang 2008]

Most studies evaluating oral dexamethasone in children have used 0.6 mg/kg per dose on one or two consecutive days.[Paniagua 2017] Dexamethasone has a longer half-life than prednisone/prednisolone. Longer courses may have more pronounced mineralocorticoid adverse effects. Oral dexamethasone treatment should not exceed 2 days. In children it may be associated with less vomiting than prednisone/prednisolone.[Paniagua 2017, Bravo-Soto 2017, Meyer 2014, Keeney 2014, Cronin 2016]

Safety

Short-term: short courses of oral corticosteroids to treat acute asthma are often well tolerated in children,[Rowe 2001, Smith 2003, Rowe 2007] but may be associated with mood changes, nocturia, and difficulty sleeping.

Long-term: short courses of oral corticosteroids to manage asthma exacerbations are associated with increased lifetime risk of osteoporosis, pneumonia, cardiovascular or cerebrovascular diseases, cataract, sleep apnoea, renal impairment,

depression/anxiety, type 2 diabetes, and weight gain.[Price 2018]

References

Bravo-Soto GA, Harismendy C, Rojas P et al. Is dexamethasone as effective as other corticosteroids for acute asthma exacerbation in children? Medwave 2017; 17: e6931.

Castro-Rodriguez, J. A., Rodrigo, G. J., Rodriguez-Martinez, C. E.. Principal findings of systematic reviews for chronic treatment in childhood asthma. J Asthma 2015; 52: 1038-45.

Chang, A B, Clark, R, Sloots, T P, et al. A 5- versus 3-day course of oral corticosteroids for children with asthma exacerbations who are not hospitalised: a randomised controlled trial. Med J Aust 2008; 189: 306-310.

Cronin JJ, McCoy S, Kennedy U et al. A randomized trial of single-dose oral dexamethasone versus multidose prednisolone for acute exacerbations of asthma in children who attend the emergency department. Ann Emerg Med 2016; 67: 593-601.e3.

Keeney GE, Gray MP, Morrison AK et al. Dexamethasone for acute asthma exacerbations in children: a meta-analysis. Pediatrics 2014; 133: 493-9.

Kirkland SW, Vandermeer B, Campbell S et al. Evaluating the effectiveness of systemic corticosteroids to mitigate relapse in children assessed and treated for acute asthma: A network meta-analysis. J Asthma 2018: 1-12.

Meyer JS, Riese J, Biondi E. Is dexamethasone an effective alternative to oral prednisone in the treatment of pediatric asthma exacerbations? Hosp Pediatr 2014; 4: 172-80.

Normansell R, Kew KM, Mansour G. Different oral corticosteroid regimens for acute asthma. Cochrane Database Syst Rev 2016; Issue 5: CD011801.

Paniagua N, Lopez R, Muñoz N, et al. Randomized trial of dexamethasone versus prednisone for children with acute asthma exacerbations. J Pediatr 2017;191:190-196.e1.

Price DB, Trudo F, Voorham J, et al. Adverse outcomes from initiation of systemic corticosteroids for asthma: long-term observational study. J Asthma Allergy 2018; 11: 193-204.

Rowe BH, Spooner C, Ducharme F, et al. Early emergency department treatment of acute asthma with systemic corticosteroids. Cochrane Database Syst Rev. 2001; Issue 1: CD002178.

Rowe BH, Spooner C, Ducharme F, et al. Corticosteroids for preventing relapse following acute exacerbations of asthma. Cochrane Database Syst Rev. 2007; Issue 3: CD000195.

Smith M, Iqbal S, Elliot TM et al. Corticosteroids for hospitalised children with acute asthma. Cochrane Database Syst Rev. 2003; Issue 2: CD002886.

Notes

Dispense only one course, to avoid overuse or inappropriate use of systemic corticosteroids.

Systemic corticosteroids are not required if the exacerbation was assessed as mild at initial presentation.

Recommendation

Assess clinical response after each dose of bronchodilator and consider repeating the dose or escalating treatment.

If dyspnoea/increased work of breathing is partially relieved within first 5 minutes, reassess the need for repeated bronchodilator at 15 minutes.

