Supplemental Information

SUPPLEMENTAL TABLE 1 Drugs Used in Cardiac Arrest, Resuscitation, and Shock

Drug	Dose	Notes
Cardiac arrest and resuscitation		
Amiodarone (injection: 2 mg/mL in D_5W; 6 mg/mL in D_5W [central line]; 50 mg/mL)	Perfusing atrial or ventricular arrhythmias: IV and/or IO: Neonates, infants, children: Give loading dose of 5 mg/kg over 20–60 min[a] Maximum single dose: 300 mg; can repeat to a maximum of 3 doses Total: 15 mg/kg per 24 h Adults: 150 mg given over 10 min and repeated if necessary, followed by a 1 mg/min infusion for 6 h, followed by 0.5 mg/min; total dose over 24 h should not exceed 2.2 g	Onset: within minutes; peak: 2–3 d to 1–3 wk; duration: 2 wk to mo after drug is discontinued Consider for use in SVT unresponsive to vagal maneuvers and adenosine and/or electrical cardioversion Consult cardiology before administration if possible Use lower dose and/or slower infusion if patient is hemodynamically unstable or receiving other medications that lower heart rate; can cause hypotension; can prolong QT interval: 1. Obtain expert consultation before administering if known or suspected long-QT syndrome 2. Routine administration in combination with procainamide or digoxin is not recommended without expert consultation Use with caution in hepatic failure Causes phlebitis: therefore, dilute to <2 mg/mL and prolong the infusion
	Pulseless ventricular tachycardia and/or ventricular fibrillation in absence of known or suspected long-QT syndrome: IV/IO: Neonates, infants, children: Initial dose: 5 mg/kg rapid bolus Maximum single dose: 300 mg; may repeat to a total of 3 doses Total: 15 mg/kg per 24 h Adults: 300-mg IV rapid bolus (may give undiluted) May give a single repeat 150-mg bolus IV if needed	May be given undiluted in pulseless VT or VF
Dobutamine (Injection 12.5 mg/mL premixed dilutions: 1, 2, 4 mg/mL)	Congestive heart failure, cardiogenic shock IV/IO: Infusion 2–20 μg/kg per min (titrated to desired change in BP and systemic perfusion)	Onset: 1–2 min; peak: 10 min; duration: <10 min after infusion is stopped Administer in large vein May be administered via peripheral IV Inactivated in alkaline solutions; do not mix with sodium bicarbonate May produce hypotension and tachyarrhythmia
Dopamine (injection: 40, 80, 160 mg/mL prediluted in D_5W: 0.8, 1.6, 3.2 mg/mL)	Distributive shock, ventricular dysfunction including cardiogenic shock IV/IO: Infusion 2–20 μg/kg per min (titrated to desired change in BP and systemic perfusion)	Onset: 1–2 min; peak: 10 min; duration: <10 min after infusion is stopped Begin administration of drug via peripheral IV and change to administration via central venous line at the earliest Inactivated in alkaline solutions; do not mix with sodium bicarbonate Tissue ischemia or necrosis with IV infiltration High infusion rates (>20 μg/kg per min) produce peripheral, renal, splanchnic vasoconstriction, and ischemia
Epinephrine[b] (0.1 mg/mL)	Cardiac arrest IV/IO: Newborn infants: 0.01–0.03 mg/kg Older infants and children: 0.01 mg/kg (maximum: 1 mg), repeated every 3–5 min	Begin administration of drug via peripheral IV and change to administration via central venous line at the earliest Preferably administered via central venous access High-dose epinephrine (0.1 mg/kg) is no longer recommended for routine use in resuscitation. It may be considered in exceptional circumstances such as β-adrenergic blocking agent poisoning. High doses produce vasoconstriction and may compromise organ function Increases myocardial oxygen requirements Local infiltration causes tissue ischemia and necrosis

SUPPLEMENTAL TABLE 1 Continued

Drug	Dose	Notes
		Catecholamines are inactivated in alkaline solutions. Do not use alkaline solutions like sodium bicarbonate in the same line as epinephrine. Use in separate lines.
Epinephrine[b] (1 mg/mL)	Cardiac arrest ET: Newborn infants: 0.05–0.1 mg/kg Older infants and children: 0.1 mg/kg (maximum: 2.5 mg), repeated every 3–5 min	Follow ET administration with saline flush or dilute in isotonic saline (1–5 mL) on the basis of patient size In newborn infants, endotracheal administration may be attempted while IV access is being established. Given the lack of supportive data for endotracheal epinephrine in newborn infants, it is reasonable to provide drugs by the IV route as soon as venous access is established
Epinephrine (0.1 mg/mL)	Shock IV/IO: Infusion: 0.1–1 μg/kg per min	Titrate dose continuously according to blood pressure, cardiac rate and function, and oxygenation Catecholamines are inactivated in alkaline solutions. Do not use alkaline solutions like sodium bicarbonate in the same line as epinephrine. Use in separate lines. Please refer to Table 4 for epinephrine used in anaphylactic shock
Lidocaine (injection: 5 mg/mL [0.5%]; 10 mg/mL [1%]; 20 mg/mL [2%]; premixed injection in D_5W: 4 mg/mL [0.4%], 8 mg/mL [0.8%])	Shock-refractory VF and pulseless VT IV/IO: 1 mg/kg loading bolus (repeat bolus if infusion initiated >15 min after initial bolus) followed by 20–50 μg/kg per min continuous infusion Maximum IV loading dose: 3 mg/kg or 300 mg administered over a 1-h period	Onset: 1–2 min; peak: unknown; duration: 10–20 min because of rapid redistribution; terminal elimination: 1.5–2 h
Lidocaine (injection: 5 mg/mL [0.5%]; 10 mg/mL [1%]; 20 mg/mL [2%])	Shock-refractory VF and pulseless VT ET: 2–3 mg/kg	Flush with 5 mL of NS and follow with 5 assisted manual ventilations
Norepinephrine (injection: 1 mg/mL)	Hypotensive shock (ie, associated with low SVR unresponsive to bolus fluid administration) IV/IO: Infusion 0.1–2 μg/kg per min (titrated to desired change in BP and systemic perfusion)	Onset: <30 s; peak: 5–10 min; duration: ≤10 min after stopping infusion Begin administration of drug via peripheral IV and change to administration via central venous line at the earliest Inactivated in alkaline solutions. Do not mix with bicarbonate. May produce hypertension, organ ischemia or arrhythmias Tissue infiltration may produce necrosis
Sodium bicarbonate (injection: 4.2% [0.5 mEq/mL], 8.4% [1 mEq/mL] injection premixed: 5% (0.6 mEq/mL])	Metabolic acidosis, hyperkalemia IV/IO: 1 mEq/kg slow bolus (maximum dose: 50 mEq) Rate of administration should not exceed 10 mEq/min	4.2% concentration is recommended for infants and children <2 y old Routine use not recommended in cardiac arrest Irrigate IV or IO tubing before and after infusion If combined with calcium salts, will precipitate into insoluble calcium carbonate crystals, which may obstruct the IV catheter or tubing Ensure adequate ventilation of patient
0.9% sodium chloride, Ringer lactate solution (250, 500, 1000 mL)	Distributive or hypovolemic shock IV/IO: 20 mL/kg IV push or administered over 20 min	May use manual or mechanical pressure systems to rapidly administer fluids May repeat 3 times, then consider vasopressors if shock persists In newborn infants, volume expansion may be considered when blood loss is known or suspected and the infant's heart rate has not responded adequately to other resuscitative measures. The recommended dose is 10 mL/kg, which may be repeated. Avoid rapid administration of fluids in premature infants Replace acute blood loss in children with blood Switch to balanced solutions (Ringer lactate) with

SUPPLEMENTAL TABLE 1 Continued

Drug	Dose	Notes
		high-volume resuscitation When caring for children with severe febrile illness in settings with limited access to critical care resources (ie, mechanical ventilation and inotropic support), administration of bolus IV fluids should be undertaken with extreme caution. Reassess after every fluid bolus Caution in cardiac disease: administer 1 bolus of 10 mL/kg and evaluate response Use of saline for resuscitation in infants and small children carries the risk of rapid development of hyperchloremic metabolic acidosis from excess chloride administration
Shock		
Hydrocortisone (injection: 100, 250, 500, 1000 mg per vial)	Adrenal insufficiency (may be associated with septic shock) IV/IO: 2 mg/kg bolus (maximum dose: 100 mg) 0–3 y old: 25 mg 3–12 y: 50 mg 12 y and older: 100 mg	Onset: rapid; peak: unknown; duration: 8–24 h Typically used in catecholamine-resistant septic shock especially with known or preexisting adrenal insufficiency Administer over 3–5 min
Milrinone (injection: 1 mg/mL premixed injection in D_5W: 200 μg/mL)	Myocardial dysfunction with high SVR (eg, cardiogenic shock) IV/IO: 50 μg/kg bolus over 10–60 min, followed by 0.25–0.75 μg/kg per min continuous IV infusion	Onset: 2–5 min; peak: 10 min; duration: variable (1.5–5 h) Use of a longer infusion time to administer the loading dose reduces the risk of hypotension Avoid in ventricular outflow tract obstruction May accumulate in renal failure Hypovolemia may worsen hypotensive effects
Nitroglycerin (injection: 5 mg/mL prediluted injection in D_5W: 100, 200, 400 μg/mL)	Cardiogenic shock, congestive heart failure IV/IO: Infusion at 0.25–0.5 μg/kg per min; titrate by 1 μg/kg per min every 15–20 min as tolerated Typical rate range is 1–5 μg/kg per min (maximum rate: 10 μg/kg per min)	Onset: 1–2 min; peak: unknown; duration: 3–5 min To be used in combination with an inotrope in a high-SVR state Monitor ECG and BP frequently May cause hypotension, especially in hypovolemia
Nitroprusside sodium (injection: 25, 0.4 mg/mL in D_5W)	Cardiogenic shock with high SVR IV/IO: Infusion: Initiate at 0.3–1 μg/kg per min; titrate to desired response up to 8 μg/kg per min	Onset: 1–2 min; peak: rapid; duration: 1–10 min after stopping infusion Use in combination with an inotrope in a high-SVR state Monitor blood pressure continuously during IV administration Hypovolemia will worsen hypotensive effect Use special administration tubing or wrap drug reservoir in opaque material to avoid deterioration of drug with light exposure Discard solution 24 h after reconstitution and dilution; compatible with D_5W, NS, and Ringer lactate Causes hypotension Prolonged use may lead to cyanide toxicity. Monitor cyanide levels with prolonged (>72 h) use or co-administer sodium thiosulfate.

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. BP, blood pressure; D_5W, dextrose 5% in water; ECG, electrocardiogram; IO, intraosseous; NS, normal saline; SVR, systemic vascular resistance; VF, ventricular fibrillation; VT, ventricular tachycardia.

[a] The time range for administration of the loading dose of amiodarone for the child with a perfusing rhythm is slightly longer in the child with cardiac disease (ie, 30–60 min) than the *Pediatric Advanced Life Support* 2015 recommended time for administration (ie, 20–60 min). The reason for this slight difference is that the child with cardiac disease is likely to be or is at risk for hemodynamic compromise.

[b] Epinephrine is available in 2 concentrations: 0.1 mg/mL and 1 mg/mL. Use caution to ensure selection of the appropriate concentration for the route of administration and patient age and condition.

SUPPLEMENTAL TABLE 2 Drugs Used in Rapid Sequence Intubation (RSI)

Drugs	Dosage	Notes
Premedication		
Atropine (injection: 0.1, 0.4, 1 mg/mL)	IV and IO: 0.02 mg/kg Maximum dose: 0.5 mg	May be used in conjunction with succinylcholine during emergency intubation when there is a higher risk of bradycardia There is no minimum dose Administer first during RSI because maximum effect of blunting bradycardic effect associated with RSI takes 1–2 min
Sedation		
Etomidate (injection: 2 mg/mL)	IV and IO: 0.3 mg/kg infused over 30–60 s Maximum dose: 20 mg	Preferred indications: hypotension not due to sepsis, cardiovascular disease, and multiple trauma (agent of choice in head injuries) Onset: 0.5–1 min; peak: 1 min; duration: 10–15 min Does not produce analgesia Side effects: myoclonus, apnea, exacerbates focal seizure disorders, nausea, vomiting, adrenal suppression Avoid use in septic shock because it suppresses cortisol production
Fentanyl (injection: 50 μg/mL)	IV: Initial dose: 1 μg/kg (up to 50 μg per dose), may repeat every 3 min	IV: onset: 1–5 min; duration: 30–60 min Give IV push over 3–5 min Use lowest dose in opioid-naïve patients Titrate to effect Recommend pulse oximetry monitoring while administering and until fully recovered Side effects: chest wall rigidity if administered rapidly, CNS and respiratory depression, hypotension, seizures, delirium
Ketamine (injection: 10, 50 mg/mL)	IV: 1–2 mg/kg	Preferred indications: status asthmaticus, septic shock, and hypotension IV: onset: 0–1 min; duration: 5–10 min Doses listed are recommended to achieve dissociative sedation or anesthesia Caution: laryngospasm may occur with rapid IV push or concomitant upper respiratory infection
Midazolam (injection: 1 mg/mL)	IV: 0.2–0.3 mg/kg Maximum dose: 10 mg	Preferred indication: status epilepticus Onset: 1–5 min; duration: 3–6 h Lower doses of midazolam are ineffective for RSI Caution: may develop apnea before paralytic agent is administered, decreasing the effectiveness of preoxygenation before intubation; causes hypotension
Neuromuscular blocking agents (do not provide sedation, analgesia, or amnesia)		
Rocuronium (injection: 10 mg/mL)	IV: 0.6–1.2 mg/kg (Usual dose: 1 mg/kg)	Onset: 1–2 min; duration: 30 min Nondepolarizing agent
Succinylcholine (injection: 20 mg/mL)	IV: Infants ≤6 mo old: 2–3 mg/kg Infants >6 mo and children ≤2 y old: 1–2 mg/kg Children >2 y old and adolescents: 1 mg/kg IM: Infants <6 mo old: 4–5 mg/kg Infants ≥6 mo old and children: 4 mg/kg Adolescents: 3–4 mg/kg Maximum dose: 150 mg	Onset (IV): 0.5–1 min; (IM): 3–5 min; duration: 5 min Depolarizing agent Consider atropine when using succinylcholine in young children to prevent severe bradycardia Contraindications: history of malignant hyperthermia, hyperkalemia, renal failure, burns >24 h, spinal cord transection >24 h, suspected myopathy or muscular dystrophy, prolonged immobility, crush injury, history of pseudocholinesterase deficiency

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. CNS, central nervous system; IM, intramuscular; IO, intraosseous.

