Alert	
Indication	Management of post-extubation stridor [evidence for effectiveness is not clear]. [1-4] Initial treatment of outpatients with moderate to severe bronchiolitis. [5] Initial treatment of croup.[6]
Action	Catecholamine drug with combined alpha and beta-agonist actions resulting in peripheral vasoconstriction reversing hypotension and mucosal oedema; increased rate and force of cardiac contractions, reversing hypotension; and reversal of bronchoconstriction and reduction in the release of inflammatory mediators. [7]
Drug Type	Inotropic vasopressor.
Trade Name	Aspen Adrenaline 1:1,000 injection
Presentation	1:1,000 ampoule [1mg/1 mL]
Dosage / Interval	0.5 mg/kg [0.5 mL/kg of adrenaline 1:1000 ampoule]. Dose may be repeated every 60 minutes if required following medical assessment of previous dose effect.
Maximum dose	N/A
Route	Nebulised
Preparation/Dilution	Draw up 0.5 mL/kg (0.5 mg/kg) of adrenaline 1:1,000 [1 mg/1 mL] ampoule and add sodium chloride 0.9% to make a final volume of 4 mL.
Administration	Deliver final volume of 4 mL via nebuliser [kept upright] over 15 minutes. Driving gas as prescribed by medical staff. Set flow rate at 6 L/minute. There will always be dead space that is not available for nebulisation – it is not possible to nebulise to dryness.
Monitoring	Administer under close supervision of medical staff. Ensure cardiorespiratory monitoring including respiratory rate, oxygen saturation, heart rate and blood pressure.
Contraindications	Nil
Precautions	Infants with arrhythmias, hypertension or hyperthyroidism. Infants with dilated or ischaemic cardiac disease.
Drug Interactions	No information.
Adverse Reactions	Tachycardia and arrhythmia. Systemic hypertension.
Compatibility	Fluids: Sodium chloride 0.9% Drugs: No information.
Incompatibility	Fluids and drugs: No information.
Stability	Discard remainder after use.
Storage	Store below 25°C. Protect from light.
Special comments	Cross-check correct adrenaline strength ampoule used.
Evidence summary	**Efficacy:** **Nebulised racemic adrenaline for extubation of newborn infants:** There are no trials proving the efficacy of nebulised adrenaline compared to placebo or intravenous dexamethasone for post extubation stridor. [1-4] **Treatment and prevention of bronchiolitis in newborns and infants:** Nebulised

	adrenaline decreases hospitalisations in patients presenting to ED. There is no evidence to support the use of adrenaline for inpatients. [5, 8] (LOE I, GOR A) **Treatment of children with croup:** Nebulised adrenaline is associated with clinically and statistically significant transient reduction of symptoms of croup 30 minutes post-treatment. [6] 30 (LOE I, GOR A) Evidence does not favour racemic adrenaline or L-adrenaline, or IPPB over simple nebulisation. (LOE II, GOR B) **Safety:** Nebulised adrenaline is associated with increased heart rate and blood pressure. [2, 8] **Pharmacokinetics:** Not reported for nebuliser use in newborns or children. No difference in plasma adrenaline concentrations in asymptomatic children with history of anaphylaxis given adrenaline inhaler (10–20 activations) versus children given a placebo.[9]
References	1. Cesar RG, de Carvalho WB. L-epinephrine and dexamethasone in postextubation airway obstruction: a prospective, randomized, double-blind placebo-controlled study. International journal of pediatric otorhinolaryngology. 2009;73:1639-43. 2. da Silva PS, Fonseca MC, Iglesias SB, Junior EL, de Aguiar VE, de Carvalho WB. Nebulized 0.5, 2.5 and 5 ml L-epinephrine for post-extubation stridor in children: a prospective, randomized, double-blind clinical trial. Intensive care medicine. 2012;38:286-93. 3. Davies MW, Davis PG. Nebulized racemic epinephrine for extubation of newborn infants. The Cochrane database of systematic reviews. 2002:CD000506. 4. Preutthipan A, Poomthavorn P, Sumanapisan A, Chinrat B, Thasuntia S, Plitponkarnpim A, Chantarojanasiri T. A prospective, randomized double-blind study in children comparing two doses of nebulized L-epinephrine in postintubation croup. Journal of the Medical Association of Thailand = Chotmaihet thangphaet. 2005;88:508-12. 5. Baraldi E, Lanari M, Manzoni P, Rossi GA, Vandini S, Rimini A, Romagnoli C, Colonna P, Biondi A, Biban P, Chiamenti G, Bernardini R, Picca M, Cappa M, Magazzu G, Catassi C, Urbino AF, Memo L, Donzelli G, Minetti C, Paravati F, Di Mauro G, Festini F, Esposito S, Corsello G. Inter-society consensus document on treatment and prevention of bronchiolitis in newborns and infants. Italian journal of pediatrics. 2014;40:65. 6. Bjornson C, Russell K, Vandermeer B, Klassen TP, Johnson DW. Nebulized epinephrine for croup in children. The Cochrane database of systematic reviews. 2013;10:CD006619. 7. Muraro A, Roberts G, Worm M, Bilo MB, Brockow K, Fernandez Rivas M, Santos AF, Zolkipli ZQ, Bellou A, Beyer K, Bindslev-Jensen C, Cardona V, Clark AT, Demoly P, Dubois AE, DunnGalvin A, Eigenmann P, Halken S, Harada L, Lack G, Jutel M, Niggemann B, Rueff F, Timmermans F, Vlieg-Boerstra BJ, Werfel T, Dhami S, Panesar S, Akdis CA, Sheikh A, Allergy EF, Anaphylaxis Guidelines G. Anaphylaxis: guidelines from the European Academy of Allergy and Clinical Immunology. Allergy. 2014;69:1026-45. 8. Hartling L, Bialy LM, Vandermeer B, Tjosvold L, Johnson DW, Plint AC, Klassen TP, Patel H, Fernandes RM. Epinephrine for bronchiolitis. The Cochrane database of systematic reviews. 2011:CD003123. 9. Simons FE, Gu X, Johnston LM, Simons KJ. Can epinephrine inhalations be substituted for epinephrine injection in children at risk for systemic anaphylaxis? Pediatrics. 2000;106:1040-4.

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