National Asthma Council Australia update for health professionals - Salbutamol nebules

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It is anticipated that there will be supply shortage of salbutamol inhalation solution ampoules 2.5mg/2.5mL (Ventolin nebules) until 21 December 2026, and for 5mg/2.5mL until 17 August 2026.

Salbutamol Cipla 5mg/2.5mL brand is currently available.

An overseas registered product has been approved for supply under Section 19A. See the TGA website for information.

There are no quality concerns with the Ventolin nebules currently supplied in Australia.

Salbutamol nebules

Salbutamol nebules are indicated for the relief of bronchospasm in patients with asthma or chronic obstructive pulmonary disease (COPD), and for acute prophylaxis against exercise-induced asthma or in other situations known to induce bronchospasm.[1]

Table 1 - Approved Product Information doses of salbutamol nebules

Age group	Dose
Children 4-12 years	2.5mg
Adults	5mg
Elderly	Lower initial dose, may increase gradually if insufficient bronchodilation
Renal/hepatic impairment	May require decreased dose

The Pharmaceutical Benefits Schedule (PBS) restricts the prescription of salbutamol nebules to patients with asthma and COPD unable to use an oral pressurised inhalation device via a spacer.

Dose equivalence

Salbutamol, a short-acting beta$_2$ agonist (SABA), delivered via nebuliser requires a higher dose without any added therapeutic benefit.[2] The dose equivalent to 5mg of salbutamol delivered by nebuliser is 10-15 puffs of 100 microgram salbutamol by a pressurised metered-dose inhaler (pMDI) plus spacer.[3]

Nebulisers deliver a lower fraction of the prescribed dose than a pMDI plus spacer – approximately 10% versus 20-30% - and therefore larger doses are prescribed.[4]

Administration of salbutamol by pMDI plus spacer is more effective than by nebuliser because a greater dose is delivered in a shorter period of time and a larger dose is delivered to the lungs as the result of greater targeting efficiency.[5]

Adverse effects

Extrapulmonary adverse effects such as tremor, heart rate and anxiety are more likely with drug delivery via nebules compared to pMDI plus spacer, related to the increased dose.[6] Nebuliser use in the emergency department (ED) setting is associated with greater increases in heart rate than with use of a pMDI plus spacer, suggesting a larger systemically absorbed dose is administered by nebulisers.[6]

Comparative efficacy

Historically, there has been a belief that salbutamol delivered via a nebuliser is more effective than inhaled therapy during acute exacerbations of asthma or COPD.[7]

Comparison of nebulised salbutamol therapy with pMDIs plus spacer or dry powder inhalers (DPIs) shows no difference in clinical outcomes among patients with asthma or COPD.[2,6,8,9,10]

Asthma

pMDIs with a spacer is at least as effective as a nebuliser for the delivery of salbutamol for adults and children, even during symptomatic exacerbations.

Comparison in patients with acute asthma showed nebuliser delivery is not significantly better in terms of clinical outcomes than pMDIs plus a spacer.[11,12,13] A 2013 Cochrane review showed no difference in hospital admission rates for adults and children, and length of stay in the emergency department for adults.[11] Peak flow and forced expiratory volume were also similar for the two delivery methods.[11] Studies included in the Cochrane review excluded people with life-threatening asthma.[11]

A prospective open-label study also showed no difference in hospital rates in adults presenting to ED, reduced time spent in ED, and a statistically greater improvement in peak flow rates in the pMDI plus spacer group compared with nebuliser use.[12]

Use of pMDI plus spacer may have some advantages compared to nebulisers for children with acute asthma.[5,11,14] Hospital admissions rates may be significantly lower when SABA is administered to younger children via pMDI plus spacer compared to nebuliser.[5,14] A systematic review concluded that this decrease may be more significant among children under 5 years of age with moderate to severe exacerbations.[5] A Cochrane review concluded that length of stay in the emergency department for children was significantly less with use of pMDI plus spacer compared to nebulised treatment.[11] Pulse rate and tremor after treatment was lower for pMDI plus spacer use in children.[11]

There is no clear evidence supporting the use of nebulisers over pMDI plus spacer based on severity of exacerbation.[14]

COPD

A systematic review of management of acute exacerbations of COPD concluded that there is insufficient evidence that neither a pMDI nor a nebuliser is superior to the other.[15] In the out-patient management of patients with COPD no differences in pulmonary function responses between delivery via nebuliser or pMDI have been shown.[6] Increases in heart rate have been shown to be greater after administration of salbutamol by nebuliser than by pMDI.[6]

It has been suggested that selection of appropriate delivery device should consider the patient's ability to use the device correctly, patient preferences, lack of time or skills to properly instruct the patient in the use of the device or monitor its appropriate use, and cost of therapy.[6]

Acute asthma treatment

To deliver salbutamol for flare-ups or acute asthma in adults and children, a pMDI plus spacer is recommended.[16] Salbutamol delivered via a pMDI plus spacer is equivalent or superior to nebulised salbutamol in school-aged children.[11,14,17]

A small volume spacer plus a tightly fitting face mask may be required for children younger than 4 years or for people who cannot seal lips tightly around the mouthpiece.[16] Consider using a nebuliser only if a child cannot be taught to inhale medicine from a spacer.