If dyspnoea/increased work of breathing is not relieved, or condition deteriorates, repeat bronchodilator dose and consider adding inhaled ipratropium bromide (if not part of initial treatment) or IV magnesium sulfate:

- Inhaled ipratropium bromide in children 6–11 years: 8 actuations via pMDI (21 microg/actuation) every 20 minutes for first hour, then every 4–6 hours for 24 hours, if needed
- Intravenous magnesium sulfate in children 6–11 years: 0.1–0.2 mmol/kg (maximum 8 mmol) (25–50 mg/kg to maximum of 2 g) diluted in a compatible solution as a single IV infusion over 20 minutes.

Alert Reduced wheezing alone is an unreliable indicator of improvement, as it may indicate deterioration

Alert Intravenous magnesium sulfate may be associated with hypotension

Sources & rationale

Recommendation type: Consensus recommendation

Inhaled ipratropium bromide

Ipratropium is recommended as a first-line bronchodilator for patients with severe or life-threatening acute asthma, and as a second-line bronchodilator if inadequate response to salbutamol. The combination of ipratropium and short-acting beta2 agonist appears to be well tolerated in children.[Griffiths 2013]

Intravenous $MgSO_4$

Intravenous magnesium sulfate can be considered as a second-line bronchodilator in severe or life-threatening acute asthma, or when poor response to repeated maximal doses of other bronchodilators. It should not be used as a substitute for inhaled $beta_2$ agonists.[Knightly 2017]

Intravenous magnesium sulfate may reduce hospitalisation rates and improve lung function among children with acute asthma presenting to the emergency department,[Goodacre 2013, Griffiths 2016] but clinical trial evidence is limited. [Griffiths 2016]

A small randomised controlled trial reported that IV magnesium sulfate was ineffective in reducing respiratory distress in very young children (6 months to 4 years) with acute virus-induced wheezing.[Pruikkonen 2018]

The optimal dose and infusion regimen has not been identified.[Green 2016]

IV magnesium sulfate is generally well tolerated.[Griffiths 2016, Irazuzta 2017]

Nebulised $MgSO_4$

A 2024 systematic review reported that nebulised $MgSO_4$ as an add-on second-line therapy for children with acute asthma may slightly improve lung function but does not reduce hospitalisation rates, based on low-certainty evidence.[Kumar 2024]

Nebulised magnesium sulfate is well tolerated in children.[Powell 2013a, Powell 2013b]

References

Goodacre S, Cohen J, Bradburn M et al. Intravenous or nebulised magnesium sulphate versus standard therapy for severe acute asthma (3Mg trial): a double-blind, randomised controlled trial. Lancet Respir Med 2013; 1: 293-300.

Griffiths B, Kew KM. Intravenous magnesium sulfate for treating children with acute asthma in the emergency department. Cochrane Database Syst Rev 2016; 4: CD011050.

Irazuzta JE, Chiriboga N. Magnesium sulfate infusion for acute asthma in the emergency department. J Pediatr (Rio J) 2017; 93 Suppl 1: 19-25.

Kumar J, Kumar P, Goyal JP, et al. Role of nebulised magnesium sulfate in treating acute asthma in children: a systematic review and meta-analysis. BMJ Paediatr Open 2024; 8: e002638.

Knightly R, Milan SJ, Hughes R et al. Inhaled magnesium sulfate in the treatment of acute asthma. Cochrane Database Syst Rev 2017; 11: CD003898.

Powell C, Kolamunnage-Dona R, Lowe J, et al. MAGNEsium Trial In Children (MAGNETIC): a randomised, placebo-controlled trial and economic evaluation of nebulised magnesium sulphate in acute severe asthma in children. Health Technol Assess. 2013; 17: 1-216.

Powell C, Kolamunnage-Dona R, Lowe J et al. Magnesium sulphate in acute severe asthma in children (MAGNETIC): a randomised, placebo-controlled trial. Lancet Respir Med 2013; 1: 301-8.

Pruikkonen H, Tapiainen T, Kallio M et al. Intravenous magnesium sulfate for acute wheezing in young children: a randomised double-blind trial. Eur Respir J 2018; 51

Su Z, Li R, Gai Z. Intravenous and nebulized magnesium sulfate for treating acute asthma in children: a systematic review and meta-analysis. Pediatr Emerg Care 2018; 34: 390-5.

Recommendation

After respiratory distress or increased work of breathing has resolved and symptoms have stabilised, observe the patient for at least 4 hours.

Sources & rationale

Recommendation type: Consensus recommendation

Recommendation

Repeat spirometry before discharge.

Sources & rationale

Recommendation type: Consensus recommendation

Recommendation

At discharge, ensure that the child has appropriate asthma treatment that includes an adequate maintenance dose of ICS.

