

Normal Heart Rates*

Age	Awake rate (beats/min)	Sleeping rate (beats/min)
Neonate	100-205	90-160
Infant	100-180	90-160
Toddler	98-140	80-120
Preschooler	80-120	65-100
School-age child	75-118	58-90
Adolescent	60-100	50-90

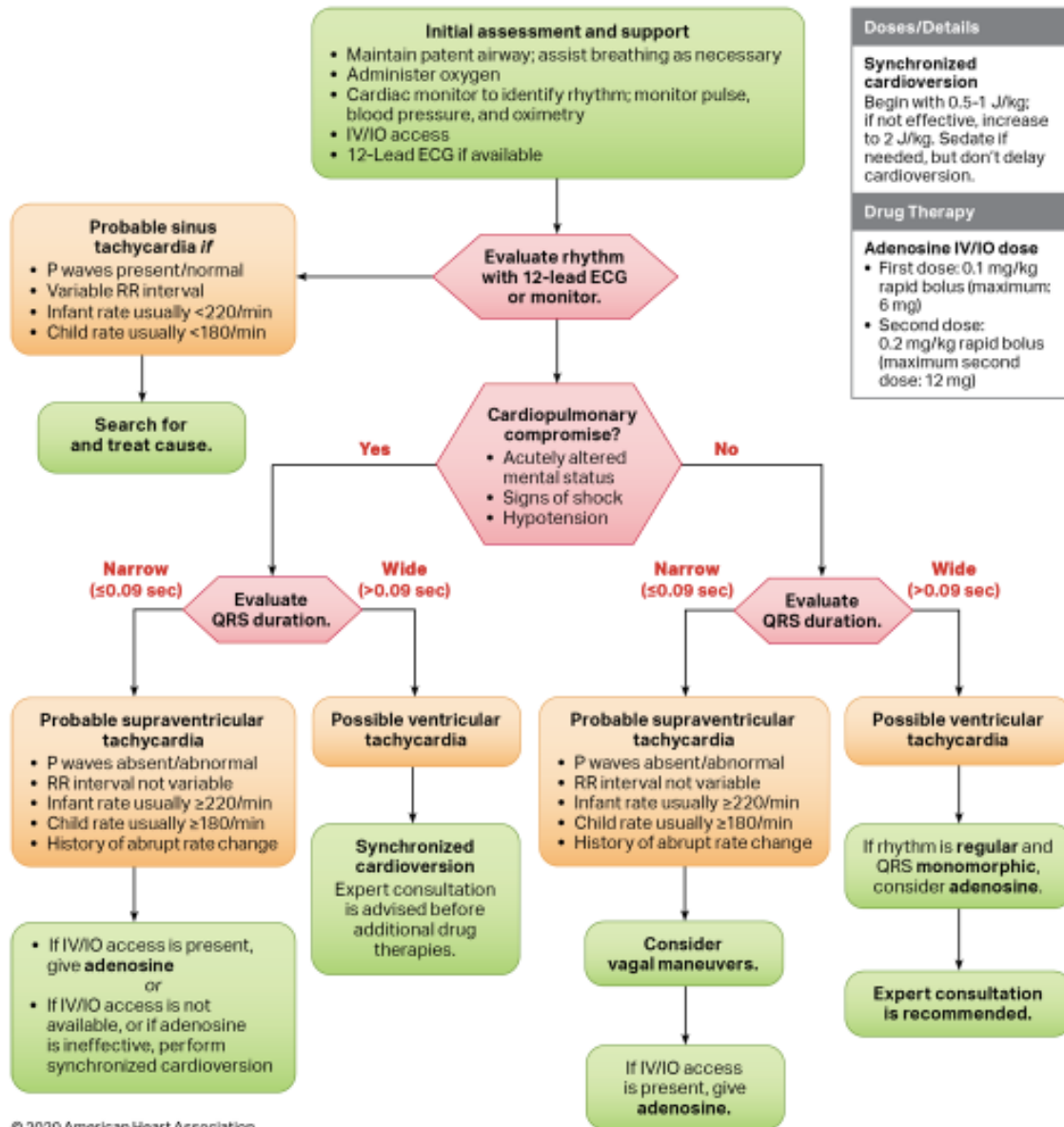
Normal Respiratory Rates*

Age	Rate (breaths/min)
Infant	30-53
Toddler	22-37
Preschooler	20-28
School-age child	18-25
Adolescent	12-20

