Managing acute asthma in adults and adolescents in primary care

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 adults and adolescents in primary care

	Mild–moderately severe	Severe	Life-threatening
Assessment	All of: Can walk, speak whole sentences in one breath 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) <92% Poor respiratory effort, soft/absent breath sounds
Triage	Manage in place	Arrange transfer to acute care	
Immediate treatment	Give salbutamol 4–12 actuations (100 microg per actuation) via pMDI and spacer (tidal breathing method)	Give salbutamol 12 actuations (100 microg per actuation) via pMDI and spacer (tidal breathing). If patient cannot use spacer, 5 mg salbutamol nebule via nebuliser (if available) Start oxygen supplementation if SpO_2 (room air) <92%.* Titrate to target SpO_2 92–96%	**Without nebuliser:** Give salbutamol 12 actuations (100 microg per actuation) via pMDI and spacer ± mask (tidal breathing). **With nebuliser:** Give salbutamol 2 x 5 mg nebules via continuous nebulisation driven by oxygen: SpO_2 target 92–96%*
Continued treatment	Repeat salbutamol 4–12 actuations every 20–30 minutes for the first hour, if needed (sooner if needed)	Repeat salbutamol 12 actuations at least every 20 minutes for first hour (3 doses)	Maintain SpO_2 to target 92–96%*

Additional information

SpO_2: oxygen saturation measured by pulse oximetry; *88–92% for patients at risk of hypercapnoea

Sources & rationale

Recommendation type: Consensus recommendation

Routine objective assessment of oxygen saturation on room air at initial assessment of acute asthma is needed because clinical signs may not correlate with hypoxaemia. Pulse oximetry is the internationally accepted method for routine assessment of oxygen status in patients with acute asthma. It should be available in all situations in which oxygen is used. [Barnett 2022]

References

Barnett A, Beasley R, Buchan C, et al. Thoracic Society of Australia and New Zealand position statement on acute oxygen use in adults: 'Swimming between the flags'. Respirology 2022; 27: 262-276.

Hinkelbein J, Koehler H, Genzwuerker HV, Fiedler F. Artificial acrylic finger nails may alter pulse oximetry measurement. Resuscitation 2007; 74: 75-82.

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.

Yek JLJ, Abdullah HR, Goh JPS, Chan YW. The effects of gel-based manicure on pulse oximetry. Singapore Med J 2019; 60: 432-435.

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] and in people wearing nail polish or acrylic artificial fingernails.[Yek 2019, Hinkelbein 2007]

Recommendation

If signs of severe or life-threatening acute asthma, call ambulance while starting bronchodilator treatment and supplemental oxygen.

Transfer to an acute care facility should be arranged if respiratory distress is severe enough to prevent person speaking in whole sentences, or oxygen saturation ≤94%.

Sources & rationale

Recommendation type: Consensus recommendation

Recommendation

Give salbutamol (100 microg per actuation) via pMDI and spacer, using tidal breathing method.

Mild–moderate exacerbation: 4–12 actuations

Severe exacerbation: 12 actuations

Repeat dose every 20 minutes for the first hour, if breathing difficulty not resolved.

If use of nebuliser is unavoidable, use 5 mg nebule for a severe exacerbation, 2 x 5 mg nebules for a life-threatening exacerbation.

Alert Follow infection control protocols for aerosol-generating procedures if using a nebuliser for a patient with a viral respiratory tract infection.

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]

Among adults with acute asthma who do not require mechanical ventilation, salbutamol delivered via a pMDI with spacer is as effective as salbutamol delivered via nebuliser, and possibly more effective.[Cates 2006, Dhuper 2011]

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.

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.

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.

Dhuper S, Chandra A, Ahmed A, *et al*. Efficacy and cost comparisons of bronchodilatator administration between metered dose inhalers with disposable spacers and nebulizers for acute asthma treatment. J Emerg Med 2011; 40: 247-55.

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.

Resources

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

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

RACGP's **Infection prevention and control guidelines for general practices and other office-based and community-based practices**

Notes

Tidal breathing method:

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

2. Shake the inhaler well

3. Release 1 actuation of salbutamol into the spacer.

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

Repeat process until all required actuations delivered, shaking inhaler again before each actuation then releasing 1 actuation into the spacer at a time before patient inhales.

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

If the patient 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%, start oxygen supplementation and titrate saturation to target 93–95%.

This oxygen saturation target applies to patients not considered to be at risk of hypercapnoea.

The recommended oxygen saturation target for patients at risk of hypercapnoea is 88–92% (see Considerations).

Follow current guidance in Thoracic Society of Australia and New Zealand's position statement on acute oxygen use in adults.

Alert In adults, avoid over-oxygenation (SpO2>95%), because this increases the risk of hypercapnoea.

