

Respiratory and Airway Medications

A study guide built entirely from the Region SOP

Every dose, route, onset, duration, contraindication and side effect in this guide comes from your Region SOP drug references and treatment protocols. Nothing has been added from a textbook or a national guideline. Where the SOP does not state something, this guide says so rather than filling the gap.

How to use this guide

- Learn the drugs in the order the protocol reaches for them, not alphabetically. The sections below follow the escalation sequence: bronchodilators first, then the escalation agents, then the airway drugs.
- Adult and pediatric doses are printed on the same line for every drug. Several of these differ in a way that is easy to miss — ketamine post-intubation sedation is the clearest example.
- The Study note under each drug is where the reasoning lives. If you only revise one thing per drug, revise that.
- The quick-reference tables at the back are for the last ten minutes before an exam or a shift. They are not a substitute for the monographs.

What this SOP does NOT carry

Two absences matter clinically and both are commonly assumed to be present.

- There is NO CORTICOSTEROID in this SOP — no methylprednisolone, no dexamethasone, no prednisone. Asthma produces a two-phase reaction, and the inflammatory second phase beginning six to eight hours after exposure is not treated by anything you carry. That is a reason to transport the asthmatic who feels better after a nebulizer, and it is worth saying to the patient.
- There is NO NEUROMUSCULAR BLOCKING AGENT — no succinylcholine, no rocuronium, no vecuronium. Your drug-assisted intubation pathway uses ketamine alone. Airway reflexes are blunted rather than abolished, which produces less ideal intubating conditions and a far more survivable failed attempt. Students who study only from a textbook will look for a paralytic that does not exist in your box.

The escalation sequence at a glance

Step	Adult Asthma / COPD	What it treats
1	OXYGEN titrated to SpO ₂ 94–99%	Hypoxia
2	DuoNeb — ALBUTEROL 2.5 mg + IPRATROPIUM 0.5 mg, repeat × 2	Bronchospasm, two receptor pathways
3	Severe: DuoNeb delivered THROUGH CPAP at 5 cm PEEP, max 10 cm	Bronchospasm plus work of breathing
4	MAGNESIUM SULFATE 2 g in 100 mL D5W over 15 min	Refractory bronchospasm
5	Deteriorating, OLMC: EPINEPHRINE 0.3 mg IM anterolateral thigh	Last-line bronchodilation
—	If the patient deteriorates on CPAP: REMOVE CPAP, consider advanced airway	Failure of noninvasive support

DuoNeb and albuterol may be administered IN-LINE for patients requiring CPAP or intubation — you do not choose between the drug and the pressure.

BRONCHODILATORS — the first-line pair

ALBUTEROL *Beta-2 agonist, sympathomimetic*

Mechanism	Acts selectively on beta-2 receptor sites in the lungs, relaxing bronchial smooth muscle, decreasing airway resistance, and relieving bronchospasm.
Supplied	2.5 mg / 3 mL plastic ampule
Adult dose	NEB 2.5 mg
Pediatric dose	NEB 2.5 mg
Onset / duration	5–15 min · 3–4 hours
Administration	NEB over 8–10 min
Contraindications	Caution (not absolute): hypertension · tachycardia · prolonged QT syndrome · PMH of cardiovascular disease
Side effects	Tremor · nervousness · nausea · palpitations or tachycardia
Protocols	Adult Asthma/COPD · Pediatric Asthma · Adult Anaphylaxis · Pediatric Anaphylaxis · Crush Syndrome

Study note. Note the listed items are cautions, not true contraindications — a wheezing patient with a cardiac history still gets the drug. In anaphylaxis the repeat is "may repeat 5 min, no max dosage"; in the asthma protocol it arrives as part of DuoNeb.

IPRATROPIUM BROMIDE *Anticholinergic, parasympatholytic*

Mechanism	Antagonizes acetylcholine by blocking muscarinic cholinergic receptors, producing bronchodilation and drying of respiratory tract secretions.
Supplied	0.5 mg / 2.5 mL plastic ampule
Adult dose	NEB 0.5 mg
Pediatric dose	NEB 0.5 mg
Onset / duration	5–10 min · 4–6 hours
Administration	NEB over 8–10 min
Contraindications	Glaucoma · prostate hypertrophy
Side effects	Bitter taste in mouth · blurred vision, dilated pupils · nausea
Protocols	Adult Asthma/COPD · Pediatric Asthma · Adult Anaphylaxis · Pediatric Anaphylaxis

Study note. Same dose in adults and children. Combined with albuterol this is DuoNeb — two different receptors, additive bronchodilation. The anticholinergic side effects (dry mouth, blurred vision, pupil dilation) all follow directly from blocking muscarinic receptors.