Normal Blood Pressures

Age	Systolic pressure (mm Hg)*	Diastolic pressure (mm Hg)*	Mean arterial pressure (mm Hg)†
Birth (12 h, <1000 g)	39-59	16-36	28-42 [‡]
Birth (12 h, 3 kg)	60-76	31-45	48-57
Neonate (96 h)	67-84	35-53	45-60
Infant (1-12 mo)	72-104	37-56	50-62
Toddler (1-2 y)	86-106	42-63	49-62
Preschooler (3-5 y)	89-112	46-72	58-69
School-age child (6-9 y)	97-115	57-76	66-72
Preadolescent (10-12 y)	102-120	61-80	71-79
Adolescent (12-15 y)	110-131	64-83	73-84

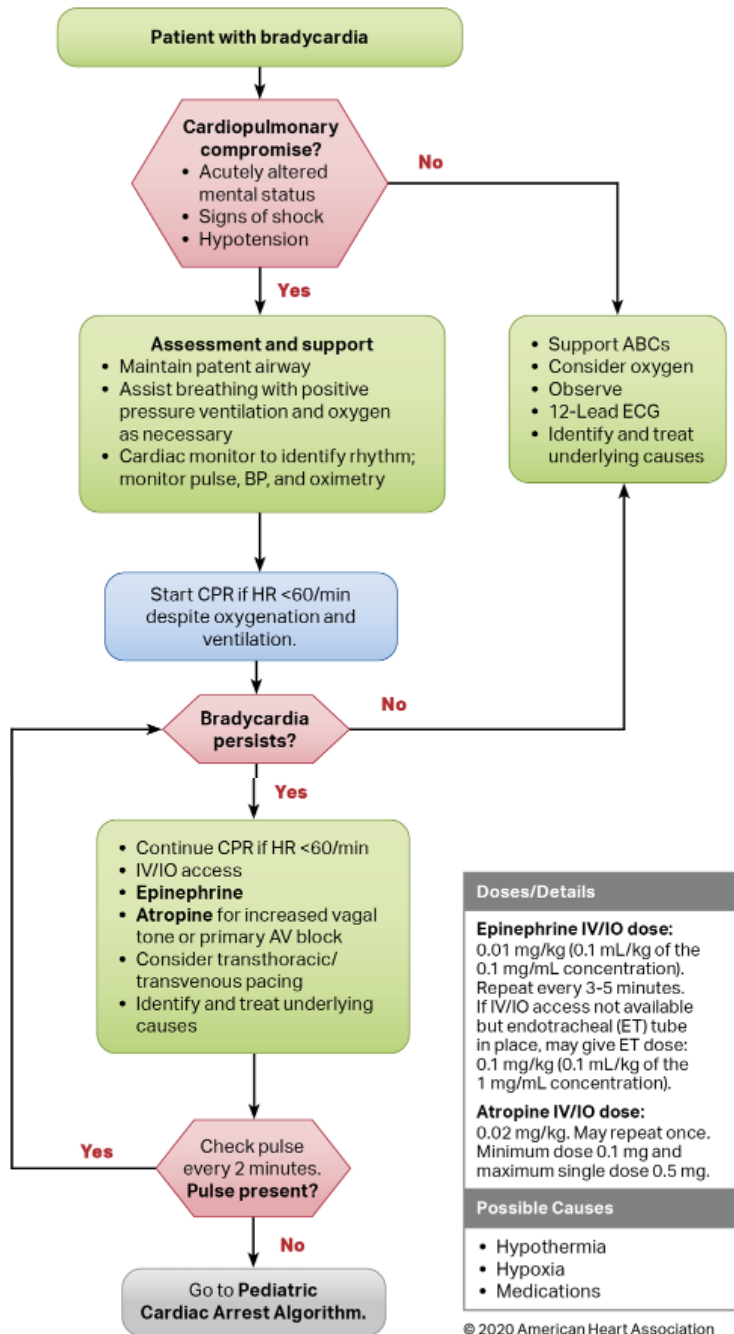
PALS Tachycardia with a Pulse



Doses/Details
<p>Synchronized cardioversion Begin with 0.5-1 J/kg; if not effective, increase to 2 J/kg. Sedate if needed, but don't delay cardioversion.</p>
Drug Therapy
<p>Adenosine IV/IO dose</p> <ul style="list-style-type: none"> • First dose: 0.1 mg/kg rapid bolus (maximum: 6 mg) • Second dose: 0.2 mg/kg rapid bolus (maximum second dose: 12 mg)