Sources & rationale

Recommendation type: Consensus recommendation

Hypoxia is associated with life-threatening acute asthma. Clinical signs may not correlate with hypoxaemia – monitor with pulse oximetry.[Barnett 2022]

Oxygen should be administered if the SpO_2 is less than 92%, and titrated to a target SpO_2 range of 92–96% using pulse oximetry (88–92% for patients at risk of hypercapnoea).[Barnett 2022]

The aim of titrated oxygen therapy in acute care is to achieve adequate oxygen saturation without causing hypercapnoea. [Barnett 2022] Adults with acute asthma and those with both asthma and COPD are at risk of hypercapnoeic respiratory failure.[Barnett 2022]

For most patients, the use of standard nasal cannulae is the preferred method of oxygen delivery, with the flow rate varied to achieve the target oxygen saturation.[Barnett 2022]

Pulse oximetry does not detect hypercapnoea. The emergency department will conduct blood gas analysis in patients with severe or life-threatening acute asthma or if hypercapnoea is suspected.[Barnett 2022]

References

Barnett A, Beasley R, Buchan C, et al. Thoracic Society of Australia and New Zealand position statement on acute oxygen use in adults: 'Swimming between the flags'. Respirology 2022; 27: 262-276.

Hodder R, Lougheed MD, Rowe BH, et al. Management of acute asthma in adults in the emergency department: nonventilatory management. CMAJ 2010; 182: E55-67.

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.

Resources

TSANZ's **position statement on acute oxygen use in adults**

Notes

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

If SpO_2 is 85%–91%, oxygen can be initially instituted at 2–4 L/min via nasal cannulae or simple face mask, and titrated to achieve the target SpO_2.[Barnett 2022]

If SpO_2 is <85%, oxygen can be initiated at 4 L/min via nasal cannulae, through a simple face mask at 5–10 L/min or 100% non-rebreather reservoir mask at 15 L/min.[Barnett 2022]

Refer to TSANZ guidance for other options and details.

Recommendation

If dyspnoea/increased work of breathing is not relieved within 5 minutes, repeat bronchodilator dose, and arrange transfer to emergency department.

Sources & rationale

Recommendation type: Consensus recommendation

Recommendation

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

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

See Table: Secondary severity assessment in adults & adolescents in primary care

Complete a brief history, including:

- reliever taken for this episode before presentation (dose, number of doses, time of last dose)
- whether oral corticosteroid started (e.g. following instructions in asthma action plan)
- current asthma medicines (regular and as-needed, including type of devices used)
- assessment of adherence to preventer (if prescribed)
- what triggered this episode, if known (e.g. allergies, immediate hypersensitivity, medicines, respiratory infections
- presence of coexisting heart or lung disease, including chronic obstructive pulmonary disease
- smoking status and 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 (unless contraindicated), regardless of severity at initial assessment.

Adults: prednisone/prednisolone 37.5–50 mg orally, then repeat each morning on second and subsequent days (total 5–10 days).

Adolescents: prednisone/prednisolone 1 mg/kg (maximum 50 mg) orally once daily for 3–5 days.

Sources & rationale

Recommendation type: Consensus recommendation

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

It is not necessary to taper the dose after a short course of oral prednisone/prednisolone.[Rowe 2017, O'Driscoll 1993]

Short-term safety: Short courses of oral corticosteroids to treat acute asthma are often well tolerated by adults,[Rowe 2001, Rowe 2007] but patients may report mood changes, sleep disturbance, or gastrointestinal effects (gastro-oesophageal reflux, constipation, bloating).[Berthon 2015] In patients with diabetes or impaired glucose tolerance, blood glucose monitoring (e.g. morning and evening samples) may be indicated during treatment with oral corticosteroids.

Long-term safety: over a lifetime, exposure to multiple short courses of oral corticosteroids to manage asthma exacerbations is 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] Most adverse effects are seen with cumulative doses of 1.0–<2.5 g, but increase risk for some adverse effects is seen at cumulative doses equivalent to four courses over a lifetime.

References

Berthon BS, Gibson PG, McElduff P et al. Effects of short-term oral corticosteroid intake on dietary intake, body weight and body composition in adults with asthma – a randomized controlled trial. Clin Exp Allergy 2015; 45: 908-19.

O'Driscoll BR, Kalra S, Wilson M, et al. Double-blind trial of steroid tapering in acute asthma. Lancet 1993; 341: 324-327.

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, Kirkland SW, Vandermeer B et al. Prioritizing systemic corticosteroid treatments to mitigate relapse in adults with acute asthma: a systematic review and network meta-analysis. Acad Emerg Med 2017; 24: 371-81.

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.

Notes

Prescribers should avoid supplying parents with more prednisone/prednisolone than needed for the course. Prescribers may write PBS scripts for less than the maximum quantity and number of repeats permitted if a lesser quantity is sufficient for the patient's requirements.

Recommendation

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

If symptoms recur, the supervising person (e.g. primary care nurse or family/carer) should administer salbutamol and call an ambulance.

Sources & rationale

Recommendation type: Consensus recommendation

Recommendation

After symptoms have resolved, arrange follow-up within 3–5 day and a comprehensive asthma review 2 weeks later, and provide an interim asthma action plan.

Provide written instructions:

- to start or continue maintenance ICS-LABA dose (ICS dose should be at least medium)
- to use reliever as needed (not by the clock)
- when to take the next dose of oral prednisone/prednisolone and how long to continue
- what to do if symptoms recur, including when to call an ambulance or go to the emergency department.