SUPPLEMENTAL TABLE 3 Drugs Used in Sedation and Analgesia, Antipyretics

Drug	Dosage	Notes
Sedation		
Dexmedetomidine	—	Relative contraindications: heart block, severe renal or hepatic impairment, or concomitant use of β-blockers
Dexmedetomidine (IV) (injection [preservative free]: 4 μg/mL)	Moderate sedation IV: Children and adults: 1–2 μg/kg bolus over 10 min once, followed by continuous infusion of 1–2 μg/kg per h (maximum infusion rate: 2 μg/kg per h)	IV administration: onset: 5–10 min; duration: 60–120 min Administer IV over 10 min Bradycardia and hypotension have been associated with rapid IV administration
Dexmedetomidine (IN) (injection: 100 μg/mL)	Moderate sedation IN: Children ≥6 mo old: 3–4 μg/kg (maximum dose: 200 μg [100 μg per nare]) Minimal sedation or anxiolysis IN: Children ≥6 mo of age: 1–2 μg/kg once (maximum dose: 200 μg [100 μg per nare])	IN administration: onset: 20–30 min; duration: 30–45 min
Etomidate (IV) (injection: 2 mg/mL)	IV: Children >10 y old and adults: 0.1–0.3 mg/kg per dose infused over 30–60 s Maximum dose: 20 mg	Onset: 0.5–1 min; peak: 1 min; duration: 10–15 min Does not produce analgesia Side effects: myoclonus, apnea, exacerbates focal seizure disorders, nausea, vomiting, adrenal suppression Avoid use in septic shock because it suppresses cortisol production
Ketamine	Dissociative: sedation	May cause laryngospasm and vomiting; emergence reactions that can manifest as vivid dreams, hallucinations, and/or frank delirium occur; these reactions are less common in patients <16 y old Contraindications: infants <3 mo old; known or suspected schizophrenia
Ketamine (IV) (injection: 10, 50 mg/mL)	IV: Children: 1–2 mg/kg per dose administered over 60 s, additional doses of 0.5–1 mg/kg per dose may be administered if necessary Adults: 1 mg/kg per dose administered over 60 s, additional doses of 0.5–1 mg/kg per dose may be administered if necessary	IV administration: onset: 1 min; duration: 5–10 min Administer slowly, do not exceed 0.5 mg/kg per min; maximum concentration for slow IV push: 50 mg/mL Administer slow IV to decrease risk of respiratory depression
Ketamine (IM) (injection: 100 mg/mL)	IM: 4–5 mg/kg per dose. May repeat (2–4 mg/kg) after 10 min	IM administration: onset: 3–5 min; duration: 15–30 min
Lorazepam (IV) (injection: 2; 4 mg/mL)	IV: 0.05–0.1 mg/kg Maximum dose = 2 mg	IV administration: onset: 15–20 min; duration: 8–12 h When used with opioids, potential for respiratory depression, airway obstruction, or hypoventilation is increased Causes respiratory depression, blurred vision, hallucinations, restlessness Titrate to effect Use with caution in patients with renal or liver impairment
Midazolam	—	Does not produce analgesia Causes anterograde amnesia, CNS

SUPPLEMENTAL TABLE 3 Continued

Drug	Dosage	Notes
		and respiratory depression, hypotension, paradoxical reactions (hyperactive or aggressive behavior particularly in adolescent, pediatric, or psychiatric patients) When used with opioids, potential for respiratory depression, airway obstruction, or hypoventilation is increased
Midazolam (IV) (injection: 1; 5 mg/mL)	IV: 0.05–0.1 mg/kg. Dose may be repeated once in 2–3 min if needed Infants and children <12 y old: (maximum single dose: 2 mg; maximum cumulative dose: 6 mg) Children 12 y and older, adults: (maximum single dose: 2 mg; maximum cumulative dose: 10 mg)	IV administration: onset: 2–3 min; duration: 45–60 min Titrate to effect IV: administer by slow IV injection over at least 2–5 min
Midazolam (IN) (injection: 5 mg/mL)	IN: 0.2–0.5 mg/kg (maximum cumulative dose: 10 mg)	IN administration: onset: 10–15 min; duration: 60 min IN: approximately half of total dose should be administered into each nare with an atomization device Maximum volume of 1 mL in each nostril (5 mg per nare)
Midazolam (PO) (syrup, oral: 2 mg/mL)	PO: 0.25–0.5 mg/kg; may give additional dose once after 20–30 min if necessary (maximum cumulative dose: 20 mg)	PO administration: onset: 15–30 min; duration: 60–90 min
Nitrous oxide (inhaled)	Minimal sedation or anxiolysis Inhaled: Children >1 y old: ≤50% nitrous oxide administered for a maximum duration of 30 min	Onset: 2–5 min; duration: 3–5 min after discontinuation of drug Maximum duration of administration 30 min Monitor for hypoxia Useful for brief, mildly painful procedures (≤30 min) Combination of N_2O and other sedatives can lead to significant respiratory depression, so careful titration and monitoring is essential Side effects: nausea or vomiting, confusion, headache, dizziness, CNS excitation Staff precaution: Because of teratogenicity of N_2O, ensure availability of suitable scavenging system Contraindications: abdominal gas distension, ileus, air leak syndromes such as pneumothorax, severe head trauma, pregnancy, eye globe injuries
	Moderate sedation Inhaled: Children >1 y old: 51%–70% nitrous oxide administered for a maximum duration of 30 min or any concentration of nitrous oxide combined with any other sedative or analgesic medications other than local anesthesia	
Pentobarbital sodium	—	Side effects: bradycardia, hypotension, thrombophlebitis, laryngospasm, CNS and respiratory depression and

SUPPLEMENTAL TABLE 3 Continued

Drug	Dosage	Notes
		hypotension May produce paradoxical excitement
Pentobarbital sodium (IV) (injection: 50 mg/mL)	IV: Infants ≥6 mo old and children: 1–3 mg/kg per dose; may repeat as needed (maximum cumulative dose: 6 mg/kg or 200 mg, whichever is less)	IV administration: onset: 1–5 min; duration: 15–45 min Titrate to effect
Pentobarbital sodium (PO) (solution: 50 mg/mL)	PO: Infants and children: 4 mg/kg initial dose; may repeat dose 2 mg/kg if needed (maximum cumulative dose: 6 mg/kg or 200 mg, whichever is less)	PO administration: onset: 20 min; duration: 30–90 min
Propofol (IV) (injection, emulsion: 10 mg/mL)	Deep sedation IV: Children and adults: 0.5–1 mg/kg bolus, followed by continuous infusion: 50–200 μg/kg per min (maximum infusion rate: 200 μg/kg per min)	IV administration: onset: <1 min; duration: 5–15 min Adults and children >50 kg should be dosed in 20–50 mg increments Causes hypotension, respiratory depression, injection site pain
Analgesia		
Acetaminophen (PO or PR)[a] (suppository, rectal: 80, 120, 325, 650 mg); suspension: 32 mg/mL; tablet: 325, 500 mg)	PO or PR: Infants and children: 10–15 mg/kg every 4–6 h PRN (maximum: 15 mg/kg per dose or 75 mg/kg per d or 2.6 g per d) Adults: 325–650 mg every 4–6 h PRN or 1000 mg 3–4 times per d PRN (maximum: 3000 mg per d)	Patients with neutropenic precautions (ANC <1000 per mm^3) should not receive suppository
Acetaminophen (IV)[a] (injection: 10 mg/mL)	IV: Infants and children <2 y old: 10 mg/kg per dose every 6 h (maximum: 60 mg/kg per d; off label)	Administer IV dose undiluted within 15 min Maximum daily dose includes all routes of administration and all acetaminophen-containing products including combination products
Fentanyl	—	Recommend pulse oximetry monitoring while administering and until fully recovered Side effects: chest wall rigidity if administered rapidly; CNS and respiratory depression, hypotension, seizures, delirium
Fentanyl (IV) (injection: 50 μg/mL)	IV: Initial dose: 1 μg/kg (up to 50 μg per dose), may repeat every 3 min	IV administration: onset: 1–5 min; duration: 30–60 min Give IV push over 3–5 min Use lowest dose in opioid-naïve patients
Fentanyl (IN) (injection: 50 μg/mL)		IN administration: onset: 7–20 min; duration: 60 min

Age group	IV dose given every 4 h	IV dose given every 6 h	Maximum single IV dose	Maximum total daily dose of acetaminophen (by any routes)
Children 2–12 y of age	12.5 mg/kg	15 mg/kg	15 mg/kg (up to 750 mg)	75 mg/kg in 24 h (up to 3750 mg)
Adults and adolescents (13 y and older) weighing <50 kg	12.5 mg/kg	15 mg/kg	15 mg/kg (up to 750 mg)	75 mg/kg in 24 h (up to 3750 mg)
Adults and adolescents (13 y and older) weighing ≥50 kg	650 mg	1000 mg	1000 mg	4000 mg in 24 h

SUPPLEMENTAL TABLE 3 Continued

Drug	Dosage	Notes
	IN: Children ≥1 y old and adults: 1.5–2 μg/kg per dose once Maximum dose: 100 μg (50 μg per nare)	Half of total dose should be administered into each nare with an atomization device The concentration of 50 μg/mL available in the United States limits the delivery of doses >100 μg, thus leading to suboptimal analgesia or requiring multiple doses in patients weighing >50 kg
Ibuprofen (PO)[a] (suspension, oral: 20 mg/mL; tablet: 200, 400, 600, 800 mg)	PO: 10 mg/kg every 6 h Maximum daily dose: 40 mg/kg per d or 1200 mg per d, whichever is less Maximum daily adult dose: 2.4 g	Not recommended in children <6 mo of age or with wt <6 kg Avoid use or use with caution in patients with chronic kidney disease or those with volume depletion because this may precipitate acute kidney injury
Morphine (IV) (injection, solution, as sulfate: 10 mg/mL; injection, solution, as sulfate [preservative free]: 1 mg/mL)	IV: Neonates: 0.05 mg/kg per dose (maximum cumulative dose: 0.1 mg/kg) Infants and children: single dose: 0.1 mg/kg per dose (maximum cumulative dose: 0.2 mg/kg)	IV: onset: 5–10 min; duration: 120–300 min Causes CNS and respiratory depression, hypotension, seizures, delirium Recommend pulse oximetry monitoring at cumulative doses
Sucrose 25% solution (PO)	PO: 2 mL by syringe into the infant's mouth (1 mL in each cheek) or allow infant to suck solution from a pacifier no more than 2 min before start of painful procedure	—
Local anesthetics		
Bupivacaine without epinephrine: 0.25% (2.5 mg/mL)	SC: 2.5 mg/kg (dose should be decreased by 30% in infants younger than 6 mo) (maximum dose)	Infiltration; duration: 180–600 min
Bupivacaine with epinephrine: 0.25% (2.5 mg/mL)	SC: 3 mg/kg (dose should be decreased by 30% in infants younger than 6 mo) (maximum dose)	Infiltration; duration: 180–600 min
Lidocaine, epinephrine, and tetracaine: topical solution	Topical (based on maximum dose of 5 mg/kg of lidocaine): Children <17 kg: 0.175 mL/kg Children >17 kg: 3 mL	Apply to simple lacerations or to complex or deeper lacerations that may require supplemental subcutaneous anesthetic administration
Lidocaine 1% (10 mg/mL); lidocaine 2% (20 mg/mL)	SC: 4.5 mg/kg (maximum dose)	Infiltration; duration: 30–120 min
Lidocaine 1% (10 mg/mL) with epinephrine	SC: 7 mg/kg (maximum dose)	Infiltration; duration: 1 h
Reversal of sedation (patients who have received reversal agents, such as flumazenil or naloxone, will require a longer period of observation, because the duration of the drugs administered may exceed the duration of the antagonist, resulting in resedation)		
Flumazenil (after diazepam, lorazepam, midazolam administration; injection: 0.1 mg/mL)	IV: Infants and children: 0.01 mg/kg (maximum dose: 0.2 mg) If needed, repeat 30–45 s after initial dose, then every 1 min (maximum cumulative dose: 0.05 mg/kg or 1 mg, whichever is less) Adults:	Indication: use only in patients who require reversal for procedural sedation such as in an OR or anesthesia setting Onset: 1–3 min Duration: dependent on dose and

SUPPLEMENTAL TABLE 3 Continued

Drug	Dosage	Notes
	0.2 mg. If needed, repeat 30–45 s after initial dose, then every 1 min (maximum cumulative dose: 1 mg)	elimination of benzodiazepine, time interval, dose of flumazenil, liver function Administer through a freely running IV infusion into a large vein Possibility of resedation because half-life of flumazenil is 53 min Treat respiratory depression with appropriate airway management including intubation Respiratory depression may not be reliably reversed Side effects: nausea, vomiting, dizziness, agitation, blurred vision, dyspnea, hyperventilation, vasodilation, pain at injection site Caution: may induce seizures in patients on sedative hypnotics
Naloxone (reversal after fentanyl, morphine administration; injection: 0.4 mg/mL)	IV, IO, IM, SC or ET 0.001–0.02 mg/kg up to full reversal dose of 0.1 mg/kg Dose may be repeated every 2 min to a cumulative dose of 10 mg Adult maximum dose: 2 mg	Use bag and mask ventilation before administration in opioid-induced respiratory depression Onset: 2 min; duration: 30–120 min Half-life shorter than most opioids, likely to need repeated doses every 20–60 min Continuous infusions may be required Titrate to effect to prevent the onset of severe pain Side effects occur because of reversal of opioid analgesia and sedation In opioid-tolerant patients, administer a reduced dose and titrate up slowly to treat symptoms but prevent acute withdrawal

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. ANC, absolute neutrophil count; CNS, central nervous system; IM, intramuscular; IN, intranasal; IO, intraosseous; N_2O, nitrous oxide; OR, operating room; PO, per os; PR, per rectal; PRN, as needed; SC, subcutaneous; —, not applicable.

[a] Acetaminophen and ibuprofen can be used for their antipyretic action in addition to their analgesic action.

SUPPLEMENTAL TABLE 4 Drugs Used in Acute Allergic Reactions and Anaphylaxis

Drugs	Dose	Notes
Albuterol (solution for inhalation: 1.25 mg/3 mL; 2.5 mg/3 mL; 5 mg/mL)	Nebulized: Intermittent treatment with 0.5% nebulizer solution (5 mg/mL): minimum dose 2.5 mg (0.5 mL) every 20 min for 3 doses then 0.15–0.30 mg/kg up to 20 mg continuously per h as long as needed (maximum dose: 20 mg per h)	Dilute in a minimum of 2–3 mL of saline solution for adequate nebulization Use an age-appropriate delivery device (eg, mask versus mouthpiece) Epinephrine is first-line treatment and will help treat respiratory symptoms. Albuterol should not replace or delay use of epinephrine for anaphylaxis. Used as an adjunct to relieve respiratory symptoms
Diphenhydramine (injection: 50 mg/mL)	IV: Children: 1 mg/kg (maximum: 50 mg), repeated every 6–8 h up to a maximum daily dose of 5 mg/kg per d or (200 mg per d) Adolescents and adults: 25–50 mg, repeated every 4–6 h as needed (maximum: 400 mg per d)	Infuse over 15 min or push over 5 min; maximum rate of infusion: 25 mg per min Use in acute allergic reactions with itching and/or hives Does not relieve stridor, shortness of breath, wheezing, gastrointestinal symptoms and signs, hypotension, or shock and should not be substituted for epinephrine
Epinephrine (injection: 1 mg/mL)	IM: 0.01 mg/kg every 5–15 min for up to 3 injections if patient is not responding (maximum dose: 0.3 mg in a prepubertal child and up to 0.5 mg in a teenager or older patient)	If >1 symptom or symptoms of severe allergy or anaphylaxis develop, use epinephrine Inject intramuscularly into the mid-outer thigh (vastus lateralis muscle) If no response after 3–4 intramuscular injections, patient will require IV epinephrine infusion with continuous monitoring in a medical setting
Epinephrine (IM autoinjector: 0.1, 0.15, 0.3 mg. Epipen, Auvi-Q, generic epinephrine)	IM autoinjector: 0.1 mg (patient's wt: 7.5–13 kg) 0.15 mg (patient's wt: 13–25 kg) 0.3 mg (patient's wt: ≥25 kg)	If >1 symptom or symptoms of severe allergy or anaphylaxis develop, use epinephrine Inject IM into the mid-outer thigh (vastus lateralis muscle) If 0.1 mg dose is not available, it is appropriate to use the 0.15 mg dose for children <25 kg Switch most children from 0.15 mg dose to 0.3 mg dose when they reach a body wt of 25–30 kg For *Epipen*: hold the autoinjector device in place for only 3 s For *Auvi-Q*: hold the device for 2 s For generic epinephrine "hold in place while slowly counting to 10" Recommended "hold times" may vary among devices. Please consider viewing the package insert before administration, but do not delay use in emergencies
Epinephrine (injection: 0.1 mg/mL)	IV or IO infusion: 0.1–1 μg/kg per min	For patients with inadequate response to IM epinephrine and IV saline Titrate dose continuously according to blood pressure, cardiac rate and function, and oxygenation Catecholamines are inactivated in alkaline solutions Do not use alkaline solutions like sodium bicarbonate in the same line as epinephrine. Use in separate lines
Glucagon (injection: 1 mg/mL)	IV: Children: 0.02–0.03 mg/kg (maximum: 1 mg) administered over 5 min, followed by an infusion at 5–15 μg per min titrated to clinical response	Administer in patients who are receiving β-adrenergic blocking agents who fail to respond to epinephrine Caution: causes vomiting with risk of aspiration in severely drowsy or obtunded patients. Therefore, placement in the lateral recumbent position provides sufficient airway protection
Methylprednisolone (as sodium succinate; injection: 40, 125 mg)	IV or IM: Load: 1–2 mg/kg (maximum: 125 mg) Maintenance: 0.5 mg/kg every 6 h or 1 mg/kg every 12 h up to 120 mg per d	Rationale for administering steroids is to prevent the biphasic or protracted reactions that occur in some cases of anaphylaxis (weak evidence) If glucocorticoid treatment is instituted, it can be

SUPPLEMENTAL TABLE 4 Continued

Drugs	Dose	Notes
		stopped after 1 or 2 d without a taper because all biphasic reactions reported to date have occurred within 72 h For patients with potential adrenal suppression, consider covering with stress-dose steroids
Ranitidine (injection: 25 mg/mL; syrup: 15 mg/mL; tablet: 75, 150, 300 mg)	IV: 1 mg/kg (maximum: 50 mg) 2–4 mg/kg per d divided every 6–8 h; maximum: 200 mg per d PO: 4–8 mg/kg per d divided twice daily; maximum: 300 mg per d	Adjunct therapy
0.9% sodium chloride (250, 500, 1000 mL)	IV: 20 mL/kg bolus	May repeat multiple times if hypotension persists Third spacing can lead to profound hypotension with loss of up to 50% of intravascular volume

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. IM, intramuscular; IO, intraosseous.