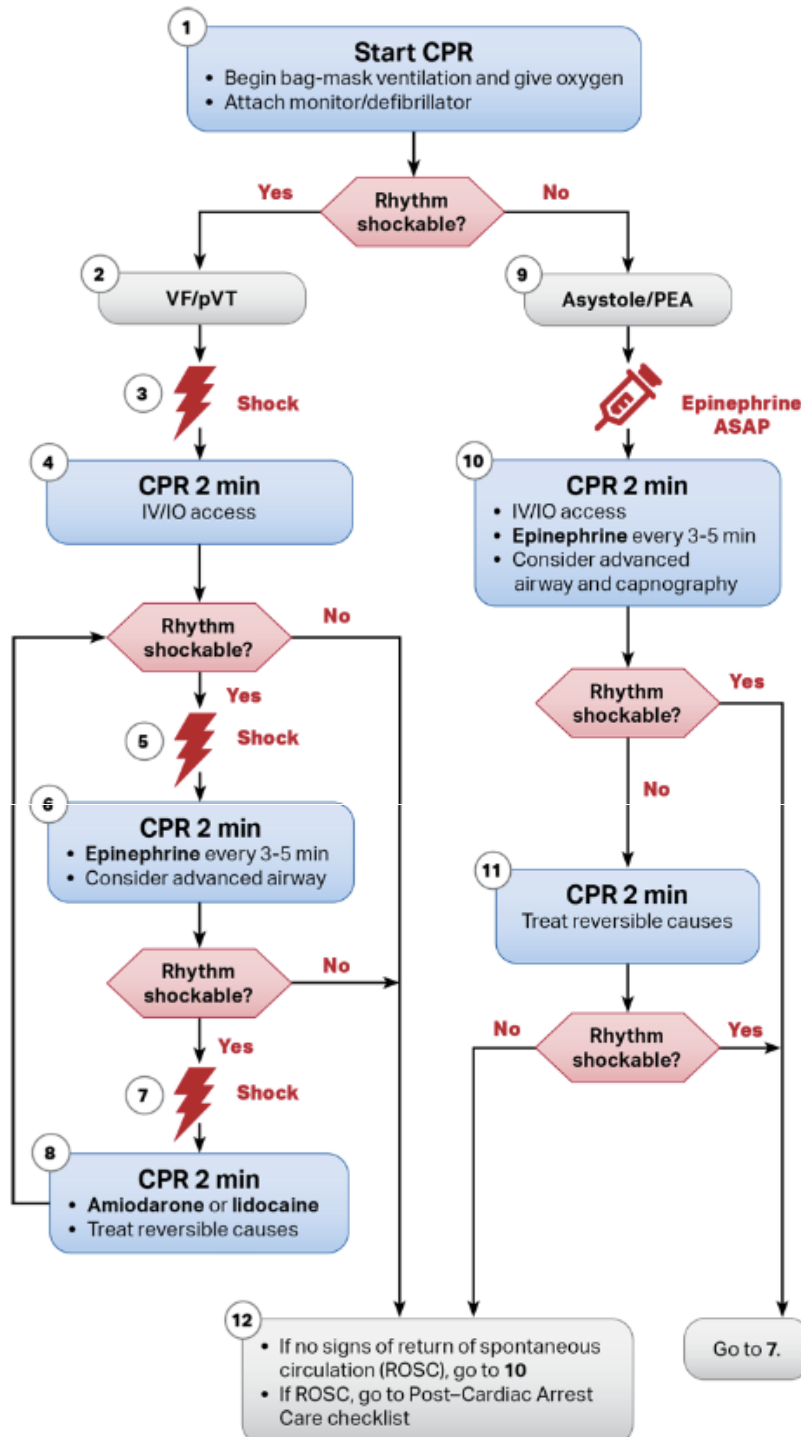
PALS Bradycardia

LEARNING OBJECTIVES



Doses/Details
<p>Epinephrine IV/IO dose: 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration). Repeat every 3-5 minutes. If IV/IO access not available but endotracheal (ET) tube in place, may give ET dose: 0.1 mg/kg (0.1 mL/kg of the 1 mg/mL concentration).</p> <p>Atropine IV/IO dose: 0.02 mg/kg. May repeat once. Minimum dose 0.1 mg and maximum single dose 0.5 mg.</p>
Possible Causes
<ul style="list-style-type: none"> • Hypothermia • Hypoxia • Medications

PALS CPR



CPR Quality

- Push hard (≥½ of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil
- Minimize interruptions in compressions
- Change compressor every 2 minutes, or sooner if fatigued
- If no advanced airway, 15:2 compression-ventilation ratio