ESCALATION FOR SEVERE BRONCHOSPASM

MAGNESIUM SULFATE *Electrolyte / smooth muscle relaxant*

Mechanism	Not stated in the SOP monograph. Used in the asthma pathway for severe or impending respiratory failure after DuoNeb and CPAP.
Supplied	Diluted in 100 mL D5W
Adult dose	2 g in 100 mL D5W IVPB over 15 min. Age ≥ 65: contact OLMC to consider 1 g
Pediatric dose	25 mg/kg in 100 mL D5W IVPB over 15 min, max 2 g
Onset / duration	Immediate · 30–60 min
Administration	IVPB over 15 minutes — the protocol says do not delay administration
Contraindications	Renal failure or dialysis patients
Side effects	Hypotension

Protocols	Adult Asthma/COPD · Pediatric Asthma · Pre-eclampsia/Eclampsia (different dose: 4 g)
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Study note. Two different doses live under one drug name. Asthma is 2 g; eclampsia is 4 g. Hypotension after administration usually responds to a fluid bolus. Mixing: add the dose to 100 mL D5W, rotate to mix, run with macro drip tubing at the rate on the drug page.

EPINEPHRINE 1 mg/mL — IM *Adrenergic catecholamine, sympathomimetic*

Mechanism	Alpha effects produce vasoconstriction. Beta effects increase automaticity, conductivity and contractility, and dilate the bronchial tree.
Supplied	1 mg/mL vial or ampule
Adult dose	IM 0.3 mg in the anterolateral thigh, may repeat 5 min, no max
Pediatric dose	IM 0.01 mg/kg in the anterolateral thigh, max single dose 0.3 mg, may repeat 5 min, no max. EpiPen: 15–29 kg = 0.15 mg; ≥ 30 kg = 0.3 mg; under 15 kg contact OLMC
Onset / duration	5–10 min · 5–10 min (IV/IO route)
Administration	IM — anterolateral thigh, max 5 mL; shoulder, max 2 mL
Contraindications	None. Cautions: sensitivity to epinephrine or sulfites · cardiovascular disease · elderly · active labor
Side effects	Anxiety · headache · nausea · tremors · tachyarrhythmia
Protocols	Adult and Pediatric Anaphylaxis · Adult Asthma/COPD (deteriorating, OLMC) · Pediatric Asthma

Study note. In anaphylaxis this is first-line and given immediately. In asthma it sits at the bottom of the protocol, after DuoNeb, CPAP and magnesium, and requires OLMC contact. Same drug, same dose, very different position in the algorithm — know which protocol you are in.

THE PEDIATRIC UPPER AIRWAY DRUG

NEBULIZED EPINEPHRINE 1 mg/mL *Adrenergic catecholamine — nebulized route*

Mechanism	Alpha-mediated vasoconstriction of the airway mucosa reduces subglottic edema; beta effects dilate the bronchial tree.
Supplied	1 mg/mL vial or ampule
Adult dose	Not used — PEDIATRICS ONLY
Pediatric dose	0.5 mg/kg NEB, may repeat, max total dose 5 mg (5 mL)
Onset / duration	5–10 min · 60–90 min
Administration	NEB over 8–10 min; repeat at 5 min. Mix with normal saline per the dosing chart and run at 8–10 L of oxygen
Contraindications	None listed; same cautions as epinephrine
Side effects	Anxiety · headache · nausea · tremors · tachyarrhythmia
Protocols	Pediatric Croup · Pediatric Epiglottitis

Study note. A short duration — 60 to 90 minutes — is the point to remember. Rebound is why these children are transported rather than released. Note the dosing chart adds normal saline to reach volume in smaller children: 3 kg gets 3 mg in 3 mL plus 2 mL saline, and at ≥ 10 kg the full 5 mL is drug with no saline added.