SUPPLEMENTAL TABLE 5 Antidotes Used in Poisoning

Antidote	Dose	Notes
Acetaminophen poisoning		
N-acetylcysteine (injection, solution: 40 mg/mL)	IV: 150 mg/kg over 60 min, followed by 12.5 mg/kg per h for 4 h, then 6.25 mg/kg per h for 16 h	IV route is more convenient than PO route because of ease of administration and less emesis Consult poison center if transaminases and synthetic function of liver are not improving on completion of N-acetylcysteine course The course needs to be individualized to the ingestion as that listed here can result in the antidote stopping prematurely Special IV dilution is required in children
N-acetylcysteine (oral solution: 10% [100 mg/mL]; 20% [200 mg/mL])	PO: 140 mg/kg, followed by 70 mg/kg every 4 h for 17 doses	PO route delivers more NAC directly to the liver than IV route because 100% of portal vein flow is to the liver (and only approximately one-sixth of cardiac output goes to the liver via the hepatic artery Use diluted solutions within 1 h of preparation; for treatment of acetaminophen overdose, administer orally as a 5% solution; dilute the 20% solution 1:3 with soda, orange juice, or other soft drink. If patient vomits within 1 h of dose, readminister
Anticholinergic syndrome		
Physostigmine (injection, solution: 1 mg/mL)	IV: Children: 0.02 mg/kg (maximum: 0.5 mg) Adults: 1–2 mg May repeat dose in 5–10 min if no adequate response and no cholinergic effects are observed	Administer no faster than 1 mg per min in adults or 0.5 mg per min in children to prevent bradycardia, respiratory distress, and seizures from too rapid administration Should be used only in patients with severe poisoning (prolonged seizures)
Benzodiazepine overdose		
Flumazenil (injection: 0.1 mg/mL)	IV: Infants and children: 0.01 mg/kg (maximum dose: 0.2 mg) If needed, repeat 30–45 s after initial dose then every 1 min (maximum cumulative dose: 0.05 mg/kg or 1 mg, whichever is less) Adults: 0.2 mg. If needed, repeat 30–45 s after initial dose then every 1 min (maximum cumulative dose: 1 mg)	Indication: use only in patients who require reversal for procedural sedation such as in an OR or anesthesia setting Onset: 1–3 min Duration: dependent on dose and elimination of benzodiazepine, time interval, dose of flumazenil, liver function Administer through a freely running IV infusion into a large vein Possibility of resedation because half-life of flumazenil is 53 min Treat respiratory depression with appropriate airway management including intubation Respiratory depression may not be reliably reversed Side effects: nausea, vomiting, dizziness, agitation, blurred vision, dyspnea, hyperventilation, vasodilation, pain at injection site Caution: may induce seizures in patients on sedative hypnotics
Acute ingestion of selected toxic substances		
Activated charcoal (oral liquid: 208.33 mg/mL in water; 208.33 mg/mL)	PO: Initial dose: 1 g/kg	Useful in situations in which an ingestion of a potentially toxic amount of a xenobiotic that is adsorbed by activated charcoal and the ingestion has occurred within a time frame amenable to adsorption by activated charcoal, and clinical features do not suggest that all the xenobiotic has been systemically absorbed Dilute powder with at least 8 mL of water per 1 g of charcoal, or mix in a charcoal/water ratio

SUPPLEMENTAL TABLE 5 Continued

Antidote	Dose	Notes
		of 1:4–1:8; mix vigorously to form a slurry May be administered PO or by NG tube If airway protective reflexes are impaired, the risk of administering activated charcoal may outweigh the benefits Consultation with poison center or clinical toxicologist is strongly encouraged before use (national Poison Control Center telephone: 800-222-1222) Iron, lithium, alcohols, ethylene glycol, alkalis, fluoride, mineral acids, and potassium are not bound by activated charcoal Contraindication: intestinal obstruction; patients at risk for GI hemorrhage or perforation; patients with an unprotected airway (eg, CNS depression without intubation); if use would increase the risk and severity of aspiration
Activated charcoal (oral liquid: 208.33 mg/mL in water; 208.33 mg/mL; multiple dosing [MDAC])	PO: 0.25–0.5 g/kg every 4–6 h for up to 12–24 h	MDAC is useful in delayed release formulations, life-threatening amount of carbamazepine, dapsone, phenobarbital, quinine, or theophylline or xenobiotics that undergo enterohepatic recirculation and are adsorbed to activated charcoal Confirm audible bowel sounds before administration
Carbon monoxide poisoning		
Oxygen	100% oxygen	Administer by nonrebreather mask or ET Consider hyperbaric oxygen if readily available Half-life of carbon monoxide is reduced from 5 h when breathing room air to ~1 h when breathing 100% oxygen at normal atmospheric pressure Continue until carboxyhemoglobin level <5%
Cholinesterase inhibitors (organophosphates, carbamates) poisoning		
Atropine (injection: 0.1, 0.4, 1 mg/mL)	IV or IM: Children: 0.05–0.1 mg/kg Adolescents: 1–3 mg/dose Adults: 1–5 mg Repeat every 3–5 min, doubling the dose if previous dose does not cause adequate atropine effect.[a] Use 3–5 mg starting dose for adults with severe poisoning For children with symptoms of severe nerve agent poisoning, doses up to 3 times these doses may be given	Decontamination of patient is essential. Remove clothing and wash with soap and water. Administer undiluted by rapid IV injection There is no upper limit to atropine therapy (whether IM or IV) Small doses 0.005 mg/kg do not cause bradycardia in children <15 kg Expected adverse events with atropine can include tachycardia, dry mouth, decreased sweating, and decreased intestinal functioning
Atropine (Atropen) (pediatric autoinjector: 0.25, 0.5, 1 and 2 mg)	IM: Mild nerve agent poisoning Children: Wt: <7 kg: 0.25 mg per dose (yellow pen) Wt: 7–18 kg: 0.5 mg per dose (blue pen) Wt: >18–41 kg: 1 mg per dose (dark-red pen) Wt >41 kg: 2 mg per dose (green pen) Severe nerve agent poisoning: doses up to 3 times the above doses may be given in rapid succession[a]	Administer wt-based dosing as soon as exposure is known or suspected
Diazepam (injection: 5 mg/mL)	IV or IO: Infant and child <5 y old: 0.2–0.5 mg/kg; repeat in 15–30 min (total maximum dose: 5 mg) Adolescent and adult: 5–10 mg; repeat every 10–15 min (total maximum dose: 30 mg) IM: Infant and child: 0.2–0.5 mg/kg; repeat every 2–5 min (total	Used to treat seizures Rapid injection may cause respiratory depression or hypotension

SUPPLEMENTAL TABLE 5 Continued

Antidote	Dose	Notes
	maximum dose: 5 mg) Adolescent and adult: 2–3 CANA autoinjectors (total maximum dose: 30 mg)	
Diazepam (autoinjector: CANA 10 mg)	IM: Child: 1 CANA autoinjector Adolescent: 2–3 CANA autoinjectors Adult: 2–3 CANA autoinjectors	Use for actively seizing patients only
Pralidoxime (injection, solution: 50 mg/mL)	IV: 20–50 mg/kg (maximum 1–2 g) infused over 30–60 min and then 10–20 mg/kg per h (maximum 500 mg per h)	To be effective, pralidoxime must be administered within minutes to a few hours after exposure (depending on the nerve agent) soman, ages in 2 min; thus, only a few minutes after exposure, oximes are useless in treating soman poisoning
Combined atropine-pralidoxime (Duodote, ATNAA) (single-dose autoinjector: atropine [2.1 mg/0.7 mL] plus pralidoxime [600 mg/2 mL])	IM: For type of autoinjector and dosages based on severity of symptoms and wt please refer to https://chemm.nlm.nih.gov/na_prehospital_mmg.htm#top	For adults and pediatric patients weighing >41 kg Inject IM into the mid-lateral thigh Inject rapidly in nerve agent exposure In severe cases of nerve agent toxicity after vapor exposure (ie, apneic and unconscious) it may take up to 15 mg of atropine to restore consciousness and breathing. Typically, atropine has not been required for >3 h to treat the life-threatening effects. Non–life-threatening effects such as nausea and vomiting have required atropine for 6–36 h
Combined atropine-pralidoxime (mark 1 autoinjector kit; atropine: 2 mg in 0.7 mL; pralidoxime [2-PAM]: 600 mg in 2 mL)	IM: For type of autoinjector and dosages based on severity of symptoms and wt please refer to https://chemm.nlm.nih.gov/na_prehospital_mmg.htm#top	Inject IM into the mid-lateral thigh
Cyanide poisoning		
Hydroxocobalamin (Cyanokit) (injection: 5 g)	IV: Children: 70 mg/kg up to 5 g Adults: 5 g	*Cyanokit* is the preferred antidote for cyanide poisoning Clear pink to red solutions are stable at room temperature for 6 h after reconstitution Reconstitute 5 g vial with 200 mL NS, LR, or 5% dextrose; after reconstitution, repeatedly invert or "rock" solution for at least 30 s; do not shake Administer over 15 min; if repeat dose is needed, administer second dose over 15 min to 2 h depending on the patient's clinical state Can be used safely in patients with smoke inhalation. Red color of drug interferes with laboratory tests and causes red discoloration of skin and urine
Cyanide antidote kit (nitrites, thiosulfate; each package contains injection, solution: sodium nitrite 300 mg/10 mL; sodium thiosulfate 12.5 g per 50 mL inhalant: amyl nitrite 0.3 mL)	Adult: amyl nitrite inhalation (inhale for 15–30 s every 60 s) pending administration of 300 mg sodium nitrite IV slowly over 2–4 min; follow immediately with 12.5 g sodium thiosulfate IV over 10–30 min. Push in cardiac arrest Children: sodium nitrite should not exceed recommended dose to avoid dangerous methemoglobinemia Hemoglobin — Initial dose 3% sodium nitrite — Initial dose 25% sodium thiosulfate 8 g — 6.6 mg/kg — 1.10 mL/kg 10 g — 8.3 mg/kg — 1.35 mL/kg 12 g (normal) — 10 mg/kg — 1.65 mL/kg 14 g — 11.6 mg/kg — 1.95 mL/kg	Administer both components undiluted via slow IV injection as soon as possible after diagnosis of acute, life-threatening cyanide poisoning Decrease rate of infusion in the event of significant hypotension, nausea, or vomiting Avoid sodium nitrite when carboxyhemoglobin is expected to be elevated such as in patients with smoke inhalation If hemoglobin values are not available, the empirical dose of sodium nitrite for a child <25 kg is based on the 10 g hemoglobin concentration Sodium nitrite is the preferred inducer of

SUPPLEMENTAL TABLE 5 Continued

Antidote	Dose	Notes
	Administer sodium nitrite IV first at a rate of 2.5–5 mL per min, followed immediately by the administration of sodium thiosulfate IV over 10–20 min	methemoglobin compared with amyl nitrite in the hospital setting
Sodium nitrite and sodium thiosulfate (Nithiodote) (sodium nitrite injection, 300 mg/10 mL plus sodium thiosulfate injection, 12.5 g per 50 mL)	IV: 1. Sodium nitrite: 6 mg/kg of sodium nitrite at the rate of 2.5–5 mL per min not to exceed 10 mL (300 mg) 2. Sodium thiosulfate: 250 mg/kg not to exceed 50 mL (12.5 g) total dose immediately after administration of sodium nitrite	
Avoid sodium nitrite when carboxyhemoglobin is expected to be elevated such as in patients with smoke inhalation		
Calcium channel blockers or β-adrenergic blocking agents poisoning		
Insulin therapy (injection: 100 U/mL)	IV: 1 U/kg IV bolus regular human insulin. Follow with an infusion of 0.5 U/kg per h with glucose infusion titrated to prevent hypoglycemia. Titrate to correction of hypotension to 2 U/kg per h if no improvement in 30 min. Add 0.5 g/kg dextrose if glucose <400 mg/dL	Monitor glucose every 30 min until stable then every 1–2 h. Maintain glucose 100–250 mg/dL. Insulin infusions of 10 U/kg per h or more may be necessary in some severe cases
Glucagon (injection: 1 mg/mL)	IV: 0.05 mg/kg infusion over 1–2 min. Dose may be increased to 10 mg in an adult	Side effect: vomiting
Calcium gluconate (10%)	IV: 60 mg/kg per dose IV (maximum dose: 3000 mg) infused not faster than 100 mg per min	Calcium salts are often ineffective because calcium channel blocker poisoning interferes with both the serum concentration and the intracellular handling of calcium
Digoxin and other natural cardioactive steroids (eg, oleander, squill) poisoning		
Digoxin immune fab (ovine) (*Digifab*); solution reconstituted (1 vial: 40 mg of digoxin immune fab)	IV: Dose based on amount ingested and/or digoxin level Digoxin immune fab dose (vials) = (serum digoxin concentration [ng/mL] × wt [kg])/100 Empirical dosing for acute ingestion: 10–20 vials	Infusion over 30 min. IV bolus in cases of cardiac arrest. See package insert Each vial of DigiFab, which will bind ∼0.5 mg digoxin
Ethylene glycol poisoning		
Fomepizole (Antizol) (injection, solution: 1000 mg/mL)	IV: 15 mg/kg infused over 30 min, next 4 doses at 10 mg/kg every 12 h; additional doses at 15 mg/kg every 12 h if needed	IV, dilute in at least 100 mL NS or D_5W (<25 mg/mL); infuse over 30 min When ingestion of ethylene glycol is possible, empirical therapy of 1 dose will provide 12 h of protection, which is usually enough time to ensure that laboratory test results return
Heparin poisoning		
Protamine (injection: 10 mg/mL)	IV: Dose of protamine should be calculated from the dose of heparin administered and heparin's approximate half-life of 60–90 min Maximum dose: 50 mg	1 mg of protamine sulfate injected IV neutralizes 100 U of heparin or 1 mg of enoxaparin Side effects: hypotension, bradycardia, and allergic reactions
Iron poisoning		
Deferoxamine (injection: IV administration: 95 mg/mL)	IV: Continuous infusion of 15 mg/kg per h (maximum: 6000 mg/24 h)	Flushing of the skin, hypotension, urticaria, and shock are associated with rapid IV infusion; therefore, limit infusion rate to 15 mg/kg per h
Isoniazid poisoning		
Pyridoxine (injection: 100 mg/mL)	IV: 1 g for each g of isoniazid up to 70 mg/kg (maximum 5 g) infused at 0.5 g per min until seizures stop, with remainder infused IV over 4–6 h. Empirical dose: 70 mg/kg at specific dosing rate. May repeat dose if needed	Undiluted slow IV push
Lead poisoning		
BAL (*Dimercaprol*) (injection: 100 mg/mL)	Blood lead levels ≥70 μg/dL, symptomatic lead poisoning, or lead encephalopathy (in conjunction with edetate	First dose to precede edetate calcium disodium by 4 h