- If advanced airway, provide continuous compressions and give a breath every 2-3 seconds

Shock Energy for Defibrillation

- First shock 2 J/kg
- Second shock 4 J/kg
- Subsequent shocks ≥4 J/kg, maximum 10 J/kg or adult dose

Drug Therapy

- **Epinephrine IV/IO dose:** 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration). Max dose 1 mg. Repeat every 3-5 minutes. If no IV/IO access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of the 1 mg/mL concentration).
- **Amiodarone IV/IO dose:** 5 mg/kg bolus during cardiac arrest. May repeat up to 3 total doses for refractory VF/pulseless VT or
- **Lidocaine IV/IO dose:** Initial: 1 mg/kg loading dose

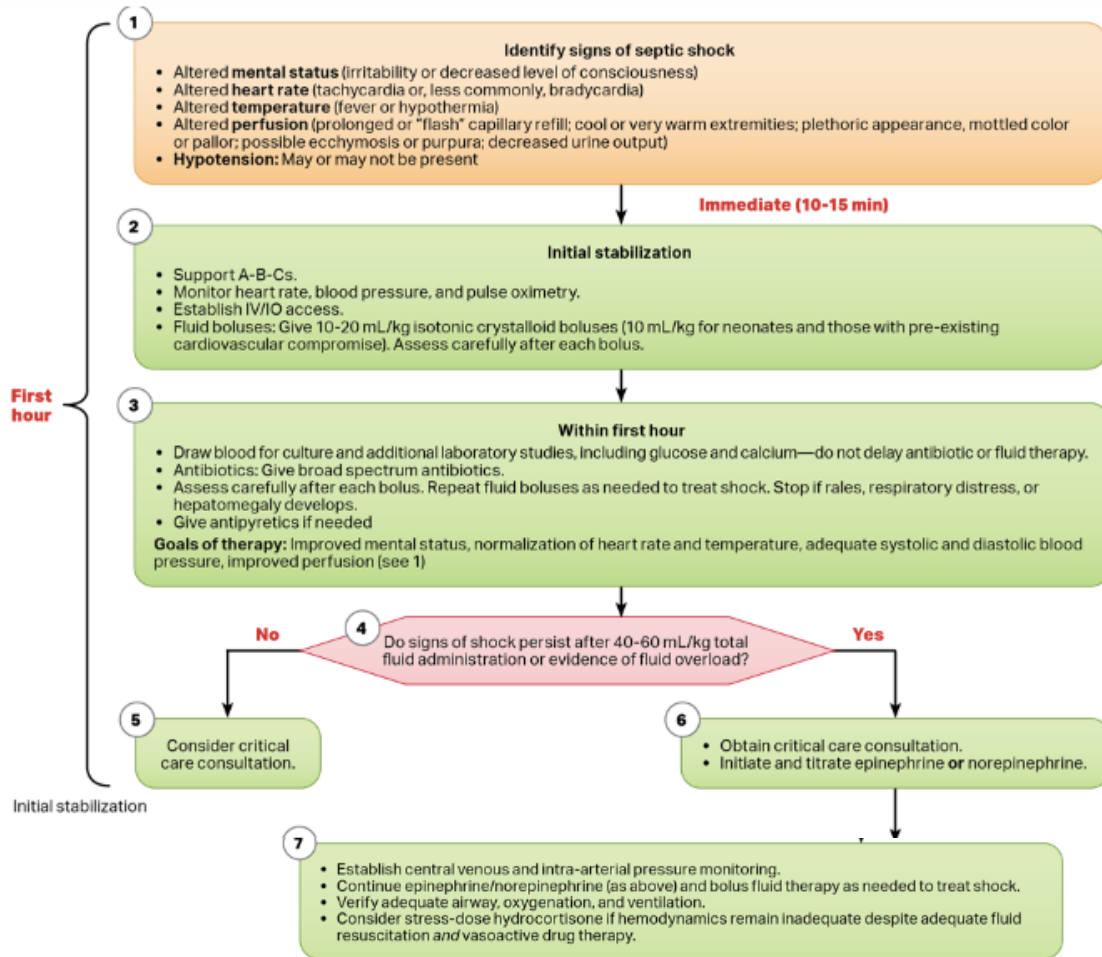
Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement

Reversible Causes

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypoglycemia
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

PALS Sepsis



Drugs

Drugs Used in PALS

Drug	Indications/dosages
Adenosine	SVT <ul style="list-style-type: none"> 0.1 mg/kg IV/IO <i>rapid</i> push (max 6 mg), second dose 0.2 mg/kg IV/IO <i>rapid</i> push (max 12 mg)
Albuterol	Asthma, anaphylaxis (bronchospasm), hyperkalemia <ul style="list-style-type: none"> MDI: 4 to 8 puffs via inhalation q 20 minutes PRN with spacer (<i>or</i> ET if intubated) Nebulizer: 2.5 mg/dose (wt <20 kg) <i>or</i> 5 mg/dose (wt >20 kg) via inhalation q 20 minutes PRN Continuous nebulizer: 0.5 mg/kg per hour via inhalation (max 20 mg/h)
Amiodarone	SVT, VT (with pulses) <ul style="list-style-type: none"> 5 mg/kg IV/IO <i>load</i> over 20 to 60 minutes (max 300 mg), repeat to daily max 15 mg/kg (2.2 g in adolescents) Pulseless arrest (ie, VF/pulseless VT) <ul style="list-style-type: none"> 5 mg/kg IV/IO <i>bolus</i> (max 300 mg), repeat to daily max 15 mg/kg (2.2 g in adolescents)
Atropine sulfate	Bradycardia (symptomatic) <ul style="list-style-type: none"> 0.02 mg/kg IV/IO (min 0.1 mg, max dose 0.5 mg), may repeat dose once in 5 minutes, max total dose child 1 mg, max total dose adolescent 3 mg 0.04 to 0.06 mg/kg ET Toxins/overdose (eg, organophosphate, carbamate) <ul style="list-style-type: none"> <12 years: 0.05 mg/kg IV/IO initially; then repeated and doubling the dose every 5 minutes until muscarinic symptoms reverse ≥12 years: 1 mg IV/IO initially; then repeated and doubling the dose every 5 minutes until muscarinic symptoms reverse
Calcium chloride 10%	Hypocalcemia, hyperkalemia, hypermagnesemia, calcium channel blocker overdose <ul style="list-style-type: none"> 20 mg/kg (0.2 mL/kg) IV/IO <i>slow</i> push during arrest, repeat PRN
Calcium gluconate	Hypocalcemia, hyperkalemia, hypermagnesemia, calcium channel blocker overdose <ul style="list-style-type: none"> 60 mg/kg (0.6 mL/kg) IV/IO <i>slow</i> push during arrest; repeat PRN
Dexamethasone	Croup <ul style="list-style-type: none"> 0.6 mg/kg PO/IM/IV (max 16 mg) Asthma <ul style="list-style-type: none"> 0.6 mg/kg PO/IM/IV every 24 hours (max 16 mg)
Dextrose (glucose)	Hypoglycemia <ul style="list-style-type: none"> 0.5 to 1 g/kg IV/IO (D₂₅W 2 to 4 mL/kg; D₁₀W 5 to 10 mL/kg)
Epinephrine	Pulseless arrest, bradycardia (symptomatic) <ul style="list-style-type: none"> 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration) IV/IO q 3 to 5 minutes (max single dose 1 mg) 0.1 mg/kg (0.1 mL/kg of the 1 mg/mL concentration) ET q 3 to 5 minutes Hypotensive shock <ul style="list-style-type: none"> 0.03 to 0.2 mcg/kg per minute* <p>*Upper limit dosing range can be highly variable and should be based on clinical scenarios.</p> Anaphylaxis <ul style="list-style-type: none"> IM autoinjector 0.3 mg (for patient weighing ≥30 kg) <i>or</i> IM junior autoinjector 0.15 mg (for patient weighing 10 to 30 kg) 0.01 mg/kg (0.01 mL/kg of the 1 mg/mL concentration) IM q 15 minutes PRN (max single dose 0.3 mg) 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration) IV/IO q 3 to 5 minutes (max single dose 1 mg) if hypotensive 0.1 to 1 mcg/kg per minute IV/IO infusion if hypotension persists despite fluids and IM injection Asthma <ul style="list-style-type: none"> 0.01 mg/kg (0.01 mL/kg of the 1 mg/mL concentration) subcutaneously q 15 minutes (max 0.3 mg <i>or</i> 0.3 mL) Croup <ul style="list-style-type: none"> 0.25 to 0.5 mL <i>racemic</i> solution (2.25%) mixed in 3 mL NS via inhalation 3 mg (3 mL of the 1 mg/mL concentration) epinephrine mixed with 3 mL NS (which yields 0.25 mL <i>racemic</i> epinephrine solution) via inhalation
Etomidate	RSI <ul style="list-style-type: none"> 0.2 to 0.4 mg/kg IV/IO infused over 30 to 60 seconds (max 20 mg) will produce rapid sedation that lasts for 10 to 15 minutes