Sources & rationale

Recommendation type: Consensus recommendation

Checkup at day 3–5 aims to check whether symptoms have resolved and assess adherence to oral corticosteroids (if prescribed) and ICS.

The purposes of a comprehensive asthma review after resolution of an exacerbation are:

- to identify what triggered the acute asthma episode and assess other risk factors
- to review the person's written asthma action plan
- to review the person's reliever use and give instructions to use reliever only as needed
- to review the treatment regimen and prescribe or adjust inhaled corticosteroid-containing preventer, if indicated (e.g. switch from a regimen with SABA reliever to MART)
- to check inhaler technique and correct it, if necessary
- to assess whether the person has other risk factors for asthma exacerbations
- to offer specialist review if the person has had more than one emergency visit to health services for acute asthma within the previous 12 months or repeated courses of systemic corticosteroids.

Notes

If the patient's current treatment regimen is budesonide-formoterol only as needed, step up to MART.

If the patient's current treatment regimen includes a low dose of ICS, consider stepping up to a higher dose for a few weeks then reviewing.

Information on assessing and reviewing asthma in adults & adolescents

Consideration

If anaphylaxis is identified or suspected, manage with adrenaline.

Doses using ampoule (1:1,000) and syringe:

Patients >12 years or >50 kg: adrenaline 0.01 mg/kg (up to 0.5 mg per dose) IM into lateral mid-thigh

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

ACAQH. Immediate injection of intramuscular adrenaline. Quality statement 2. Australian Commission on Safety and Quality in Health Care. https://www.safetyandquality.gov.au/standards/clinical-care-standards/acute-anaphylaxis-clinical-care-standard/quality-statements/immediate-injection-intramuscular-adrenaline

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

Resources

Australian Prescriber's Anaphylaxis: emergency management for health professionals wallchart

ASCIA Guidelines: Acute management of anaphylaxis

Notes

When anaphylaxis is suspected adrenaline should be given immediately,[ACAQH 2025] and before considering salbutamol. [ASCIA 2024]

Consideration

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

via auto-injector: 300 microg IM

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 in a patient with respiratory arrest or pre-arrest status, or when anaphylaxis is suspected.

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 3.12.15 (2024).

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. [Ambulance Victoria 2024]

Consideration

For patients at risk of hypercapnoea, use a lower oxygen target range of 88%–92%.

Risk factors include COPD, obesity, obesity hypoventilation syndrome, bronchiectasis, cystic fibrosis, neuromuscular disease, and chest wall deformities (e.g. severe kyphoscoliosis).

Follow current guidance in Thoracic Society of Australia and New Zealand's position statement on acute oxygen use in adults.

Sources & rationale

Recommendation type: Adapted from TSANZ 2022

Current Thoracic Society of Australia and New Zealand guidance recommends a SpO_2 target of 88–92% in conditions associated with chronic respiratory failure, including exacerbations of COPD.[Barnett 2022]

References

Barnett A, Beasley R, Buchan C, et al. Thoracic Society of Australia and New Zealand position statement on acute oxygen use in adults: 'Swimming between the flags'. Respirology 2022; 27: 262-276.

Resources

TSANZ's **position statement on acute oxygen use in adults**

Notes

Refer to TSANZ guidance for other options and details.

Practice point

There are two methods for inhaling reliever from a pMDI plus spacer: single-breath technique and tidal breathing.

Single-breath technique is the standard, recommended method: one actuation is released into the spacer at a time. The patient takes a single slow deep breath after each actuation, then holds their breath for 5 seconds, then exhales away from the spacer.

Tidal breathing is the alternative method for use in a person with acute asthma who cannot coordinate their breathing with actuations. Up to 2 actuations are released into the spacer at the same time, and the patient takes multiple breaths (aim for four), breathing in and out through the spacer mouthpiece.

The tidal breathing method is usually used in EDs to deliver SABA in acute asthma, but patients should revert to the preferred single-breath technique after discharge.

Resources

National Asthma Council Australia's information paper: Inhaler technique for people with asthma or COPD (2018)
https://files.nationalasthma.org.au/resources/Inhaler-Technique-info-paper-20180607-web.pdf

National Asthma Council Australia's video: How to use a metered dose inhaler (puffer) with a spacer for adults
https://www.nationalasthma.org.au/living-with-asthma/how-to-videos/how-to-use-a-puffer-with-a-spacer-for-adults

National Asthma Council Australia's fact sheet on spacers for pressurised metered-dose inhalers
https://files.nationalasthma.org.au/resources/NAC047-Spacers-for-Pressurised-Metered-Dose-Inhalers-Information-Sheet-2025_Web.pdf

Practice point

When prescribing oral corticosteroids, consider writing a PBS script for the precise number of tablets needed for one course, with no repeats.

Practice point

Manage acute asthma in pregnant women as for other adults. Treat promptly to minimise risk to the foetus as well as the woman.

Resources

Asthma in pregnancy

https://www.asthmahandbook.org.au/clinical-topics/asthma-in-pregnancy