If the child's asthma has been managed with a reliever alone (e.g. as-needed salbutamol), prescribe (or arrange urgent review for) maintenance ICS treatment.

Sources & rationale

Recommendation type: Consensus recommendation

Notes

A child with an asthma exacerbation severe enough to necessitate an ED visit needs maintenance ICS treatment, even if the child has been prescribed a short course of systemic corticosteroid. ICS should be started before the end of the systemic corticosteroid course, and the dose reviewed by the GP at follow-up.

Recommendation

Write an interim asthma action plan at discharge, including instructions on maintenance ICS dosing, salbutamol taken only as needed, and what to do is symptoms recur or worsen.

Sources & rationale

Recommendation type: Consensus recommendation

References

Warraich S, Bush A, Levy ML, Fleming L. Regular (up to 10 puffs 4-hourly) inhaled salbutamol should be prescribed at discharge after an asthma attack: myth or maxim? Breathe (Sheff) 2023; 19: 230054.

Notes

‘Weaning plans’ for salbutamol are not recommended.[Warraich 2023]

Recommendation

Arrange follow-up

Recheck within 3 days with the child’s usual GP.

Comprehensive assessment in 2–4 weeks to reassess risk factors and review the treatment regimen (GP, pediatric respiratory physician, allergist, or paediatrician).

Sources & rationale

Recommendation type: Consensus recommendation

Consideration

If anaphylaxis is identified or suspected, manage with adrenaline.

Sample doses (ASCIA 2024):

Auto-injector

Child 5–12 years >20 kg: adrenaline 300 microg IM via auto-injector

Child <20 kg: adrenaline 150 microg IM via auto-injector

IM via needle and syringe using adrenaline 1:1,000 ampoules (1 mg per 1 mL)

Children: 0.01 mg per kg up to 0.5 mg (0.5 mL) per dose

Sources & rationale

Recommendation type: Adapted from ASCIA 2024

Anaphylaxis should be suspected when asthma-like respiratory symptoms are accompanied by either of the following features:[ASCIA 2024]

- Acute onset (minutes to hours) with simultaneous involvement of the skin, mucosal tissue, or both (e.g. generalized hives, pruritus or flushing, swollen lips-tongue-uvula)
- Acute onset of hypotension or bronchospasm or laryngeal involvement after exposure to a known or highly probable allergen for that patient (minutes to several hours), even in the absence of typical skin involvement.

References

ASCIA. **Acute management of anaphylaxis**. 2024, Australasian Society of Clinical Immunology and Allergy.

Resources

ASCIA Guidelines: **Acute management of anaphylaxis**

Notes

Adrenaline should be given before considering salbutamol when anaphylaxis is suspected.[ASCIA 2024]

Consideration

For patients with life-threatening asthma, deliver salbutamol via continuous nebulisation driven by oxygen.

When breathing improves, consider changing to a pressurised metered-dose inhaler plus spacer or intermittent nebuliser.

Alert When using a nebuliser, follow your organisation's infection control protocols

Sources & rationale

Recommendation type: Consensus recommendation

The use of nebulisers carries a risk of viral transmission.[GINA 2025]

References

Biney IN, Ari A, Barjaktarevic IZ, et al. Guidance on mitigating the risk of transmitting respiratory infections during nebulization by the COPD Foundation Nebulizer Consortium. Chest 2024; 165: 653-668.

Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention, 2025. Available from: **www.ginasthma.org**

Goldstein KM, Ghadimi K, Mystakelis H, et al. Risk of transmitting coronavirus disease 2019 during nebulizer treatment: a systematic review. J Aerosol Med Pulm Drug Deliv 2021; 34: 155-170.

Hui DS, Chow BK, Chu LC, et al. Exhaled air and aerosolized droplet dispersion during application of a jet nebulizer. Chest 2009; 135: 648-654.

Notes

To deliver intermittent nebulised bronchodilators in a patient receiving oxygen therapy, use an air-driven compressor nebuliser and administer oxygen by nasal cannulae.

Titrate oxygen to target SpO_2 92–96% in children (or according to local policy).

If nebulised salbutamol is needed for a patient receiving supplemental oxygen, the nebuliser can be driven by piped (wall) oxygen or an oxygen cylinder fitted with a high-flow regulator capable of delivering >6 L/min. The patient should be changed back to their original oxygen mask when nebulisation is completed.