Hydrocortisone	Adrenal insufficiency <ul style="list-style-type: none"> • 2 mg/kg IV bolus (max 100 mg)
Ipratropium bromide	Asthma <ul style="list-style-type: none"> • 250 to 500 mcg via inhalation q 20 minutes PRN x 3 doses
Lidocaine	VF/pulseless VT, wide-complex tachycardia (with pulses) <ul style="list-style-type: none"> • 1 mg/kg IV/IO bolus • Maintenance: 20 to 50 mcg/kg per minute IV/IO infusion (repeat bolus dose if infusion initiated >15 minutes after initial bolus) • 2 to 3 mg/kg ET
Magnesium sulfate	Asthma (refractory status asthmaticus), torsades de pointes, hypomagnesemia <ul style="list-style-type: none"> • 25 to 50 mg/kg IV/IO <i>bolus</i> (max 2 g) (pulseless VT) <i>or</i> over 10 to 20 minutes (VT with pulses) <i>or</i> <i>slow</i> infusion over 15 to 30 minutes (status asthmaticus)
Methylprednisolone	Asthma (status asthmaticus), anaphylactic shock <ul style="list-style-type: none"> • Load: 2 mg/kg IV/IO/IM (max 60 mg); only use acetate salt IM • Maintenance: 0.5 mg/kg IV/IO q 6 hours (max 120 mg/d)
Milrinone	Myocardial dysfunction and increased SVR/PVR <ul style="list-style-type: none"> • Loading dose: 50 mcg/kg IV/IO over 10 to 60 minutes followed by 0.25 to 0.75 mcg/kg per minute IV/IO infusion
Naloxone	Narcotic (opiate) reversal <ul style="list-style-type: none"> • Total reversal required (for narcotic toxicity secondary to overdose): 0.1 mg/kg IV/IO/IM/subcutaneous bolus q 2 minutes PRN (max 2 mg) • Total reversal <i>not</i> required (eg, for respiratory depression associated with therapeutic narcotic use): 1 to 5 mcg/kg IV/IO/IM/subcutaneously; titrate to desired effect • Maintain reversal: 0.002 to 0.16 mg/kg per hour IV/IO infusion
Nitroglycerin	Heart failure, cardiogenic shock <ul style="list-style-type: none"> • Initiate at 0.25 to 0.5 mcg/kg per minute IV/IO infusion; titrate by 1 mcg/kg per minute q 15 to 20 minutes as tolerated. Typical dose range 1 to 5 mcg/kg per minute (max 10 mcg/kg per minute) • In adolescents, start with 5 to 10 mcg <i>per minute</i> (<i>not</i> per kilogram per minute) and increase to max 200 mcg <i>per minute</i>
Nitroprusside	Cardiogenic shock (ie, associated with high SVR), severe hypertension <ul style="list-style-type: none"> • 0.3 to 1 mcg/kg per minute initial dose; then titrate up to 8 mcg/kg per minute PRN
Norepinephrine	Hypotensive (usually distributive) shock (ie, low SVR and fluid refractory) <ul style="list-style-type: none"> • 0.05 to 0.5 mcg/kg per minute* IV/IO infusion (*Upper limit dosing range can be highly variable and should be based on clinical scenarios); titrate to desired effect
Prostaglandin E₁ (PGE₁)	Ductal-dependent congenital heart disease (all forms) <ul style="list-style-type: none"> • 0.05 to 0.1 mcg/kg per minute IV/IO infusion initially; then 0.01 to 0.05 mcg/kg per minute IV/IO
Sodium bicarbonate	Metabolic acidosis (severe), hyperkalemia <ul style="list-style-type: none"> • 1 mEq/kg IV/IO <i>slow</i> bolus Sodium channel blocker overdose (eg, tricyclic antidepressant) <ul style="list-style-type: none"> • 1 to 2 mEq/kg IV/IO bolus until serum pH is >7.45 (7.50 to 7.55 for severe poisoning) followed by IV/IO infusion of 150 mEq NaHCO₃/L solution titrated to maintain alkalosis
Vasopressin	Catecholamine-resistant hypotension <ul style="list-style-type: none"> • 0.0002 to 0.002 unit/kg per minute (0.2 to 2 milliunits/kg per minute) continuous infusion