SUPPLEMENTAL TABLE 5 Continued

Antidote	Dose	Notes
	calcium disodium IM (deep): 4 mg/kg every 4 h	Duration of therapy: 2–7 d Some experts recommend minimum 3 d of therapy Consider topical EMLA or lidocaine infiltration at injection site before administering BAL Contraindicated in peanut allergy
Edetate calcium disodium ($CaNa_2EDTA$) (injection: 500 mg/25 mL; 1 g/5 mL)	Lead encephalopathy (in conjunction with dimercaprol) IM/IV: 50–75 mg/kg per d (maximum: 1000 mg per d) for 5 d	Begin treatment with edetate calcium disodium with the second dimercaprol dose Caution: fatalities from hypocalcemia have occurred after erroneous administration of EDTA disodium Infusion more effective than intermittent dosing Contraindications and monitoring: dose should be reduced with preexisting mild renal disease. Should not be used in patients with anuria. Hydration, careful monitoring of electrolytes, blood urea nitrogen and creatinine, calcium, phosphorus, urinalysis, and for cardiac arrhythmias are indicated
	Blood lead levels ≥70 μg/dL or symptomatic lead poisoning (in conjunction with dimercaprol) IM or IV: 25–50 mg/kg per d (maximum: 1000 mg per d) for 5 d	
DMSA (Succimer) (capsule 100 mg)	PO: 10 mg/kg orally every 8 h for 5 d followed by 10 mg/kg every 12 h for 14 d (maximum dose: 1500 mg per d)	Capsules may be opened and sprinkled onto spoonful of food for children who cannot swallow capsules
Lipid-soluble agent-induced cardiac arrest due to local anesthetics		
Lipid 20% (*Intralipid*) (injection, emulsion [soybean oil]: 20% [200 mg/mL])	IV: Administer 1.5 mL/kg of 20% lipid emulsion over 1 min. Repeat bolus once or twice for persistent cardiovascular collapse. Follow with 20% lipid infusion (0.25 mL/kg per min) until hemodynamic stability is restored. Increase the rate to 0.5 mL/kg per min if BP declines. Continue infusion for at least 10 min after attaining circulatory stability. Maximum dose of 8 mL/kg	Continue CPR during administration of intralipid
Methanol poisoning		
Fomepizole (*Antizol*) (injection, solution: 1000 mg/mL)	IV: 15 mg/kg infused over 30 min, next 4 doses at 10 mg/kg every 12 h; additional doses at 15 mg/kg every 12 h as needed	IV: dilute in at least 100 mL NS or D_5W (<25 mg/mL); infuse over 30 min When ingestion of methanol is possible, empirical therapy of 1 dose will provide 12 h of protection, which is usually enough time to ensure that laboratory test results return
Folate (injection: 5 mg/mL)	IV: 1–2 mg/kg IV every 4–6 h	Administer until methanol and formate are eliminated
Methemoglobinemia		
Methylene blue (injection: 5 mg/mL)	IV: 1 mg/kg IV over 5–30 min If the methemoglobin level remains >30% or if clinical signs and symptoms persist, a repeat dose of 1 mg/kg may be given 1 h after the first dose 1–2 mg/kg IV over 5 min, followed by 30 mL fluid flush	Administer undiluted by direct IV injection over several minutes Consider alternative treatments if there is no resolution of methemoglobinemia after 2 doses Contraindication: patients with glucose-6-phosphate dehydrogenase deficiency because of the risk of hemolytic anemia May be diluted before use in a solution of 50 mL D_5W to avoid local pain, particularly in the pediatric population. Use diluted solution immediately after preparation
Opioid agent-induced respiratory depression (morphine, fentanyl, etc)		

SUPPLEMENTAL TABLE 5 Continued

Antidote	Dose	Notes
Naloxone (injection: 0.4 mg/mL)	IV, IO, IM, SC, or ET: 0.001–0.02 mg/kg up to full reversal dose of 0.1 mg/kg Dose may be repeated every 2 min to a cumulative dose of 10 mg Adult maximum dose: 2 mg Continuous IV or IO infusion: 0.002–0.16 mg/kg per h	Use bag and mask ventilation before administration in opioid-induced respiratory depression Onset: 2 min; duration: 30–120 min Half-life shorter than most opioids, likely to need repeated doses every 20–60 min. Continuous infusions may be required Titrate to effect to prevent the onset of severe pain Side effects occur because of reversal of opioid analgesia and sedation In opioid-tolerant patients, administer a reduced dose and titrate up slowly to treat symptoms but prevent acute withdrawal
Naloxone (autoinjector 0.4 mg/0.4 mL; 2 mg/0.4 mL)	IM or SC: Administer as a single dose; may repeat every 2–3 min if needed until emergency medical assistance becomes available	Inject while pressing into the anterolateral aspect of the thigh. (In children <1 y of age, pinch the thigh muscle while administering medication.) User actuated; may be administered through clothing if needed If the desired response is not obtained after 2 or 3 min, an additional dose may be administered
Naloxone (*Narcan*) (nasal spray: 2, 4 mg)	IN: Administer as a single dose; may repeat every 2–3 min in alternating nostrils if needed until medical assistance becomes available	Use of Narcan nasal spray in opioid-dependent patients may result in severe opioid withdrawal characterized by body aches, diarrhea, increased heart rate (tachycardia), fever, runny nose, sneezing, goose bumps (piloerection), sweating, yawning, nausea or vomiting, nervousness, restlessness or irritability, shivering or trembling, abdominal cramps, weakness, and increased blood pressure
Scorpion bite (*Centruroides* species)		
Immune f(ab')2 (equine)	IV: Initial dose: 3 vials Reconstitute each vial with 5 mL of sterile normal saline. Combine and further dilute to a total of 50 mL. Infuse over 10 min. Additional doses: as needed, administer 1 vial at a time at 30–60 min intervals	Initiate treatment as soon as possible in patients who develop clinically important signs of scorpion envenomation, including but not limited to loss of muscle control, roving or abnormal eye movements, slurred speech, respiratory distress, excessive salivation, frothing at the mouth, vomiting, cardiac arrhythmias Severe hypersensitivity reactions, including anaphylaxis, and delayed allergic reactions (serum sickness) may occur after treatment Prepare for monitoring and management of allergic reactions, particularly in patients with a history of hypersensitivity to equine (horse) proteins or patients who have received previous therapy with antivenoms containing equine proteins
Sodium channel blocker overdose (eg, tricyclic antidepressant)		
Sodium bicarbonate (injection: 4.2% [0.5 mEq/mL], 8.4% [1 mEq/mL])	IV: 1–2 mEq/kg bolus. Repeat in 5 min if no response. Follow with infusion of 150 mEq $NaHCO_3$/L solution	For tricyclic antidepressant poisoning with hypotension, widening of the QRS interval >100 ms or ventricular arrhythmia pH goal is 7.50–7.55 A continuous 12-lead ECG during the infusion to demonstrate the presence (or absence) of narrowing of the QRS complex is useful

SUPPLEMENTAL TABLE 5 Continued

Antidote	Dose	Notes
Snake bite (*Crotalidae*) (rattlesnakes, copperheads, and cottonmouths and water moccasins)		
Crotalidae polyvalent immune fab (ovine)	IV: Initial: 4–6 vials; mixed in 250 mL of 0.9% sodium chloride administered over 1 h Maintenance: 2 vials every 6 h for total of 3 doses Mixed in 250 mL of 0.9 sodium chloride administered over 1 h	May decrease the volume for dilution in children Additional doses may be necessary if swelling not controlled or there is recurrence of coagulopathy Antivenom dosage is based on venom load and severity of symptoms and not on patient size Store at 2°C–8°C; use within 4 h of reconstitution and dilution Copperhead envenomation typically may have only swelling and pain and may not require antivenom; consult toxicology
Spider bite: *Latrodectus* (black widow spider)		
Latrodectus antivenom (equine) (injection: 6000 U per vial)	IV: Administer over 15–30 min Children <12 y old: IV: 1 vial (2.5 mL) diluted in 50 mL saline; a second dose may be needed in some cases; >1–2 vials are rarely required Children ≥12 y old and adults: IM or IV 1 vial (2.5 mL) diluted in 50 mL saline; a second dose may be needed in some cases; >1–2 vials are rarely required	For patients with severe symptoms (eg, cramping, intractable pain, hypertension) attributable to *Latrodectus mactans* and other *Latrodectus* species envenomation after the use of muscle relaxants and opioid analgesics Risk of an anaphylactic reaction; therefore, administer antivenom only to those with significant signs and symptoms of envenomation. Do not administer prophylactically to asymptomatic patients Intradermal skin test or conjunctival test may be performed before antivenin administration. Before intradermal testing, confirm patient history of previous antivenin administration or allergy to equine proteins Store at 2°C–8°C
Sulfonylurea-induced hypoglycemia		
Octreotide (injection: IV: 10 μg/mL; SC: 50, 100, 500 μg/mL)	SC: Children: 1.25 μg/kg (maximum 50 μg) SC every 6 h Adults: 50 μg SC every 6 h	Contraindication: sensitivity to the drug or its components
Valproic acid-induced hyperammonemia or elevated transaminases		
L-carnitine (injection: 200 mg/mL)	IV: 100 mg/kg (up to 6 g) infused over 30 min, followed by 15 mg/kg infused over 30 min every 4 h	Use in clinically ill-appearing patients
L-carnitine (tablet: 330 mg)	PO: 100 mg/kg per d oral divided every 6 h up to 3 g per d	Use in clinically well-appearing patients
Warfarin (and "superwarfarin" rat poison) poisoning		
Vitamin K_1 (injection: 2 mg/mL)	IV, IM, SC, or PO: Children 1–5 mg Adults 10 mg	Treatment may last for weeks to months

It is advisable to contact the Poison Control Center in cases of suspected poisoning. Call 1-800-222-122 for further guidance. Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. ATNAA, antidote treatment-nerve agent auto-injector; BAL, British anti-Lewisite; BP, blood pressure; CANA, convulsant antidote for nerve agent; CNS, central nervous system; CPR, cardiopulmonary resuscitation; DMSA, meso-2,3-dimercaptosuccinic acid; D_5W, dextrose 5% in water; ECG, electrocardiogram; $CaNa_2EDTA$, calcium disodium edetate; EMLA, eutectic mixture of local anesthetics; GI, gastrointestinal; IM, intramuscular; IN, intranasal; IO, intraosseous; LR, lactated Ringer; MDAC, multiple-dose activated charcoal; NAC, N-acetylcysteine; $NaHCO_3$, sodium bicarbonate; NG, nasogastric; NS, normal saline; OR, operating room; PO, per os; SC, subcutaneous; 2-PAM, pralidoxime.

[a] End point for adequate atropine effect is clear lungs with no bronchial secretions or wheezing.

SUPPLEMENTAL TABLE 6 Drugs Used in Disaster Situations

Drug or Agent	Dosage	Notes
Radioactive agents (for a complete list of treatment of internal contamination of radioactive agents: https://www.remm.nlm.gov/isotopestable.pdf)		
Radioactive iodine (^{125}I, ^{131}I) dirty bomb		
Potassium iodide (tablet: 65, 130 mg; oral solution: 65 mg/mL losat [130 mg], Thyrosafe [65 mg], Thyroshield solution [65 mg/mL])	PO: (daily doses) Birth–1 mo old: 16 mg 1 mo–3 y old: 32 mg 3–12 y old: 65 mg 12–18 y old: 65 mg Adolescents ≥70 kg: 130 mg Pregnant or lactating women: 130 mg Adults: 130 mg	Administer shortly before exposure or promptly after notification of potential radioactive iodine release and continue daily if continued risk warrants it Tablets packed in foil remain fresh for 5 y Because KI protects for ~24 h, it should be dosed daily until the risk no longer exists Contraindications: iodine sensitivity, history of dermatitis herpetiformis and hypocomplementemic vasculitis Side effects: rash, swelling salivary glands, "iodism" (metallic taste; burning mouth, teeth, or gums; diarrhea), allergic reaction
Plutonium (Pu-238, Pu-239), americium (Am-241), curium (Cm-244), FDA approved		
Ca-DTPA (Ca-Diethylenetriamine pentaacetate) (sterile solution in 5 mL single-use clear glass ampules at 200 mg/mL [each ampule contains equivalent of 1000 mg Ca-DTPA])	IV: Initial dose (as single dose): Children <12 y old: 14 mg/kg (maximum: 1 g) Adults and adolescents: 1 g Maintenance dose (IV): (to start on the next day if indicated) Children <12 y old: 14 mg/kg once daily (maximum daily dose: 1 g) Adults and adolescents: 1 g once daily Administered as slow IV push over 3–4 min or by IV infusion over 30 min Inhalation (nebulized): When internal contamination is only by inhalation route within the previous 24 h, Ca-DTPA can be administered as inhalation solution. Dilute 1:1 with sterile water or saline and administer over 15–20 min	Simultaneous superficial decontamination must occur Administer Ca-DTPA within first 24 h postexposure (best within first hour) as the first dose Ca-DTPA and Zn-DTPA cannot be administered simultaneously If additional treatment is required, switch to Zn-DTPA. Ca-DTPA is more effective than Zn-DTPA during the first 24 h after internal contamination. After 24 h, Zn-DTPA and Ca-DTPA are similarly effective, but Ca-DTPA causes more loss of essential metals, such as zinc from the body. Therefore, Zn-DTPA is preferred for maintenance therapy. If Zn-DTPA is not available. Treatment may continue with Ca-DTPA; however, mineral supplements containing zinc should be given concomitantly as appropriate. Duration of chelation depends on amount of internal contamination and patient's response to treatment The safety and effectiveness of the nebulized route of administration has not been established in the pediatric population
Zn-DTPA (Zn-Diethylenetriamine pentaacetate) (sterile solution in 5 mL single-use clear glass ampules at 200 mg/mL [each ampule contains equivalent of 1000 mg of Zn-DTPA])	IV: Initial dose (as single dose): Children <12 y old: 14 mg/kg (maximum: 1 g) Adults and adolescents: 1 g Maintenance dose (IV): (to start on next day if indicated) Children <12 y old: 14 mg/kg once daily (maximum daily dose: 1 g) Adults and adolescents: 1 g once daily Administered as slow IV push over 3–4 min or by IV infusion over 30 min Inhalation (nebulized): When internal contamination is only by inhalation route within the previous 24 h, Zn-DTPA can be administered as inhalation solution. Dilute 1:1 with sterile water or saline and administer over 15–20 min	Simultaneous superficial decontamination must occur Administer Ca-DTPA within first 24 h postexposure (best within first hour) as the first dose Ca-DTPA and Zn-DTPA cannot be administered simultaneously If additional treatment is required, switch to Zn-DTPA. Ca-DTPA is more effective than Zn-DTPA during the first 24 h after internal contamination. After 24 h, Zn-DTPA and Ca-DTPA are similarly effective, but Ca-DTPA causes more loss of essential metals, such as zinc, from the body. Therefore, Zn-DTPA is preferred for maintenance therapy. Duration of chelation depends on amount of internal contamination and patient's response to treatment The safety and effectiveness of the nebulized route of administration has not been established in the pediatric population

SUPPLEMENTAL TABLE 6 Continued

Drug or Agent	Dosage	Notes
Radioactive thallium (Th-201), FDA approved		
Prussian blue (Radiogardase) (capsule: 0.5 g)	PO: Children 2–12 y old: 1 g every 8 h Adolescents and adults: 3 g every 8 h	Treatment may last 30 d or longer Side effects: constipation, electrolyte abnormalities, bluish discoloration of stool, oral mucosa, and teeth
Radioactive cesium (^{137}Cs), FDA approved		
Prussian blue (Radiogardase) (capsule: 0.5 g)	PO: Children 2–12 y old: 1 g every 8 h Adolescents and adults: 3 g every 8 h	Treatment may last for 30 d or longer Side effects: constipation, electrolyte abnormalities, bluish discoloration of stool, oral mucosa, and teeth
Chemical agents		
Cholinesterase inhibitors: organophosphates tabun (GA), sarin (GB), soman (GD), cyclosarin (GF), and VX		
Atropine (injection: 0.1, 0.4, 1 mg/mL)	IV or IM: Children: 0.05–0.1 mg/kg Adolescents: 1–3 mg/dose Adults: 1–5 mg, Repeat every 3–5 min, doubling the dose if previous dose does not cause adequate atropine effect.[a] Use 3 to 5 mg starting dose for adults with severe poisoning. For children with symptoms of severe nerve agent poisoning, doses up to 3 times these doses may be given	Decontamination of patient is essential. Remove clothing and wash with soap and water Administer undiluted by rapid IV injection There is no upper limit to atropine therapy (whether IM or IV) Small doses of 0.005 mg/kg do not cause bradycardia in children <15 kg Expected adverse events with atropine can include tachycardia, dry mouth, decreased sweating, and decreased intestinal functioning
Atropine (Atropen) (pediatric autoinjector: 0.25, 0.5, 1, and 2 mg)	IM: Mild nerve agent poisoning Children: Wt: <7 kg: 0.25 mg per dose (yellow pen) Wt: 7–18 kg: 0.5 mg per dose (blue pen) Wt: >18–41 kg: 1 mg per dose (dark-red pen) Wt >41 kg: 2 mg per dose (green pen) Severe nerve agent poisoning: Doses up to 3 times the above doses may be given in rapid succession[a]	Administer wt-based dosing as soon as exposure is known or suspected
Diazepam (injection: 5 mg/mL)	IV or IO: Infant and child <5 y old: 0.2–0.5 mg/kg; repeat in 15–30 min (total maximum dose: 5 mg) Adolescent and adult: 5–10 mg; repeat every 10–15 min (total maximum dose: 30 mg) IM: Infant and child: 0.2–0.5 mg/kg; repeat every 2–5 min (total maximum dose: 5 mg) Adolescent and adult: 2–3 CANA autoinjectors (total maximum dose: 30 mg)	Used to treat seizures Rapid injection may cause respiratory depression or hypotension
Diazepam (autoinjector: CANA, 10 mg)	IM: Child: 1 CANA autoinjector Adolescent: 2–3 CANA autoinjectors Adult: 2–3 CANA autoinjectors	Use for actively seizing patients only
Pralidoxime (injection, solution: 50 mg/mL)	IV: 20–50 mg/kg (maximum 1–2 g) infused over 30–60 min and then 10–20 mg/kg/h (maximum 500 mg per h)	To be effective, pralidoxime must be administered within min to a few h after exposure (depending on the nerve agent). Soman ages in 2 min; thus, only a few minutes after exposure, oximes are useless in treating soman poisoning
Combined atropine-pralidoxime (Duodote, ATNAA) (single-dose autoinjector: atropine [2.1 mg/0.7 mL] plus pralidoxime [600 mg/2 mL])	IM: For type of autoinjector and dosages based on severity of symptoms and wt please refer to https://chemm.nlm.nih.gov/na_prehospital_mmg.htm#top	For adults and pediatric patients weighing >41 kg Inject IM into the mid-lateral thigh Inject rapidly in nerve agent exposure In severe cases of nerve agent toxicity after vapor exposure (ie, apneic and unconscious) it may take up to 15 mg of atropine to restore consciousness and breathing Typically, atropine has not been required for more than 3 h to treat the life-threatening effects.