The use of nebulisers may increase the risk of viral transmission.[Hui 2009, Biney 2024, Goldstein 2021] Healthcare workers should follow infection control procedures including use of personal protective equipment such as face masks.

Consideration

If the patient is unresponsive, cannot inhale bronchodilators, or is considered to be in peri-arrest, consider adrenaline.

Alert Do not use adrenaline in place of salbutamol as initial bronchodilator

Sources & rationale

Recommendation type: Consensus recommendation

Adrenaline is not used routinely in the management of severe acute asthma. Its use should be reserved for situations where inhaled salbutamol cannot be given to a patient with respiratory arrest or pre-arrest status, or when anaphylaxis is suspected.

Evidence for outcomes with adrenaline is mainly from clinical trials conducted before 2000.[Baggott 2022] There is insufficient evidence to determine whether inhaled salbutamol is more effective than adrenaline as first-line treatment in the management of severe acute asthma, due to high risk of bias in published clinical trials and significant heterogeneity, including differences in study design.[Baggott 2022] Available evidence suggests adrenaline may be more effective in adults than in children.[Baggott 2022]

Low-quality evidence suggests that adrenaline is associated with higher rates of agitation, tremor and headache than inhaled salbutamol. [Baggott 2022]

There is also insufficient evidence to determine whether intramuscular adrenaline, given in addition to inhaled salbutamol, is more effective than inhaled salbutamol alone.[Baggott 2022]

References

Ambulance Victoria. **Clinical practice guidelines**. Version 3.12.17 (2025).

Baggott C, Hardy JK, Sparks J, et al. Epinephrine (adrenaline) compared to selective beta-2-agonist in adults or children with acute asthma: a systematic review and meta-analysis. Thorax 2022; 77: 563-572.

Notes

International asthma guidelines recommend inhaled salbutamol as the primary bronchodilator in acute asthma, and do not recommend the use of adrenaline except for patients with concomitant acute asthma and anaphylaxis or angioedema. [Baggott 2022] However, intramuscular adrenaline in addition to inhaled SABA is included in ambulance guidelines for prehospital management of acute asthma in some jurisdictions,[Baggott 2022] including in some Australian states (e.g. for children with acute asthma and critical status).[Ambulance Victoria 2025]

Practice point

Intravenous salbutamol is not recommended.

Practice point

Do not give oral salbutamol.

Practice point

Perform blood gas analysis in patients with life-threatening acute asthma.

Practice point

Monitor for signs of salbutamol toxicity (e.g. worsening tachycardia, metabolic acidosis, hypokalaemia).

Practice point

Consider admitting child to hospital if risk factors for poor response or relapse.

Consider admission if any of the following:

- hypoxia at presentation
- FEV_1 <60% predicted (or 50% of usual, if known) at 1-hour check
- respiratory distress/increased work of breathing unresolved or unable to lie flat without dyspnoea 1–2 hours after presentation
- a history of ICU admission for asthma
- presentation for acute asthma within the past 4 weeks
- frequent presentations for acute asthma (e.g. several over previous year)
- high recent use of $beta_2$ agonists
- child cannot be monitored adequately at home or cannot easily return to hospital if needed
- other risk factors for adverse outcomes.

Practice point

The appropriate maintenance ICS dose at discharge depends on the history and the severity of the acute episode.

For most children with asthma who have an acute episode requiring an ED visit, ICS should be started at (or increased to) medium doses, with review scheduled for 2–3 months later.

Table

Low, medium and high ICS doses in children 6–11 years

Active ingredient	Total daily dose (microg)		
	Low	Medium	High
Fluticasone propionate	100 (50 twice daily)	<8 years: >100–200 (e.g. 100 twice daily)	<8 years: >200
		8–11 years: >100–250 (e.g. 100 twice daily or 125 twice daily)	8–11 years: >250
Ciclesonide	80	160	>160
Budesonide	100–200	>200–400	>400
Beclometasone (extra-fine particle)	50–100	>100–200	>200

Additional information

ICS: inhaled corticosteroid;

[ ] Options recommended for first-line use in children, based on current evidence for efficacy and safety

Options not recommended as first-line treatment in children due to delivery device or concerns about systemic effects including potentially greater effects on growth

Practice point

Do not give instructions for pre-emptive or regular salbutamol dosing on discharge, but instruct parents to administer salbutamol only as needed. ‘Weaning plans’ are not recommended.