DRUG-ASSISTED INTUBATION — the primary agent

KETAMINE *General anesthetic (dissociative)*

Mechanism	Not stated in the SOP monograph. Produces dissociative sedation while largely preserving respiratory drive and airway reflexes.
Supplied	500 mg / 10 mL (50 mg per mL)

Adult dose	DAI by ideal body weight: initial induction, max single dose 300 mg · second induction at 1 min if sedation inadequate, max TOTAL 450 mg · post-intubation sedation, may repeat at 5 min, no max, titrate to RASS -2 to -3
Pediatric dose	Induction 1: 1 mg/kg IV/IO, max 300 mg · Induction 2: 0.5 mg/kg IV/IO, max total 450 mg · Post-intubation sedation: 0.5 mg/kg at 15 min after induction, NO REPEAT DOSING
Onset / duration	1 min · 10–20 min
Administration	IVP/IO slowly over 1 minute
Contraindications	Age ≥ 65 years (for the behavioral/restraint indication)
Side effects	Disorientation, delirium, psychosis · auditory and visual hallucinations · rigidity, dystonic reactions · respiratory arrest, increased secretions
Protocols	Adult Drug Assisted Intubation · Pediatric Advanced Airway Management · Behavioral Emergencies · Patient Restraint

Study note. Dosed by IDEAL body weight from a height chart, not actual weight. Adult and pediatric post-intubation rules differ: the adult dose has no maximum and repeats at 5 minutes; the pediatric dose is given once at 15 minutes with NO repeat. That asymmetry is commonly missed.

DRUG-ASSISTED INTUBATION — shortage agents only

ETOMIDATE *Short-acting hypnotic — DRUG SHORTAGES ONLY*

Mechanism	Induction agent used only when ketamine is unavailable.
Supplied	Per drug reference
Adult dose	Induction 0.3 mg/kg, max 40 mg
Pediatric dose	Over 10 years: 0.3 mg/kg, max 20 mg. Under 10 years: etomidate is not used — midazolam 0.1 mg/kg, max 10 mg
Onset / duration	Per drug reference · Per drug reference
Administration	IV/IO slow push over 60 seconds unless otherwise specified
Contraindications	Per drug reference
Side effects	Per drug reference
Protocols	Drug Assisted Intubation — Drug Shortage Procedures only

Study note. This agent appears only in the shortage pathway. Under 10 years of age the shortage pathway substitutes midazolam rather than etomidate — an age split worth memorising alongside the cricothyrotomy age split.

MIDAZOLAM (VERSED) *Benzodiazepine*

Mechanism	Enhances the effect of GABA, an inhibitory neurotransmitter, decreasing nerve cell activity throughout the CNS.
Supplied	10 mg/2 mL vial (5 mg/mL) or 1 mg/1 mL vial — CHECK CONCENTRATION BEFORE ADMINISTRATION
Adult dose	DAI shortage induction (no ketamine or etomidate): 0.2 mg/kg, max 20 mg · Post-intubation sedation: 2 mg, max 10 mg, with fentanyl, repeat every 15 min to RASS -2
Pediatric dose	Shortage induction: 0.1 mg/kg, max 10 mg · Post-intubation sedation: 0.1 mg/kg, max 10 mg with fentanyl
Onset / duration	IV/IO/IN 1–3 min · IM 5–15 min · 40 min
Administration	IV/IO push; IN rapid push, max 1 mL per nostril
Contraindications	Hypotension, shock · taking narcotics or depressants · pregnancy unless seizing · debilitated or chronic disease · crosses the placental barrier
Side effects	RESPIRATORY DEPRESSION / ARREST · drowsiness, sedation · hypotension · ataxia · confusion, amnesia

Protocols	Drug Shortages · Adult and Pediatric Seizures · Behavioral Emergencies · Head/Spine Injuries · Eclampsia · Stimulant Overdose
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Study note. Two concentrations are stocked and the SOP prints the warning in capitals. Note the contraindication "taking narcotics or depressants" sits directly against the post-intubation combination with fentanyl — that combination is a deliberate, monitored exception, not a loophole.