SUPPLEMENTAL TABLE 6 Continued

Drug or Agent	Dosage	Notes
		Non–life-threatening effects such as nausea and vomiting have required atropine for 6–36 h
Combined atropine-pralidoxime (mark 1 autoinjector kit; atropine [2 mg in 0.7 mL; pralidoxime [2-PAM] 600 mg in 2 mL)	IM: For type of autoinjector and dosages based on severity of symptoms and wt please refer to https://chemm.nlm.nih.gov/na_prehospital_mmg.htm#top	Inject IM into the mid-lateral thigh
Biological agents (infectious diseases in disasters)		
Anthrax (Bacillus anthracis)	Please refer to the AAP guidelines on the management of anthrax: http://pediatrics.aappublications.org/content/133/5/e1411	Anthrax antitoxin therapy: www.accessdata.fda.gov/drugsatfda_docs/label/2012/125349s000lbl.pdf
Plague (Yersinia pestis): contained casualty setting		
Gentamicin (preferred choice)	IM or IV: 2.5 mg/kg, 3 times daily, for 10 d	
Streptomycin (preferred choice)	IM: 15 mg/kg, twice daily, for 10 d (should not exceed 2 g per d)	Oral therapy may be substituted once patient improves
Ciprofloxacin (alternative choice)	IV: 15 mg/kg, twice daily, for 10 d Maximum: 1 g per d	Oral therapy may be substituted once patient improves
Doxycycline (alternative choice)	IV: Wt <45 kg: 2.2 mg/kg, twice daily, for 10 d (maximum: 200 mg per d) Wt ≥45 kg: 100 mg, twice daily, for 10 d	Oral therapy may be substituted once patient improves
Plague (Yersinia pestis): mass casualty setting and for postexposure prophylaxis		
Ciprofloxacin (preferred choice)	PO: 20 mg/kg per dose every 12 h Maximum: 500 mg per dose	Duration (mass casualty setting): 10 d Duration (postexposure prophylaxis): 7 d Bactericidal
Doxycycline (preferred choice)	PO: Wt <45 kg: 2.2 mg/kg twice daily (maximum: 100 mg per dose) Wt >45 kg: 100 mg twice daily	Duration (mass casualty setting): 10 d Duration (postexposure prophylaxis): 7 d Bacteriostatic Isolation of victims Side effects: bulging fontanels in infants, photosensitivity are seen with doxycycline (no tooth staining after multiple short courses)
Tularemia (*Francisella tularensis*): contained casualty		
Gentamicin (preferred choice)	IM or IV: 2.5 mg/kg, 3 times daily, for 10 d	
Streptomycin (preferred choice)	IM: 15 mg/kg, twice daily, for 10 d (should not exceed 2 g per d)	
Ciprofloxacin (alternative choice)	IV: 15 mg/kg, twice daily, for 10 d Maximum: 1 g per d	Persons beginning treatment with IM or IV routes of administration can switch to oral antibiotic administration when clinically indicated
Doxycycline (alternative choice)	IV: Wt <45 kg: 2.2 mg/kg, twice daily Wt ≥45 kg: 100 mg, twice daily Duration of therapy: 14–21 d	Persons beginning treatment with IM or IV routes of administration can switch to oral antibiotic administration when clinically indicated
Tularemia (*Francisella tularensis*): mass casualty setting and for postexposure prophylaxis		
Ciprofloxacin (preferred)	PO: 15 mg/kg, twice daily, for 14 d Maximum: 1 g per d	
Doxycycline (preferred)	PO: Wt <45 kg: 2.2 mg/kg, twice daily Wt ≥45 kg: 100 mg, twice daily Duration of therapy: 14 d	
Brucellosis (Brucella species)		
Doxycycline plus rifampin		Treatment for a minimum of 6 wk

SUPPLEMENTAL TABLE 6 Continued

Drug or Agent	Dosage	Notes
	PO: Children >8 y old and adults: Doxycycline 2–4 mg/kg per d (maximum 200 mg per d) in 2 divided doses and Rifampicin 15–20 mg/kg per d (maximum 600–900 mg per d) in 1 or 2 divided doses	
Trimethoprim-sulfamethoxazole	PO: Children <8 y old: Trimethoprim 10 mg/kg per d (maximum: 480 mg per d) and sulfamethoxazole 50 mg/kg per d (maximum: 2.4 g per d) divided in 2 doses	Treatment for 4–6 wk
Q fever (*Coxiella* burnetii)		
Doxycycline	PO: Children <8 y old with mild or uncomplicated illness: 2.2 mg/kg per dose, twice daily, for 5 d (maximum: 100 mg per dose) Children <8 y old (with high-risk criteria)[b]: 2.2 mg/kg per dose, twice daily (maximum: 100 mg per dose) for 14 d Children >8 y old: 2.2 mg/kg per dose, twice daily (maximum: 100 mg/dose) for 14 d Adults: 100 mg, twice daily, for 14 d	The benefit of doxycycline in treating Q fever in children <8 y of age with severe illness or who are hospitalized is greater than the potential risk of dental staining Children with mild illness who are <8 y of age: if patient remains febrile past 5 d of treatment with doxycycline: administer trimethoprim-sulfamethoxazole 4–20 mg/kg twice a day for 14 d (maximum: 800 mg per dose)
Botulinum toxin		
Botulinum antitoxin (heptavalent), equine	IV: Adults (>17 y old): 1 vial of antitoxin IV Children (1–<17 y old): 20%–100% of adult dose Infants (<1 y old): 10% of adult dose regardless of body wt	Call your state health department's emergency 24-h telephone number immediately if you suspect botulism in a patient. The state health department will contact the CDC to report suspected botulism cases, arrange for a clinical consultation by telephone, and if indicated, request release of botulinum antitoxin State health departments should call the CDC 24-h telephone number at 770-488-7100. The call will be taken by the CDC Emergency Operations Center, which will page the Foodborne and Diarrheal Diseases Branch medical officer on call. Before administration of antitoxin, perform skin testing for sensitivity to serum or antitoxin. After skin testing, administration of 1 vial of antitoxin, IV, is recommended. There is no need to readminister the antitoxin because the circulating antitoxins have a half-life of 5–8 d. Meticulous intensive care should be exercised, including monitoring of respiratory function and when required, ventilator support. Recovery follows the regeneration of new neuromuscular connections. 2–8 wk duration of ventilatory support may be required in more severe cases On the basis of limited information, there is no indication that treatment of children, pregnant women, or immunocompromised persons with botulism should differ from standard therapy
Botulism immune globulin IV (human) (BabyBIG) (100 ± 20 mg lyophilized immunoglobulin per single-dose vial)	IV: 1.0 mL/kg (50 mg/kg) given as a single infusion as soon as the clinical diagnosis of infant botulism is made	Contraindications: previous history of severe reaction to other human immunoglobulin preparations and selective IgA deficiency with anti-IgA antibodies

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. ATNAA, antidote treatment-nerve agent auto-injector; CANA convulsant antidote for nerve agent; Ca-DTPA, Ca-diethylenetriamine pentaacetate; CDC, Centers for Disease Control and Prevention; GA, Tabun; GB, Sarin; GD, Soman; GF, Cyclosarin; IgA,

SUPPLEMENTAL TABLE 6 Continued

Drug or Agent	Dosage	Notes

immunoglobulin A; IM, intramuscular; IO, intraosseous; KI, potassium iodide; PO, per os; Zn-DTPA, Zn-diethylenetriamine pentaacetate; 2-PAM, pralidoxime.

[a] End point for adequate atropine effect is clear lungs with no bronchial secretions or wheezing.

[b] High-risk criteria: hospitalized children, severe illness (preexisting heart valvulopathy), immunocompromised, and delayed Q fever diagnosis with illness for >14 d without symptom resolution.

SUPPLEMENTAL TABLE 7 Drugs Used in Cardiovascular Emergencies

Drug	Dose	Notes
Symptomatic bradycardia (heart rate slower than normal for the child's age associated with cardiopulmonary compromise [ie, signs of poor perfusion: altered mentation, capillary refill >3 s, oliguria])		
Atropine (injection: 0.1, 0.4, 1 mg/mL)	IV: 0.02 mg/kg (minimum dose: 0.5 mg; maximum single dose: 0.5 mg) May repeat dose once (maximum total dose for child: 1 mg; maximum total dose for adolescent: 3 mg)	Vagal-mediated bradycardia; primary atrioventricular block Loss of constrictive pupillary reflex to light
	ET: 0.04–0.06 mg/kg	Flush with 5 mL of normal saline and follow with 5 ventilations
Epinephrine (injection: 0.1 mg/mL)	IV or IO: 0.01 mg/kg (maximum dose: 1 mg)	—
	IV: Give 0.001 mg/kg followed by continuous infusion of 0.01–0.2 μg/kg per min[a]	Give via central administration Significant vasoconstriction at higher doses; increases myocardial oxygen consumption
Epinephrine (injection: 1 mg/mL)	ET: 0.1 mg/kg (maximum single dose: 2.5 mg)	Follow ET administration with saline flush or dilute in isotonic saline (1–5 mL) on the basis of patient size
Tachyarrhythmias		
Adenosine (injection: 3 mg/mL)	Atrioventricular node–dependent supraventricular tachycardia IV or IO: First dose: 0.1 mg/kg rapid push followed immediately by 5–10 mL saline flush (maximum dose: 6 mg) Second dose: 0.2 mg/kg rapid push followed immediately by 5–10 mL saline flush (maximum dose: 12 mg)	Use most proximal injection site or central venous line Stopcock or T-connector method recommended for rapid administration IV push as quickly as possible (over 1–2 s) immediately, followed by a 10 mL normal saline flush pushed as fast as possible, then elevate extremity Record continuous ECG concurrently Adenosine will not effectively terminate atrioventricular node–independent tachycardias, such as atrial flutter, ectopic atrial tachycardia, or atrial fibrillation Should not be administered for wide QRS complex tachycardia unless it is clear that the underlying rhythm is not atrial fibrillation or atrial flutter with associated antegrade accessory pathway conduction Expert consultation should be obtained before administration of adenosine as a diagnostic and potentially therapeutic intervention for stable patients who have wide QRS complex tachycardia Caution: caffeine and theophylline reduce the effect of adenosine; carbamazepine and dipyridamole increase the effect of adenosine
Amiodarone (injection: 2 mg/mL in D_5W; 6 mg/mL in D_5W [central line]; 50 mg/mL)	For perfusing atrial or ventricular arrhythmias IV or IO: Neonates, infants, children: give loading dose of 5 mg/kg over 20–60 min[b] Maximum single dose: 300 mg; can repeat to a maximum of 3 doses Total: 15 mg/kg per 24 h Adults: 150 mg given over 10 min and repeated if necessary, followed by a 1 mg per min infusion for 6 h, followed by 0.5 mg per min. Total dose over 24 h should not exceed 2.2 g	Consider for use in SVT unresponsive to vagal maneuvers and adenosine and/or electrical cardioversion Consult cardiology before administration if possible Use lower dose and/or slower infusion if patient is hemodynamically unstable or receiving other medications that lower heart rate; can cause hypotension; can prolong QT interval: 1. Obtain expert consultation before administering, if known or suspected long-QT syndrome. 2. Routine administration in combination with procainamide or digoxin is not recommended without expert consultation Use with caution in hepatic failure

SUPPLEMENTAL TABLE 7 Continued

Drug	Dose	Notes
		Causes phlebitis; therefore, dilute to <2 mg/mL and prolong the infusion
	Pulseless ventricular tachycardia or ventricular fibrillation in absence of known or suspected long-QT syndrome: IV or IO: Neonates, infants, children: Initial dose: 5-mg/kg rapid bolus Maximum single dose: 300 mg; may repeat to a total of 3 doses Total: 15 mg/kg per 24 h Adults: 300 mg IV rapid bolus (may give undiluted) May give a single repeat 150 mg bolus IV if needed	May be given undiluted in pulseless VT or VF
Lidocaine (injection: 5 mg/mL [0.5%]; 10 mg/mL [1%]; 20 mg/mL [2%] premixed injection in D_5W: 0.4%, 0.8%)	VF or pulseless VT cardiac arrest; ventricular arrhythmias IV or IO: 1 mg/kg loading bolus (repeat bolus if infusion initiated >15 min after initial bolus) followed by a continuous infusion of 20–50 μg/kg per min	Note multiple concentrations and formulations Monitor QTc Use with caution in hepatic failure Can cause seizures at high levels
Lidocaine (injection: 5 mg/mL [0.5%]; 10 mg/mL [1%]; 20 mg/mL [2%])	VF or pulseless VT cardiac arrest; ventricular arrhythmias ET: 2–3 mg/kg per dose	Flush with 5 mL of NS and follow with 5 assisted manual ventilations
Procainamide (injection: 100, 500 mg/mL)	Junctional ectopic tachycardia; SVT; atrial fibrillation IV or IO: 15 mg/kg load over 30–60 min (maximum dose: 100 mg) followed by a continuous infusion: 20–80 μg/kg per min up to a max. of 2000 mg per 24 h	Consider for use in SVT unresponsive to vagal maneuvers and adenosine and/or electrical cardioversion Risk of hypotension and negative inotropic effects increases with rapid administration Monitor ECG and procainamide and NAPA levels; can prolong QT interval: 1. Obtain expert consultation before administering, if known or suspected long-QT syndrome 2. Routine administration in combination with amiodarone is not recommended without expert consultation
Esmolol (injection: 10 mg/mL; premixed in 0.9% saline: 2000 mg/100 mL, 2500 mg/250 mL)	Supraventricular tachycardia IV: Initial dose of 100–500 μg/kg given over 1–2 min, followed by a continuous infusion of 50–500 μg/kg per min	Consider for use in SVT unresponsive to vagal maneuvers and adenosine and/or electrical cardioversion Monitor blood pressure, for extravasation, hyperkalemia Side effects: bradycardia, hypotension, hypoglycemia, potential for bronchoconstriction Contraindications: bronchospastic conditions, diabetes, heart failure, concurrent calcium channel blocker use, conduction abnormalities
Magnesium sulfate (injection: 500 mg/mL; premixed in D_5W: 10, 20 mg/mL; premixed in sterile water for injection: 40 mg/mL)	Pulseless VT with Torsades de pointes IV: 25 to 50 mg/kg bolus (maximum dose: 2 g) VT with pulses with Torsades IV: 25 to 50 mg/kg over 10–20 min (maximum dose: 2 g)	Rapid bolus may cause hypotension Contraindicated in renal failure Calcium chloride can reverse magnesium toxicity
Congenital heart disease with duct dependency		
Alprostadil (prostaglandin E_1) (injection: 500 μg/mL)	To establish ductus arteriosus patency IV or IO infusion: 0.05–0.1 μg/kg per min	Side effects are typically dose dependent Use lowest effective dose because of potential adverse effects May cause apnea, flushing and fever, hypotension Use of lower doses (<0.015 μg/kg per min) associated with a lower incidence of apnea during transport Extravasation causes tissue sloughing