It is important to note that most trials excluded people with life-threatening asthma. nebules may be appropriate in the treatment of life-threatening asthma (*Table 2*).[16]

Table 2 - Immediate treatment in acute asthma in the ED[16]

Mild/moderate	Severe	Life-threatening
Children 1-5 years		
Salbutamol 2-6 puffs (100 microg/actuation) via pMDI and spacer (tidal breathing) plus mask if needed	Salbutamol 6 puffs (100 microg/actuation) via pMDI and spacer (tidal breathing) plus mask if needed	Salbutamol 2 x 2.5mg nebules via continuous nebulisation driven by oxygen
Adults and children 6 years and over		
Salbutamol 4-12 puffs (100 microg/actuation) via pMDI and spacer (tidal breathing)	Salbutamol 12 puffs (100 microg/actuation) via pMDI and spacer (tidal breathing)	Salbutamol 2 x 5mg nebules via continuous nebulisation driven by oxygen

Infection control

Use of nebulisers can disseminate aerosols and potentially contribute to spread of respiratory viral infections.[23] The National Asthma Council's Australian Asthma Handbook states that use of nebulisers carries a high risk of transmitting viral infections because they generate aerosol particles that can spread for several metres and remain airborne for more than 30 minutes.[16] The Australian Asthma Handbook further states that use of nebulisers increases the risk of transmitting respiratory infections to staff and other patients.[16]

If use of a nebuliser is needed in settings where COVID-19 infection is possible, strict infection control procedures should be followed.[18] For patients with known current COVID-19 infection Australian guidelines recommend against the use of a nebuliser.[19]

SABA overuse

Dispensing of 3 or more SABA canisters per year (corresponding to average use more than daily) is associated with increased risk of emergency department visit or hospitalisation independent of severity and dispensing of 12 or more canisters per year (one a month) is associated with substantially increased risk of asthma-related death.[20,21]

These risks are higher with nebulised SABA.[22] A study of SABA use among patients with asthma aged 5 to 56 years showed nebuliser use was associated with a 20-fold increase in the likelihood of asthma-related hospitalisation compared with SABA pMDI use.[22]

Table 3 - Comparison on pMDI plus spacer versus nebuliser

pMDI + spacer	Nebuliser
No power source required	Require power source
Easy portability, less portable than pMDI alone	Reduced portability
Simple and quick to use	Greater time to deliver dose
Less personnel time to prepare and administer	Greater health staff or parent time to prepare and administer
Less maintenance required, easily cleaned	Regular maintenance required
Spacer less expensive than nebuliser	Equipment more expensive
Low risk of cross-infection	Higher risk of cross-infection
Low risk of aerosol or droplet transmission	Increased risk of transmission of infectious microbes through respiratory droplet spread
More efficient drug delivery	Inefficient drug delivery
Less expensive	More expensive
Fewer potential systemic side effects	More potential systemic side effects
Smaller particle size, allowing for greater deposition in small airways	Larger particle size, allowing for greater impaction in upper airways
Minimal patient coordination required	Patient coordination not required
Cannot be used with supplemental oxygen	Can be used with supplemental oxygen
Effective with tidal breathing	Effective with tidal breathing
HFA propellant release	No HFA propellant release

What do clinical guidelines say?

The Global Initiative for Asthma (GINA) report states that delivery of SABA via a pMDI plus spacer or DPI leads to a similar improvement in lung function as delivery via nebuliser.[23]

The Australian Asthma Handbook states salbutamol delivered via a pMDI with spacer is at least as effective as salbutamol delivered via nebuliser in preschool children (with viral-induced wheezing or acute asthma) and adults and is equivalent or superior in school-aged children.[16]

The Royal Children's Hospital Melbourne states for the treatment of acute asthma a pMDI is preferable to nebulisers given its rapid delivery, comparable efficacy, and fewer side effects.[24] For life-threatening asthma, salbutamol nebules are recommended.[24]

The COPD-X Plan states there is a lack of evidence in favour of one mode of delivery over another for bronchodilators during exacerbations of COPD.[3]

The 2026 GOLD Report on COPD states there is no evidence for superiority of nebulised therapy over pMDIs in patients who are able to use them properly.[23]

Recommendations

Use a pMDI in combination with a spacer to deliver bronchodilators for patients with asthma or COPD.

A pMDI plus spacer is at least as effective as a nebuliser in outpatient, in-patient, ED and intensive care units across all ranges of severity of acute asthma among adults and children.

Cost and infection control considerations are additional important determinants.

Requests for prescription of salbutamol nebules provides an opportunity to confirm diagnosis, assess control, optimise therapy, assess adherence and inhaler technique, and update written action plans.

Education to patients, carers and health professionals is required to close the gap between evidence and practice with respect to use of nebulisers.

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