FENTANYL *Opioid analgesic*

Mechanism	Per drug reference.
Supplied	100 mcg / 2 mL (50 mcg per mL)
Adult dose	Post-intubation sedation (shortage pathway): 50 mcg with midazolam, repeat every 15 min to RASS -2, max 200 mcg · Analgesia: 1 mcg/kg, max single 100 mcg, max total 200 mcg
Pediatric dose	Post-intubation sedation (shortage pathway): 0.1 mcg/kg with midazolam, max 100 mcg · Analgesia: 1 mcg/kg, max single 100 mcg, max total 200 mcg
Onset / duration	IV/IO/IN 1–3 min · 1–2 hours
Administration	IV/IO slow push
Contraindications	Hypersensitivity to opiates
Side effects	Per drug reference — respiratory depression is the class effect that matters here
Protocols	Drug Shortage Procedures (post-intubation sedation) · pain management protocols

Study note. In the airway context fentanyl appears only in the shortage pathway, always paired with midazolam, always to a RASS target rather than a fixed endpoint. Both drugs depress respiration — acceptable in an already-intubated and ventilated patient, dangerous in one who is not.

SUPPORTING DRUGS IN RESPIRATORY PROTOCOLS

DIPHENHYDRAMINE (BENADRYL) *Antihistamine, H1 antagonist*

Mechanism	Blocks H1 receptors, causing bronchoconstriction and contraction of the gut, and H2 receptors causing peripheral vasodilation and secretion of gastric acid.
Supplied	50 mg/mL vial
Adult dose	Unstable: 50 mg IV/IO/IM · Stable: 25 mg IV/IO/IM
Pediatric dose	Unstable: 1 mg/kg IV/IO/IM, max 50 mg · Stable: 1 mg/kg IV/IO/IM, max 25 mg
Onset / duration	IV/IO immediate · IM 30 min · 4–7 hours
Administration	IV/IO SLOW over 2 minutes
Contraindications	Per drug reference
Side effects	Sedation · CNS depression · dizziness · seizures · paradoxical CNS stimulation (pediatric)
Protocols	Adult and Pediatric Anaphylaxis · Acute Asthma/COPD

Study note. A second-line agent in anaphylaxis — it does not replace epinephrine and does not treat airway edema quickly enough to rely on. The sedation is relevant if you are also assessing mental status as a respiratory sign.

NALOXONE (NARCAN) *Narcotic antagonist*

Mechanism	Binds competitively to opiate receptor sites, displacing narcotics and synthetic narcotics, and antagonizes all actions of narcotics.
Supplied	2 mg/mL preload syringe
Adult dose	2 mg IV/IO/IN/IM, repeat at 3 min, max 10 mg
Pediatric dose	0.1 mg/kg IV/IO/IN/IM, max 2 mg. Do NOT administer to patients under 5 kg

Onset / duration	IV/IO/IN 1–2 min · IM 2–8 min · 30–60 min
Administration	IV/IO push · IN rapid push, max 1 mL per nostril · IM anterolateral thigh max 5 mL, shoulder max 2 mL
Contraindications	Do not administer under 5 kg. Caution in patients with cardiac irritability and narcotic addiction
Side effects	Nausea/vomiting · withdrawal symptoms · seizures
Protocols	Adult and Pediatric Depressant Overdose

Study note. Duration of 30 to 60 minutes is shorter than many opioids, so re-sedation is expected and the patient is transported. This is a ventilation drug in disguise — the problem it treats is a brainstem drive failure, and ventilation is established first.

NITROGLYCERIN *Vasodilator*

Mechanism	Decreases blood return to the right heart, decreasing preload and afterload and myocardial oxygen consumption.
Supplied	0.4 mg dissolvable tablets or spray
Adult dose	Acute Heart Failure: 0.4 mg SL, repeat 5 min, no max. If SBP > 160: initial dose 1.2 mg (3 tablets) SL
Pediatric dose	NONE
Onset / duration	SL 1–3 min · 30 min
Administration	Sublingual
Contraindications	Hypotension SBP < 90 · use of erectile dysfunction or pulmonary hypertension drugs within 48 hours · hypersensitivity to nitrates · head trauma · brain bleed
Side effects	Headache · hypotension · nausea/vomiting · palpitations · sublingual burning
Protocols	Adult Congestive Heart Failure / Acute Heart Failure (Pulmonary Edema) · Adult Acute Coronary Syndrome

Study note. This is the drug that separates cardiogenic pulmonary edema from the obstructive diseases. A wheezing patient who is actually in heart failure needs nitroglycerin and CPAP, not a bronchodilator alone — and the SOP pearl that CHF tends to run LOWER capnography than COPD is the field discriminator.