SUPPLEMENTAL TABLE 7 Continued

Drug	Dose	Notes
	To maintain ductus arteriosus patency IV or IO infusion: 0.01–0.05 μg/kg per min	
Heart failure (pulmonary edema and fluid overload)		
Furosemide (injection: 10 mg/mL)	IV or IM: 1 mg/kg (typical maximum dose 20 mg for patient not chronically on loop diuretics)	Onset: 5 min (IV); 30 min (IM) Peak: 30 min (IV); unknown (IM) Duration: 2 h (IV); 4–8 h (IM) Patients with impaired renal function may need a higher dose Monitor for hypokalemia Can cause hypokalemia, hypochloremic metabolic acidosis, or hypotension if preload dependent
Cardiac ischemia (the goal is to stabilize the adult and transfer to an appropriate facility for reperfusion therapy)		
Nitroglycerin (tablet, sublingual: 0.4 mg; translingual spray: 0.4 mg per metered spray)	Sublingual or buccal spray: Adults: 0.4 mg every 5 min for maximum of 3 doses in 15 min	If pain persists after 3 doses of sublingual or buccal spray, administer IV infusion
Nitroglycerin (injection: 5 mg/mL prediluted injection in D_5W: 100, 200, 400 μg/mL)	IV: Adult: start infusion at 10 μg per min	Do not start infusion if systolic BP <90 mm Hg or clinical findings of right ventricular infarct (inferior infarction on ECG, elevated jugular venous pressure, clear lungs, and hypotension) The rate of the infusion may be increased by 10 μg per min every 3–5 min until symptoms are relieved, systolic arterial pressure falls to <100 mm Hg, or the dose reaches 200 μg per min
Aspirin (tablet: 325 mg; tablet: chewable, children's: 81 mg)	PO: 160–325 mg as chewable tablet (3–5 mg/kg) Maximum dose: 325 mg	Chew non–enteric-coated product in an emergency situation Do not give enteric-coated product
Morphine (injection: 1 mg/mL, 2 mg/mL, 10 mg/mL)	IV: Adults: Initial dose of 2–5 mg May be repeated every 5–30 min as needed to relieve symptoms and maintain patient comfort	Avoid if hypotension present Use lower doses in elderly patients
Kawasaki disease		
Immune globulin IV	IV: 2 g/kg, once, infused over 10–12 h	The effectiveness of IVIG therapy is best established for patients treated within the first 7–10 d of illness Differences in products and manufacturing may result in differing adverse effect profiles
Aspirin (tablet: 325 mg; tablet: chewable, children's: 81 mg; enteric coated: 325 mg)	PO: Moderate dose: 30–50 mg/kg per d or High dose: 80–100 mg/kg per d, divided every 6 h; after fever resolves for at least 48 h: 3–5 mg/kg per d, once daily	Ibuprofen generally should be avoided in children with coronary artery aneurysms taking aspirin for its antiplatelet effects Consider alternative antiplatelet therapy in child with Kawasaki disease and influenza to prevent Reye syndrome
Deep vein thrombosis and pulmonary embolism		
Unfractionated heparin (injection: 1; 10; 100; 500; 1000; 5000; 10 000; 20 000 U/mL)	IV: Initial bolus: 75 U/kg over 10 min Continuous infusion: Children <1 y old: 28 U/kg per h Children ≥1 y old: 20 U/kg per h Maximum initial infusion: 1000 U per h	For IV infusion: usual concentration: 100 U/mL. Indication for IV bolus made on an individual basis; do not bolus in sick neonates, patients with stroke, bleeding, or high-risk for bleeding Obtain anti-Xa level 4 h after initiation of infusion and 4 h after each dosage change Therapeutic unfractionated heparin in children is titrated to achieve a target anti-Xa range of 0.35–0.7 U/mL or an activated partial thromboplastin time range that correlates to this anti-Xa range or to a protamine titration range of 0.2–0.4 U/mL Correct underlying coagulopathy as needed

SUPPLEMENTAL TABLE 7 Continued

Drug	Dose	Notes
		Platelets must be corrected to $\geq$50 000/mm^3
		Consultation with a hematologist is recommended
Low molecular wt heparin enoxaparin (injection: 100, 150 mg/mL)	SC:	Correct underlying coagulopathy as needed
	Child <2 mo old: 1.5 mg/kg every 12 h	Platelets must be corrected to $\geq$50 000/mm^3
	Child $\geq$2 mo old: 1 mg/kg every 12 h	Obtain anti-Xa level 4 h after second dose from initiation of therapy and 4 h after each dosage change (usual therapeutic anti-Xa level between 0.5 and 1 U/mL)
		Consultation with a hematologist is recommended
		May require dilution to achieve small pediatric doses
		Delayed elimination of enoxaparin in renal failure
		Modify dose in patients with renal failure

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. BP, blood pressure; D_5W, dextrose 5% in water; ECG, echocardiogram; IM, intramuscular; IO, intraosseous; IVIG, intravenous immune globulin; NAPA, N-acetylprocainamide; NS, normal saline; PO, per os; QTc, corrected QT interval; SC, subcutaneous; SVT, supraventricular tachycardia; VF, ventricular fibrillation; VT, ventricular tachycardia; Xa, factor Xa; —, not applicable.

[a] For treatment of hypotension or persistent bradycardia with a pulse in the patient with an at-risk myocardium, give low dose via central administration (0.001 mg/kg), which is one-tenth the standard recommended resuscitation dose for symptomatic bradycardia in the 2015 *Pediatric Advanced Life Support*.

[b] The time range for administration of the loading dose of amiodarone for the child with a perfusing rhythm is slightly longer in the child with cardiac disease (ie, 30–60 min) than the 2015 *Pediatric Advanced Life Support*–recommended time for administration (ie, 20–60 min). The reason for this slight difference is that the child with cardiac disease is likely to be or is at risk for hemodynamic compromise.

SUPPLEMENTAL TABLE 8 Drugs Used in Respiratory Emergencies

Drug	Dosage	Special Considerations
Acute asthma exacerbation and bronchospasm		
Albuterol (solution for inhalation: 1.25 per 3 mL; 2.5 mg per 3 mL; 5 mg/mL)	Children ≤12 y old: Intermittent nebulized treatment with 0.5% nebulizer solution (5 mg/mL): 0.15 mg/kg (minimum dose 2.5 mg) every 20 min for 3 doses, then 0.15–0.3 mg/kg up to 10 mg every 1–4 h as needed Continuous/prolonged nebulization: 0.5 mg/kg per h up to 10–20 mg per h Adolescents and adults: 2.5–5 mg every 20 min for 3 doses, then 2.5–10 mg every 1–4 h as needed or 10–15 mg per h continuously	Dilute in a minimum of 2–3 mL of saline solution for adequate nebulization Use an age-appropriate delivery device (eg, mask versus mouthpiece) Administration can be repeated, and dose can be adjusted until desired clinical effect unless patient develops symptomatic tachycardia Oxygen is the preferred gas source for nebulization. Supplemental oxygen may be needed when compressed air–driven nebulizers are used or when the oxygen flow rate dictated by the nebulizer device is inadequate to maintain adequate oxygen saturation
Albuterol (MDI: 90 μg per puff)	Metered-dose HFA inhaler 90 μg per puff) with spacer: Children ≤12 y old: 4–8 puffs every 20 min for 3 doses, then every 1–4 h inhalation maneuver as needed Children >12 y old, adults: 4–8 puffs every 20 min for up to 4 h, then every 1–4 h as needed	Use spacing chamber; add mask in children <4 y old
Dexamethasone (tablet: 0.5, 2, 4 mg; injection, IM: 10 mg/mL)	IV, IM, or PO: 0.6 mg/kg every 24 h for 2 doses (maximum: 16 mg)	Use the injection solution for oral use
Epinephrine (injection: 1 mg/mL)	IM: 0.01 mg/kg every 5–15 min for up to 3 injections if patient is not responding (maximum dose: 0.3 mg in a prepubertal child and up to 0.5 mg in a teenager or adult)	If >1 symptom or symptoms of severe allergy or anaphylaxis develops, use epinephrine Reserved for patients with poor inspiratory flow or who cannot cooperate with inhaled therapy or severe asthma with suboptimal response to initial aerosolized therapy Inject intramuscularly into the mid-outer thigh (vastus lateralis muscle)
Epinephrine (IM autoinjector: 0.1, 0.15, 0.3 mg. *Epipen, Auvi-Q, g*eneric epinephrine)	IM autoinjector: 0.1 mg (patient's wt: 7.5–13 kg) 0.15 mg (patient's wt: 13–25 kg) 0.3 mg (patient's wt: ≥25 kg)	If >1 symptom or symptoms of severe allergy or anaphylaxis develops, use epinephrine Inject intramuscularly into the mid-outer thigh (vastus lateralis muscle) If 0.1 mg dose is not available, it is appropriate to use the 0.15 mg dose for children <25 kg Switch most children from 0.15 mg dose to 0.3 mg dose when they reach a body wt of 25–30 kg For Epipen: hold the autoinjector device in place for only 3 s For Auvi-Q: hold the device for 2 s For generic epinephrine: "hold in place while slowly counting to 10" Recommended "hold times" may vary among devices. Please consider viewing the package insert before administration, but do not delay use in emergencies
Ipratropium (nebulized solution: 0.25 mg/mL)	Nebulized treatment Children ≤12 y old: 0.25 mg every 20 min for 3 doses, then as needed Children >12 y old and adults: 0.5 mg every 20 min for 3 doses, then as needed	Adjunct to β-agonists for status asthmaticus or bronchospasm May be mixed with albuterol aerosol Do not use as first-line therapy
Ipratropium (MDI: 18 μg per puff)	MDI Children ≤12 y old: 4–8 puffs every 20 min as needed up to 3 h Children >12 y old and adults: 8 puffs every 20 min as needed up to 3 h	Adjunct to β-agonists for status asthmaticus or bronchospasm Studies have examined ipratropium bromide MDI for up to 3 h
Levalbuterol (nebulized solution: 0.63 mg per 3 mL; 1.25 mg per 0.5 mL; 1.25 mg per 3 mL)	Nebulized treatment Children: 0.075 mg/kg (minimum dose 1.25 mg)	There is no proven benefit of levalbuterol over albuterol

SUPPLEMENTAL TABLE 8 Continued

Drug	Dosage	Special Considerations
	every 20 min for up to 3 doses, then 0.075 mg–0.15 mg/kg up to 5 mg every 1–4 h Adults: 1.25–2.5 mg every 20 min for 3 doses, then 1.25–5 mg every 1–4 h as needed	Levalbuterol has not been evaluated by continuous nebulization
Levalbuterol (MDI: 45 μg per puff)	MDI: see albuterol MDI dose	
Magnesium sulfate (injection: 500 mg/mL)	IV or IO: 25–50 mg/kg (maximum dose: 2 g) once over 15–30 min (usual dose 40 mg/kg)	Use for refractory status asthmaticus Rapid infusion may cause hypotension and bradycardia
Prednisone, prednisolone, methylprednisolone (liquid, oral: 3 mg/mL; tablet: 5 mg; ODT: 10, 15, 30 mg)	PO: Infants and children ≤12 y old: 1–2 mg/kg per d in 1–2 divided doses (maximum 60 mg per d) for 3–10 d (usually 5 d) Children >12 y old and adolescents: 40–60 mg per d in 1–2 divided doses for 3–10 d (usually 5 d)	Administer until peak expiratory flow is 70% of predicted or personal best No advantage of IV or IM preparations over the PO route if gastrointestinal absorption is not impaired. No need to taper steroid dose if used for <10 d
Terbutaline (injection 1 mg/mL)	SC: 0.01 mg/kg every 10–15 min until IV infusion is initiated (maximum dose 0.4 mg) IV: Load: 10 μg/kg over 5 min then continuous infusion at 0.1–10 μg/kg per min	Use for asthma that is poorly responsive to conventional therapy No proven advantage of systemic therapy over aerosol Use in monitored setting with continuous cardiac monitoring Lowers serum potassium
Croup and upper-airway edema		
Dexamethasone (tablet: 0.5, 2, 4 mg; injection, IM: 10 mg/mL)	Croup IV, IM, or PO: 0.15–0.6 mg/kg (maximum: 16 mg) for 1 dose Airway edema IV, IM, or PO: 0.5 mg/kg per dose (maximum dose: 10 mg per dose) administered 6–12 h before extubation then every 6 h for 6 doses (total dexamethasone dose: 3 mg/kg)	Use the injection solution for oral use
Racemic epinephrine (D- and L-epinephrine isomers; 2.25% inhalation solution)	Inhalation: 0.05 mL/kg (maximum: 0.5 mL) in 2 mL of normal saline administered by nebulizer	Many institutions use a standard 0.5 mL dose of racemic epinephrine for all patients Recommend 2 h observation for return of symptoms
Single isomer L-epinephrine (standard epinephrine; 1 mg/mL)	Inhalation: 0.5 mL/kg up to 5 mL administered by nebulizer	May use in place of racemic epinephrine
Bronchiolitis		
Albuterol and epinephrine treatments and systemic corticosteroids are not recommended in the treatment of bronchiolitis		

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. HFA, hydrofluoroalkane; IM, intramuscular; IO, intraosseous; MDI, metered-dose inhaler; ODT, orally disintegrating tablet; PO, per os; SC, subcutaneous.

SUPPLEMENTAL TABLE 9 Drugs Used in Endocrine Emergencies

Drug	Dose	Notes
DKA		
Insulin, regular (injection: 100 U/mL)	IV: Infusion of 0.05–0.10 U/kg per h Neonatal: 0.05 U/kg per h	Initial isotonic fluid bolus and replace fluid deficit over 48 h IV bolus insulin is not generally recommended for children with DKA Monitor blood glucose and potassium concentrations hourly or more closely as needed Reduce blood glucose level gradually by 50–90 mg/dL per h Start IV dextrose when blood sugar is <200 mg/dL
Hyperthyroidism		
Propranolol (tablet: 10, 20, 40 mg)	PO: Neonates, infants, and children: oral: 2 mg/kg per d in divided doses every 6–12 h; occasionally higher doses may be required (maximum dose: 40 mg per dose) Adolescents and adults: oral: 10–40 mg per dose every 6–8 h	Contraindication: asthma
Methimazole (tablet: 5 mg)	PO: 0.25–1.0 mg/kg per 24 h given once or twice daily	Use in consultation with an endocrinologist
Hydrocortisone (injection: 100, 250, 500, 1000 mg per vial)	IV: 2 mg/kg bolus (maximum dose: 100 mg) 0–3 y old: 25 mg, then 25 mg per d in divided doses every 6 h for 24 h[a] 3–12 y old: 50 mg, then 50 mg per d in divided doses every 6 h for 24 h[a] 12 y and older: 100 mg (maximum dose: 100 mg), then 100 mg per d in divided doses every 6 h for 24 h[a] Adults: 300 mg loading dose, then 100 mg every 8 h	For thyroid storm
Acute adrenal insufficiency		
Hydrocortisone (injection: 100, 250, 500, 1000 mg per vial)	IV or IO: 2 mg/kg bolus (maximum dose: 100 mg) 0–3 y old: 25 mg, then 25 mg per d in divided doses every 6 h for 24 h[a] 3–12 y old: 50 mg, then 50 mg per d in divided doses every 6 h for 24 h[a] 12 y and older: 100 mg (maximum dose: 100 mg), then 100 mg per d in divided doses every 6 h for 24 h[a]	Administer over 3–5 min

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. DKA diabetic ketoacidosis; IO, intraosseous; PO, per os.
[a] Subsequent dose reductions and rate determined by patient response.