RT Tapes

Zone	3 kg <3 mos	4 kg <3 mos	5 kg <3 mos	Pink 6–7 kg 3–5 mos	Red 8–9 kg 6–11 mos	Purple 10–11 kg 12–24 mos	Yellow 12–14 kg 2 yrs	White 15–18 kg 3–4 yrs	Blue 19–23 kg 5–6 yrs	Orange 24–29 kg 7–9 yrs	Green 30–36 kg 10–11 yrs
ETT uncuffed (mm)	3.5	3.5	3.5	3.5	3.5	4.0	4.5	5.0	5.5	N/A	N/A
ETT cuffed (mm)	3.0	3.0	3.0	3.0	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Lip-tip (cm)	9-9.5	9.5-10	10-10.5	10-10.5	10.5-11	11-12	12.5-13.5	14-15	15.5-16.5	17-18	18.5-19.5
Suction (F)	8	8	8	8	8	8	10	10	10	10	12
L-scope blade	1 straight	1 straight	1 straight	1 straight	1 straight	1-1.5 straight	2 straight/curved	2 straight/curved	2 straight/curved	2-3 straight/curved	2-3 straight/curved
Stylet	6 F	6 F	6 F	6 F	6 F	6 F	10 F	10 F	10 F	14 F	14 F
OPA (mm)	50	50	50	50	50	60	60	60	70	80	80
NPA (F)	14	14	14	14	14	18	20	22	24	26	26
Bag-mask device (minimum mL)	450	450	450	450	450	450	450	450-750	750-1000	750-1000	1000
ETCO₂ detector	Ped	Ped	Ped	Ped	Ped	Ped	Ped	Adult	Adult	Adult	Adult
LMA	1	1	1	1.5	1.5	2	2	2	2-2.5	2.5	3
Tidal volume (mL)	20-30	24-40	30-50	40-65	50-85	65-105	80-130	100-165	125-210	160-265	200-330
Frequency	20-25/min	20-25/min	20-25/min	20-25/min	20-25/min	15-25/min	15-25/min	15-25/min	12-20/min	12-20/min	12-20/min