Quick reference

Dose card

Drug	Adult	Pediatric
Albuterol	NEB 2.5 mg	NEB 2.5 mg
Ipratropium	NEB 0.5 mg	NEB 0.5 mg
Magnesium (asthma)	2 g over 15 min (≥ 65 : OLMC, 1 g)	25 mg/kg over 15 min, max 2 g
Epinephrine IM	0.3 mg anterolateral thigh	0.01 mg/kg, max 0.3 mg
Epinephrine NEB	Not used	0.5 mg/kg, max total 5 mg
Ketamine induction 1	Ideal body weight, max 300 mg	1 mg/kg, max 300 mg
Ketamine induction 2	Max TOTAL 450 mg	0.5 mg/kg, max total 450 mg
Ketamine post-intubation	Repeat q5 min, no max, RASS -2 to -3	0.5 mg/kg at 15 min, NO repeat
Diphenhydramine	50 mg unstable / 25 mg stable	1 mg/kg, max 50 / 25 mg
Naloxone	2 mg, repeat q3 min, max 10 mg	0.1 mg/kg, max 2 mg. None under 5 kg
Nitroglycerin	0.4 mg SL q5 min (SBP > 160: 1.2 mg initial)	NONE

Onset and duration card

Drug	Onset	Duration
Albuterol	5–15 min	3–4 hours
Ipratropium	5–10 min	4–6 hours
Magnesium sulfate	Immediate	30–60 min
Epinephrine IM	5–10 min	5–10 min
Epinephrine NEB	5–10 min	60–90 min
Ketamine	1 min	10–20 min
Midazolam	1–3 min IV · 5–15 min IM	40 min
Fentanyl	1–3 min	1–2 hours
Diphenhydramine	Immediate IV · 30 min IM	4–7 hours
Naloxone	1–2 min IV · 2–8 min IM	30–60 min
Nitroglycerin	1–3 min	30 min

Contraindications worth memorising

Drug	Do not give to
Magnesium sulfate	Renal failure or dialysis patients
Naloxone	Patients under 5 kg
Nitroglycerin	SBP < 90 · ED or pulmonary hypertension drugs within 48 hours · head trauma · brain bleed
Midazolam	Hypotension or shock · patients taking narcotics or depressants · pregnancy unless seizing
Ipratropium	Glaucoma · prostate hypertrophy
Ketamine	Age ≥ 65 (behavioral/restraint indication)
Fentanyl	Hypersensitivity to opiates
Albuterol	No true contraindication — cautions only (HTN, tachycardia, prolonged QT, cardiac history)
Epinephrine	None listed — cautions only (sulfite sensitivity, CVD, elderly, active labor)

Five things that are easy to confuse

- Magnesium has two doses under one name. Asthma is 2 g; eclampsia is 4 g.
- Epinephrine has four presentations: 1 mg/mL IM for anaphylaxis and asthma, 1 mg/mL nebulized for pediatric croup and epiglottitis, 1 mg/10 mL cardiac, and push-dose at 10 mcg/mL which must be mixed.
- Ketamine post-intubation sedation repeats every 5 minutes with no maximum in adults, but is given ONCE at 15 minutes with no repeat in children.
- Midazolam is stocked in two concentrations — 5 mg/mL and 1 mg/mL. The SOP prints the warning to check the vial in capitals.
- Nebulized epinephrine lasts 60 to 90 minutes, which is shorter than the illness. Rebound is expected, which is why the croup patient is transported.

Self-test

Cover the tables and answer from memory. Every answer is in this guide.

- Give the DuoNeb components and doses, and explain why two drugs are used instead of one.
- Your asthma patient is 70 years old and remains severe after CPAP. What magnesium dose applies and what must you do first?
- A 22 kg child has croup with resting stridor. Calculate the nebulized epinephrine dose and state the maximum.
- State all three ketamine dose limits for adult drug-assisted intubation and the sedation target.
- Ketamine is unavailable. Give the adult induction agent and dose, and the post-intubation combination.
- Which respiratory drug in this SOP has no true contraindication, only cautions? Name two of the cautions.
- A patient in acute heart failure has an SBP of 172. What is the initial nitroglycerin dose, and how does it differ from the standard dose?
- Which two drug classes that you would expect to find in a respiratory protocol are absent from this SOP, and what is the clinical consequence of each?