SUPPLEMENTAL TABLE 10 Drugs Used in Metabolic Emergencies

Drugs	Dose	Notes
Hypoglycemia		
Dextrose (glucose) (injection: $D_{10}W$; $D_{25}W$; $D_{50}W$)	IV or IO: Neonate: 200 mg/kg as $D_{10}W$ only Children: 0.5–1 g/kg or (5–10 mL/kg $D_{10}W$; 2–4 mL/kg $D_{25}W$; 1–2 mL/kg $D_{50}W$) Maximum dose: 25 g per dose	$D_{50}W$ is irritating to veins; dilution to 25% dextrose is desirable Maximum concentration for newborn administration is $D_{12.5}W$ Follow bolus of glucose with continuous infusion if continued therapy is indicated
Glucagon (injection: 1 mg/mL)	IV, IM, or SC: 0.03 mg/kg (maximum: 1 mg); may repeat every 15 min up to 3 doses	Used to treat hypoglycemia attributable to insulin excess in conjunction with glucose Side effect: nausea
Hypokalemia		
Potassium chloride (injection: 0.06; 0.08; 0.2; 0.3; 2 mEq/mL)	IV (intermittent): 0.5–1 mEq/kg per dose Maximum dose: 40 mEq per dose Administer as continuous Infusion at rate ≤0.5 mEq/kg per h	For severe hypokalemia (arrhythmias, marked muscle weakness, or paralysis) May administer via peripheral line as infusion of 0.08 mEq/mL Maximum rate of all sources of potassium: ≤1 mEq/kg per h or ≤40 mEq per h over ≤6 h Continuous cardiac monitoring required Measure serum concentrations 1–2 h after infusion ends
Hyperkalemia		
Albuterol (inhalation solution: 1.25 per 3 mL; 2.5 mg per 3 mL; 5 mg per mL)	Intermittent nebulized treatment with 0.5% nebulizer solution (5 mg/mL): 0.15 mg/kg (minimum dose 2.5 mg) every 20 min for 1–2 doses Infants and children <25 kg: 2.5 mg Children between 25 and 50 kg: 5 mg Children >50 kg: 10 mg	Onset: 20–30 min Decreases serum potassium by 1–1.5 mEq/L within an hour of administration Place on cardiac monitor Avoid in children with preexisting cardiac arrhythmia
Bicarbonate, sodium (injection: 4.2% [0.5 mEq/mL]; 8.4% [1 mEq/mL])	IV or IO: 1 mEq/kg given slowly over 10–15 min Maximum single dose: 50 mEq	Onset: 15 min Only the 0.5 mEq/mL concentration should be used for newborn infants Do not give by ET route Dilution of available stock solutions may be necessary Do not mix sodium bicarbonate with vasoactive amines or calcium Only use in the presence of concomitant metabolic acidosis Administration of sodium bicarbonate in patients with severe hypokalemia and metabolic acidosis may further lower the serum potassium level and precipitate symptomatic hypokalemia
Calcium chloride (10%; injection: 100 mg/mL)	IV or IO: 20 mg/kg Maximum: 1000 mg	Onset: immediate Must be administered over 30–60 min into a central venous line or IO
Calcium gluconate (10%; 100 mg/mL)	IV or IO: 60–100 mg/kg per dose Infuse not faster than 100 mg per min Maximum: 2000 mg	Onset: immediate Preferred over calcium chloride ECG monitoring heart rate and QRS width. Repeat dose as necessary for desired clinical effect. Stop infusion if symptomatic bradycardia occurs
Insulin (injection: 100 U/mL) plus dextrose (10%; injection: 100 mg/mL)	IV: Administer regular insulin 0.1 U/kg (maximum dose 10 U) and dextrose 0.5 g/kg over 30 min (administer 10% dextrose at 5 mL/kg)	Onset: 10–20 min; peak: 30–60 min Monitor ECG changes and serum glucose with therapy
Symptomatic hyponatremia (with seizures)		
Sodium chloride (3%; injection: 3%)	IV: 3–5 mL/kg Administer over 20–30 min for symptomatic hyponatremia	For cessation of hyponatremic seizures 1 mL/kg of 3% saline, on average, raises the serum Na+ concentration by 1 mEq/L
Symptomatic hypocalcemia and hypermagnesemia		
Calcium gluconate (10%; 100 mg/mL)		

SUPPLEMENTAL TABLE 10 Continued

Drugs	Dose	Notes
	IV or IO: 100 mg/kg per dose administered over 5 min Maximum dose: 2000 mg	For symptomatic patients (seizures, tetany) Preferred over calcium chloride ECG monitor heart rate; repeat dose as necessary for desired clinical effect (such as resolution of seizures, tetany). Stop infusion if symptomatic bradycardia occurs
Calcium chloride (10%; injection: 100 mg/mL)	IV: 20 mg/kg Maximum dose: 1000 mg	Must be administered over 30–60 min, preferentially into a central venous line
Hypomagnesemia		
Magnesium sulfate (injection: 30 mg/mL)	IV or IO: 25–50 mg/kg (maximum dose: 2 g) Administer over 15–20 min	Rapid infusion may cause hypotension and bradycardia Adjust dosing in renal failure Calcium chloride should be available if needed to reverse magnesium toxicity Patients with chronic hypomagnesemia may require additional doses
Metabolic acidosis		
Bicarbonate, sodium (injection: 4.2% [0.5 mEq/mL]; 8.4% [1 mEq/mL])	IV or IO: 0.5–1 mEq/kg given over 5–15 min Maximum single dose: 50 mEq	Only the 0.5 mEq/mL concentration should be used for newborn infants. Dilution of available stock solutions may be necessary. Do not give by ET route Warnings: 1. Do not mix sodium bicarbonate with vasoactive amines or calcium 2. Administration of sodium bicarbonate to patients with metabolic acidosis and severe hypocalcemia will lower the serum ionized calcium concentration and may precipitate tetany or seizures 3. Administration of sodium bicarbonate to patients with severe hypokalemia and metabolic acidosis may further lower the serum potassium level and precipitate symptomatic hypokalemia 4. Not usually recommended for diabetic ketoacidosis unless severely acidotic with impairment of cardiac contractility or life-threatening hyperkalemia
Hyperammonemia		
Sodium benzoate and sodium phenylacetate *(Ammonul)* (injection: sodium phenylacetate 100 mg and sodium benzoate 100 mg/mL)	IV: ≤20 kg: loading dose 250 mg/kg over 90–120 min, followed by maintenance dose 250 mg/kg per d as a continuous infusion >20 kg: loading dose 5500 mg/m^2 over 90–120 min, followed by maintenance dose 5500 mg/m^2 per d as a continuous infusion	For carbamoyl phosphate synthetase and ornithine transcarbamylase deficiency Administer IV as a loading dose over 90–120 min, followed by an equivalent dose as a maintenance infusion over 24 h
Arginine (injection: arginine 100 mg/mL)	IV: Adults and children >20 kg and children ≤20 kg: loading dose 200 mg/kg over 90–120 min, followed by maintenance dose 200 mg/kg per d as a continuous infusion	For carbamoyl phosphate synthetase and ornithine transcarbamylase deficiency Because a hyperchloremic acidosis may ensue after high-dose arginine hydrochloride administration, plasma levels of chloride and bicarbonate should be monitored

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. $D_{10}W$, dextrose 10% in water; $D_{12.5}W$, dextrose 12.5% in water; $D_{25}W$, dextrose 25% in water; $D_{50}W$, dextrose 50% in water; ECG, electrocardiogram; IM, intramuscular; IO, intraosseous; Na+, sodium; SC, subcutaneous.

SUPPLEMENTAL TABLE 11 Drugs Used in Neurologic Emergencies

Drug	Dose	Notes
Status epilepticus		
Diazepam (IV) (injection: 5 mg/mL)	IV: 0.15–0.2 mg/kg per dose; maximum: 10 mg per dose May repeat dose once	Administer as an adequate single full dose rather than broken into multiple smaller doses If the seizure is not aborted by diazepam, then it should be followed by a long-acting anticonvulsant such as phenytoin, fosphenytoin, or levetiracetam because it is rapidly distributed and seizures often recur within 15–20 min Lorazepam is preferred to diazepam because of longer duration of anticonvulsant activity Increased risk of apnea when diazepam is given rapidly IV or when used in combination with other sedative agents
Diazepam (rectal) (rectal gel: 2.5, 5, 7.5, 10, 12.5, 15, 17.5, or 20 mg)	Rectal: Children 2–5 y old: 0.5 mg/kg Children 6–11 y old: 0.3 mg/kg Children ≥12 y old and adults: 0.2 mg/kg (maximum dose: 20 mg per dose)	Dose is obtained by rounding upward to the next available dose
Fosphenytoin (injection: 25 mg/mL)	IV: Children: 15–20 mg PE/kg Infused at a rate of 1–2 mg PE/kg per min (maximum rate 150 mg PE per min; maximum dose: 1500 mg) Adults: 20 mg PE/kg (maximum dose: 1500 mg PE per dose)	Doses of fosphenytoin sodium injection are always expressed in terms of mg of PE. 1 mg PE is equivalent to 1 mg phenytoin sodium. Rapid IV administration increases the risk of adverse cardiovascular reactions Cardiac monitoring is required both during and after administration Side effects: severe hypotension and arrhythmias, rash Fosphenytoin should be discontinued at the first sign of a rash. SJS or TEN as well as DRESS are potential complications, and an alternative therapy should be sought
Levetiracetam (Keppra) (injection: 100 mg/mL)	IV: 60 mg/kg (maximum: 4.5 g per dose, single dose) over 5 min	Off-label use in status epilepticus Dilute in 100 mL of a compatible diluent (0.9 NS, LR, D_5 W) and administer as a 15 min IV infusion
Lorazepam (injection: 2 mg/mL)	IV or IM: 0.1 mg/kg per dose (maximum dose: 4 mg per dose) May repeat dose once	Store intact vials at 2°C–8°C and protected from light Dilute before IV administration with an equal volume of compatible diluent (NS or D_5W) Administer as a single full dose If no response, then a second agent should be given Increased risk of apnea when combined with other sedative agents
Midazolam (buccal) (injection: 1; 5 mg/mL; oral solution: 2 mg/mL)	Buccal: 0.3–0.5 mg/kg (range: 2.5–10 mg) Age-based dosing: 6–12 mo old: 2.5 mg 1–4 y old: 5 mg 5–10 y old: 7.5 mg ≥10 y old: 10 mg	Buccal midazolam is preferred instead of rectal diazepam when IV access is unavailable as in prehospital Midazolam does not require refrigeration
Midazolam (IN) (injection: 5 mg/mL)	IN: 0.2 mg/kg (maximum dose: 10 mg)	Administer by using a 1 mL needleless syringe and atomizer into the nares over 15 s; use the 5 mg/mL injection; half of the dose may be administered to each nare
Midazolam (IM or IV) (injection 1; 5 mg/mL)	IM: 0.2 mg/kg (maximum: 10 mg/dose) Wt 13–40 kg: 5 mg Wt >40 kg: 10 mg IV: 0.2 mg/kg (maximum cumulative dose: 10 mg)	IV or oral solution may be given buccally Other benzodiazepines (lorazepam) are typically used for initial IV treatment of status epilepticus in a hospital setting
Phenobarbital (injection: 65; 130 mg/mL)	IV: Neonates: 15–20 mg/kg in a single or divided dose; may repeat doses of 5–10 mg/kg every 15–20 min as needed (maximum total dose: 40 mg/kg)	Be prepared to support respirations, particularly if given in combination with other anticonvulsants

SUPPLEMENTAL TABLE 11 Continued

Drug	Dose	Notes
	Infants and children: initial 15 mg/kg (maximum: 1000 mg per dose), may repeat dose after 15 min as needed (maximum total dose: 40 mg/kg); infuse over 10 min	
Sodium valproate (injection: 30 mg/mL)	IV: 40 mg/kg (maximum dose: 3000 mg per dose, single dose) Administer at a rate of 1.5–3 mg/kg per min	Off-label use in status epilepticus Dilute dose before administration
Acute migraine		
Diphenhydramine (injection: 50 mg/mL)	IV or IM: 1–2 mg/kg (maximum dose: 50 mg)	Treatment of dystonic reactions or agitation from other migraine therapy medications Side effects: sedation or possibly paradoxical excitement or agitation
Ketorolac (injection: 5, 10, 15 mg/mL)	IV: 0.5 mg/kg every 6–8 h (maximum dose: 15 mg) IM: 1 mg/kg every 6–8 h (maximum dose: 30 mg)	—
Metoclopramide (injection: 2.5 mg, 5 mg/mL)	IV: 0.2 mg/kg (maximum dose: 10 mg) May repeat once	Diphenhydramine can be used for moderate to severe agitation Off-label use in migraine Side effects: dystonia, akathisia, irritability, and agitation
Prochlorperazine (injection: 5 mg/mL)	IV: 0.15 mg/kg (maximum dose: 10 mg)	Diphenhydramine can be used for moderate to severe agitation Side effects: akathisia, irritability, or agitation
Increased intracranial pressure		
Mannitol (IV solution: 20%)	IV: 0.25–1 g/kg per dose infused over 20–30 min; may repeat every 6–8 h as needed	Maintain serum osmolality <300–320 mOsm/kg If patient is hypotensive, consider 3% saline as preferential option for ICP management or use a lower dose of mannitol (0.5 g/kg as opposed to 1 g/kg) Side effect: hypotension
3% saline	IV: 5 mL/kg administered over 20–30 min	Monitor serum and urine electrolytes if >1 dose is given May be repeated hourly as needed until serum sodium reaches 160 mEq/L
Acute dystonia		
Diphenhydramine (injection: 50 mg/mL)	IV: 1 mg/kg Maximum dose: 50 mg	Side effects: sedation or possibly paradoxical excitement or agitation

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. DRESS, drug reaction with eosinophilia and systemic symptoms; D_5W, dextrose 5% in water; ICP, intracranial pressure; IM, intramuscular; IN, intranasal; LR, lactated Ringer; NS, normal saline; PE, phenytoin sodium equivalent; SJS, Stevens-Johnson syndrome; TEN, toxic epidermal necrolysis; —, not applicable.

SUPPLEMENTAL TABLE 12 Drugs Used in Psychiatric Emergencies

Drug	Dose	Notes
Acute agitation		
Haloperidol (injection, IM: 5 mg/mL; tablet: 0.5, 1 mg)	PO or IM: 0.025–0.075 mg/kg Usual dose: Child: 0.5–2 mg Adolescent: 2–5 mg Adult: 5–10 mg May repeat IM every 20–30 min, PO every 60 min (usual total dose for tranquilization: 10–20 mg (adults)	IM: Onset: 20–30 min; peak: 60 min PO: Onset: 45–60 min; peak: 3 h Duration: 4–8 h PO risperidone preferable in children because it has equivalent efficacy and similar time to onset of action compared with IM haloperidol Observe the patient's response before redosing Side effects: prolonged QTc, dysrhythmias, hypotension, akathisia, dystonic reactions, neuroleptic malignant syndrome
Lorazepam (injection: 2 mg/mL; tablet: 0.5, 1, 2 mg)	PO, IM, or IV: Children: 0.05–0.1 mg/kg up to 2 mg PO or IM: Adult: 2 mg May repeat every 30–60 min	Onset of action depends on administration route: IV: Onset: 5–10 min; peak: 30 min; duration: 2 h IM: Onset: 15 min; peak: 1 h; duration: 6–8 h PO: Onset: 20–30 min; peak: 2 h; duration: 6–8 h
Midazolam (injection: 1; 5 mg/mL; syrup, oral: 2 mg/mL)	PO, IM, or IV: Children: 0.1 mg/kg up to 2 mg PO or IM: Adult: 2 mg May repeat every 30–60 min	Onset of action depends on administration route: IV: Onset: 5–10 min; peak: 5–15 min; duration: 3–4 h IM: Onset: 10–15 min; peak: 15–30 min; duration: 3–4 h PO: Onset: 20 min; peak: 1 h; duration: 3–4 h
Olanzapine (solution reconstituted IM: 10 mg; tablet: 2.5, 5, 7.5, 10 mg; ODT: 5, 10 mg)	PO or IM: 0.1 mg/kg Usual dose: Child: 2.5 mg Adolescent: 5–10 mg Adult: 10 mg May repeat IM every 20–30 min, PO every 30–45 min (maximum: 30 mg daily)	Onset of action: IM: 20–30 min; PO: 20–30 min Peak action: IM: 15–45 min; PO: 6 h Duration: 24 h IM olanzapine can be chosen over IM haloperidol in children if the goal is a lower risk of extrapyramidal side effects or if the clinician wishes to start a medicine that will more likely be converted later to a PO form Consider cardiac monitoring for at least 3 h after injection Observe the patient's response before redosing Patients may experience post injection delirium or sedation Side effects: prolonged QTc, dysrhythmias, hypotension, akathisia, dystonic reactions, neuroleptic malignant syndrome, hyperglycemia
Risperidone (solution PO: 1 mg/mL; ODT: 0.5, 1, 2, 3, 4 mg; tablets: 0.25, 0.5, 1, 2, 3, 4 mg)	PO: 0.025–0.05 mg/kg Usual dose: Children: 0.25–0.5 mg Adolescent: 0.5–1 mg May repeat PO every 60 min Maximum dose: <20 kg: 1 mg per d 20–45 kg: 2.5 mg per d >45 kg: 3 mg per d	Onset of action: PO: 30–60 min; peak action: PO: 1–2 h PO risperidone preferable in children because it has equivalent efficacy and similar time to onset of action compared with IM haloperidol Observe the patient's response before redosing Side effects: prolonged QTc, dysrhythmias, hypotension, akathisia, dystonic reactions, neuroleptic malignant syndrome

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. IM, intramuscular; ODT, orally disintegrating tablet; PO, per os; QTc, corrected QT interval.

SUPPLEMENTAL TABLE 13 Drugs Used in Obstetric and Gynecologic Emergencies

Drug	Dose	Notes
Dysfunctional uterine bleeding		
Conjugated estrogen (injection: 5 mg/mL)	IV: 25 mg every 4 h; maximum of 6 doses until bleeding stops	This should be reserved only for patients with acute hemorrhagic shock and who cannot take oral medications Ensure that patient is not pregnant Causes nausea; need to pretreat with ondansetron or promethazine Complication: thromboembolism
Conjugated estrogen (tablet: 0.3, 0.625 mg)	PO: 5 mg, 2–4 times per d; if bleeding is profuse, 20–40 mg every 4 h (note: a progestational-weighted contraception pill or medroxyprogesterone acetate 5–10 mg per d should also be given)	Ensure that patient is not pregnant The risk of venous thrombotic events is higher for formulations with increasing doses of estrogen (compare 20–35 μg ethinyl estradiol) Complication: thromboembolism
Combination estrogen-progesterone (tablet: 30 μg ethinyl estradiol, 0.15 mg levonorgestrel)	PO 1 pill every 8 h until the bleeding stops (usually within 48 h), then 1 pill every 12 h for 2 d, then 1 pill once per day for a total of at least 21 d	Use only hormone-containing pills May cause nausea; pretreat with promethazine or ondansetron Complication: thromboembolism
Norethindrone acetate (tablet: 0.35 mg)	PO: 5 or 10 mg nightly until bleeding stops (may be administered up to 4 times per d if acute bleeding is severe)	For female patients who cannot tolerate, dislike, or have a contraindication to estrogen therapy (eg, migraine with aura, SLE, arterial or venous thromboembolic disease, estrogen-dependent tumors, and hepatic dysfunction or disease) Irregular spotting may occur
Eclampsia		
Magnesium sulfate (infusion: 4 g per 100 mL, 6 g per 150 mL, 20 g per 500 mL)	IV: 4–6 g over 15–20 min	Monitor vital signs and deep tendon reflexes Magnesium toxicity may cause hypotension, respiratory depression, and coma
Emergency contraception in victims of sexual assault		
Levonorgestrel (pill: 0.75 mg)	PO: 2 pills as a single dose or Each of the 2 pills 12 h apart	Take within 72 h of unprotected intercourse
Ulipristal (tablet: 30 mg)	PO: 1 tablet, PO, once	Indicated up to 120 h after unprotected intercourse

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. PO, per os; SLE, systemic lupus erythematosus.

SUPPLEMENTAL TABLE 14 Drugs Used in Hematologic and Oncologic Emergencies

Drug	Dose	Notes
Hemophilia and bleeding disorders		
Aminocaproic acid (Amicar) (tablets: 500, 1000 mg; solution, PO: 0.25 g/mL)	PO: 50 mg/kg every 6 h Maximum recommended dose is 24 g per d	Medication should be swished in mouth before swallowing Control of oral bleeding in congenital and acquired coagulation disorder (off-label use)
Antihemophilic factor, VWF complex (human) (injection)	IV: Type 1 VWD: Major bleeding: loading dose 50–75 U/kg every 8–12 h for 3 d to keep trough level of VWF/Roc >50%, then 40–60 U/kg daily for total 7 d of treatment Minor bleeding: 40–50 U/kg (1–2 doses) Types 2 and 3 VWD: Major bleeding: loading dose 60–80 U/kg every 8–12 h for 3 d to keep trough level of VWF/Roc >50%, then 40–60 U/kg daily for total 7 d of treatment Minor bleeding: 40–50 U/kg (1–2 doses)	Dosing based on ristocetin cofactor units, not units of factor VIII For emergency surgery, use 50–60 U/kg and administer subsequent doses based on trough Only specific types of factor with VWF can be used
DDAVP (IV) (injection: 4 μg/mL)	IV: 0.3 μg/kg over 30 min	Useful in VWD; some children do not respond to this therapy Parenteral form should be used in patients for whom intranasal route is compromised or inappropriate Side effects: facial flushing and headache Severe hyponatremia and seizures have been observed in patients <24 mo of age
DDAVP (IN) (spray, nasal: 1.5 mg/mL)	IN: 150 μg (1 puff) for children weighing <50 kg 300 μg (2 puffs) for children and young adults weighing >50 kg	Hemophilia A or mild or moderate VWD type 1 with a factor VIII activity level >5% Laboratory response and patient's clinical condition should determine need for repeat dosage Most patients respond to 1–2 doses; the second dose should be given 8–24 h after the first
Factor VIIa (recombinant) (injection)	IV: Hemophilia A or B with inhibitors: Bleeding episodes: 90 μg/kg every 2 h until hemostasis is achieved Surgery: 90 μg/kg immediately before surgery Congenital factor VII deficiency: Bleeding episodes: 15–30 μg/kg every 4–6 h until hemostasis is achieved Surgery: 15–30 μg/kg immediately before surgery, repeat every 4–6 h for duration of surgery and until hemostasis is achieved	Treat patient before obtaining diagnostic or radiographic studies Potential risk of arterial and venous thrombotic events. In patients with factor VII deficiency, suspect antibody formation if bleeding remains uncontrolled despite appropriate dosing
Factor VIII (recombinant) (injection for hemophilia A)	IV: Wt (kg) × desired level of correction (%) × 0.5 = No. units	Treat patient before obtaining diagnostic or radiographic studies Careful attention should be given to patient's treatment plan (type of bleed, dose, and frequency) developed by the hemophilia center When mild to moderate bleeding occurs, values of factor VIII must be raised to hemostatic levels, in the 35%–50% range. For life-threatening or major hemorrhages, the dose should aim to achieve levels of 100% activity. 1 U/kg will increase plasma levels by 2% Use entire vial to achieve the calculated minimum dose
Factor IX (injection for hemophilia B)	IV: Wt (kg) × desired level of correction (%) × 1.4 = No. units (recombinant factor IX) Wt (kg) × desired level of correction (%) × 1 = No. unit (plasma-derived factor IX)	Treat patient before obtaining diagnostic or radiographic studies Careful attention should be given to patient's treatment plan (type of bleed, dose, and frequency) developed by the hemophilia center

SUPPLEMENTAL TABLE 14 Continued

Drug	Dose	Notes
		When mild to moderate bleeding occurs, values of factor IX must be raised to hemostatic levels, in the 35%–50% range. For life-threatening or major hemorrhages, the dose should aim to achieve levels of 100% activity. Because of the decreased in vivo recovery, the most commonly available form of recombinant factor IX concentrate *(*Benefix*)* requires a higher per-kg dose Use entire vial to achieve the calculated minimum dose
Oncologic disorders		
Allopurinol (tablets: 100, 300 mg; suspension: 20 mg/mL)	PO: 10 mg/kg/d in 3 divided doses Any single oral dose should not exceed 300 mg Maximum daily dose: 800 mg/d	To be used to treat hyperuricemia secondary to tumor lysis syndrome when uric acid <7.0 mg/dL
Dexamethasone (injection: 4 mg/mL)	IV: Loading dose of 1–2 mg/kg followed by 0.25–0.5 mg/kg every 6 h Maximum dose: 16 mg	To be used to mitigate effects of acute spinal cord compression or large mediastinal masses that are causing respiratory failure
Hydrocortisone (injection: 100, 250, 500, 1000 mg per vial)	IV or IO: 2 mg/kg bolus (maximum dose: 100 mg) 0–3 y old: 25 mg, then 25 mg per d in divided doses every 6 h for 24 h[a] 3–12 y old: 50 mg, then 50 m per d in divided doses every 6 h for 24 h[a] 12 y and older: 100 mg (maximum dose: 100 mg), then 100 mg per d in divided doses every 6 h for 24 h[a]	Treatment of pediatric cancer can result in adrenal insufficiency; therefore, should be considered when an oncology patient is acutely ill Onset: rapid; peak: unknown; duration: 8–24 h Administer over 3–5 min
Rasburicase (injection, powder for reconstitution: 1.5 mg)	IV: 0.15–2 mg/kg per dose once daily for up to 5 doses	To be used when allopurinol is insufficient to lower uric acid levels (typically when uric acid ≥7 mg/dL Not to be used in patients with known G6PD deficiency Anaphylactic precautions should be taken

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. DDAVP, desmopressin; G6PD, glucose-6-phosphate dehydrogenase; IN, intranasal; IO, intraosseous; PO, per os; VWD, von Willebrand disease; VWF von Willebrand factor.

[a] Subsequent dose reductions and rate determined by patient response.

SUPPLEMENTAL TABLE 15 Drugs Used in Renal Emergencies

Drug	Dosage	Notes
Acute hypertensive crisis		
Esmolol (injection: 10 mg/mL; premixed in 0.9% saline: 2000 mg per 100 mL, 2500 mg per 250 mL)	IV: Loading dose: 100–500 μg/kg given over 1–2 min followed by an infusion of 100 μg/kg per min	Short-acting, constant infusion preferred Titrate every 10–15 min up to 1000 μg/kg per min Monitor BP, for extravasation, hyperkalemia Side effects: bradycardia, hypoglycemia, and potential for bronchoconstriction Contraindications: bronchospastic conditions, diabetes, heart failure, concurrent calcium channel blocker use, conduction abnormalities
Labetalol (injection: 5 mg/mL)	IV: Loading dose: 0.2–1 mg/kg (maximum dose: 40 mg) followed by infusion of 0.25–3 mg/kg per h	Onset of action: 5–10 min; duration of action: 2–4 h Contraindications: 1. Asthma, BPD, and HF and may mask symptoms of hypoglycemia 2. Patients with decreased cardiac output, heart block, and clinical signs of congestive heart failure
Nicardipine (injection: 2.5, 0.1 mg/mL in D_5W)	IV: Bolus with 30 μg/kg up to 2 mg per dose followed by an infusion of 0.5–4 μg/kg per min	Short-term treatment of hypertension when oral treatment is not feasible Onset of action: 2–5 min; duration of action: 30 min–4 h Central line administration is preferred; if peripheral line administration is necessary, infusion site should be changed every 12 h to minimize venous irritation Monitor infusion site for extravasation; monitor BP continuously during IV administration May cause reflex tachycardia
Nitroprusside sodium (injection: 25; 0.4 mg/mL in D_5W)	IV: Continuous infusion: start at 0–3 μg/kg per min to a maximum of 10 μg/kg per min	Onset: 1–2 min; peak: rapid; duration: 1–10 min after stopping infusion Monitor BP continuously during IV administration Do not use the maximum dose for >10 min; if BP is not controlled by the maximum rate (ie, 10 μg/kg per min) after 10 min, discontinue infusion Use special administration tubing or wrap drug reservoir in opaque material to avoid deterioration of drug with light exposure Discard solution 24 h after reconstitution and dilution; compatible with D_5W, NS, Ringer lactate Prolonged use may lead to cyanide toxicity. Monitor cyanide levels with prolonged (>72 h) use or coadminister sodium thiosulfate
Hypertensive urgency		
Captopril (tablet 12.5, 25, 50, 100 mg; extemporaneous liquid: 1 mg/mL)	PO: Infants: 0.05 mg/kg per dose (maximum: 6 mg/kg per d) Dosing interval: daily to 4 times per d Children: 0.5 mg/kg per dose (maximum: 6 mg/kg per d) Dosing interval: 3 times a d Maximum daily dose: 450 mg per d	Side effects: cough, angioedema
Enalapril (tablet: 2.5, 5, 10, 20 mg; solution: 1 mg/mL)	PO: ≥1 mo old: Initial dose: 0.08 mg/kg per d (up to 5 mg per d) Maximum dose: 0.6 mg/kg per d (up to 40 mg per d)	Dosing interval: daily to twice daily Common side effects: cough, headache, dizziness, asthenia Severe side effects: hyperkalemia, acute kidney injury, angioedema, fetal toxicity Contraindications: pregnancy and angioedema
Hydralazine (injection: 20 mg/mL)	IM or IV: 0.1–0.2 mg/kg per dose every 4–6 h; can increase slowly up to 0.2–0.6 mg/kg per dose every 4–6 h	Give every 4 h when given IV bolus Causes tachycardia

SUPPLEMENTAL TABLE 15 Continued

Drug	Dosage	Notes
Hydralazine (tablet: 10, 25, 50, 100 mg)	PO: 0.25 mg/kg per dose up to 25 mg per dose given every 6–8 h	Causes tachycardia
Isradipine (capsule: 2.5, 5 mg)	PO: 0.05–0.1 mg/kg per dose up to 5 mg per dose given 6–8 h	Exaggerated decrease in BP can be seen in patients receiving azole antifungal agents

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. BP, blood pressure; BPD, bronchopulmonary dysplasia; D_5W, dextrose 5% in water; HF, heart failure; IM, intramuscular; NS, normal saline; PO, per os.

SUPPLEMENTAL TABLE 16 Drugs Used in Gastrointestinal Emergencies

Drug	Dosage	Notes
Upper gastrointestinal tract bleeding		
Lansoprazole (capsules: 15, 30 mg; powder packet: 15, 30 mg; SoluTab: 15, 30 mg)	PO: 0.8–4 mg/kg per d Wt <30 kg: 15 mg per d Wt >30 kg: 30 mg per d	Reduce dose if severe hepatic impairment
Omeprazole (capsules: 10, 20, 40 mg; suspension: 2 mg/mL)	PO: 1.0–3.3 mg/kg per d Wt <20 kg: 10 mg per d Wt >20 kg: 20 mg per d	Tablet and capsule formulations should be swallowed whole, without crushing or chewing
Pantoprazole (injection: 40 mg; tablet: 20, 40 mg; powder pack: 40 mg)	IV: 1 mg/kg once daily (maximum dose: 40 mg) PO: 1–5 y old: 0.3–1.2 mg/kg per d >5 y of age: Wt >15 kg to <40 kg: 20 mg per d Wt >40 kg: 40 mg/d	Do not crush or chew tablets
Bleeding esophageal varices		
Octreotide acetate (injection: 50, 100, 500 μg/mL)	IV: 1–2 μg/kg bolus (maximum: 50 μg) followed by 1–2 μg/kg per h continuous infusion	Titrate infusion rate to response
Vomiting		
Ondansetron (injection: 2 mg/mL; ODT: 4 mg; solution: 0.8 mg/mL)	IV: 0.15–0.3 mg/kg once PO: 8–15 kg: 2 mg >15–30 kg: 4 mg >30 kg: 8 mg	IV doses >16 mg not recommended because of potential for QT prolongation Caution: avoid in pregnancy Potential for QT prolongation and Torsades. Care to be taken with other drugs that prolong QT interval

Doses listed are not comprehensive, and variations in dosing may be indicated for specific patients and/or clinical situations. PO, per os.