Acetaminophen (Tylenol®)

Class	Nonnarcotic analgesic; Antipyretic
Mechanism of Action	Inhibits cyclooxygenase
Indications	Mild to moderate pain control; fever
Contraindications	Hypersensitivity, severe acute liver disease
Precautions	Use with caution in children <3 years and patients with known liver disease
Adverse Effects	Minimal within recommended dosage range
Adult Dose	650-1000 mg (max 1000 mg)
Pediatric Dose	15 mg/kg (max 975 mg) PO
Route/Administration	Oral
Monitoring	None
Special Considerations	Do not give or call medical control if patient has taken an acetaminophen containing product within the past 4 hours [Tylenol, acetaminophen/hydrocodone (Vicodin, Norco), acetaminophen/oxycodone (Percocet), butalbital/acetaminophen/caffeine (Fioricet), etc]

Adenosine (Adenocard)

Class	Antiarrhythmic
Mechanism of Action	Slows AV node conduction
Indications	Symptomatic PSVT
Contraindications	-Second- or third-degree heart block -Sick-sinus syndrome
Precautions	-Arrhythmias, including blocks, are common at the time of cardioversion -Use with caution in patients with bronchospasm
Adverse Effects	Facial flushing, headache, shortness of breath, dizziness, nausea, lightheadedness, chest pressure, discomfort of neck, throat or jaw, AV block
Adult Dose	6 mg **rapid** IVP over 1-2 seconds followed by 10 mL NS flush. If cardioversion does not occur after 1-2 minutes, may repeat with 12mg **rapid** IVP over 1-2 seconds followed by 10 mL NS flush, up to 2 times.
Pediatric Dose	Think fluids and oxygen in young children and infants. First dose: 0.1 mg/kg (max 6 mg) rapid IV push followed by 10 mL NS flush Second dose: 0.2 mg/kg (max 12 mg) rapid IV push followed by 10 mL NS flush
Route/Administration	**Rapid** IVP over 1-2 seconds. Should be administered directly into a large vein closest to the heart or into the medication administration port closest to the patient and followed immediately by a flush of the line with IV fluid (at least 10 mL for all patient sizes).
Monitoring	Vitals, cardiac monitoring
Special Considerations	-6 second half-life – must get into the patient as quickly as possible -Feeling of "impending doom" -Brief asystole possible -Profound dyspnea possible -Pregnancy Class C – ACLS guidelines suggest use is safe and effective in pregnancy

Albuterol (Ventolin HFA, Proventil HFA)

Class	Beta$_2$-agonist, sympathomimetic
Mechanism of Action	Short acting beta$_2$-agonist = bronchodilation
Indications	-Asthma -COPD -Anaphylaxis
Contraindications	Symptomatic tachycardia
Precautions	Use with caution in patients with known heart disease, diabetes and seizures
Adverse Effects	Tremor, tachycardia, headache, hypokalemia, hypoglycemia, palpitations, anxiety, dizziness
Adult Dose	-*Metered Dose Inhaler* 1-2 puffs (90 micrograms per puff) -*Small Volume Nebulizer* 0.5 mL (2.5 mg) in 2.5 mL normal saline over 5-15 minutes -*In-Line CPAP:* 0.5mL (2.5mg) placed in-line with CPAP circuit tubing and breathed by the patient
Pediatric Dose	*Metered Dose Inhaler* <15 kg: 4 puffs ≥15 kg: 8 puffs *Nebulizer* <30 kg: 2.5 mg ≥30 kg: 5 mg
Route/Administration	Inhalation via nebulizer or metered dose inhaler
Monitoring	Vitals, cardiac monitoring
Special Considerations	-Quick acting -Pregnancy Class C

Albuterol/Ipratropium Bromide (Duoneb)

Class	Beta$_2$ Agonist/Anticholinergic Agent
Mechanism of Action	Short acting beta$_2$-agonist = bronchodilation, ipratropium = Blocks the action of acetylcholine at parasympathetic sites in bronchial smooth muscle causing bronchodilation; local application to nasal mucosa inhibits serous and seromucous gland secretions.
Indications	-COPD, bronchospasm, asthma exacerbation, severe
Contraindications	Hypersensitivity to any component Symptomatic tachycardia
Precautions	-Use with caution in patients with known heart disease, diabetes and seizures. -Caution warranted in patients with narrow-angle glaucoma, prostatic hypertrophy, or bladder neck obstruction due to anticholinergic properties. -Myasthenia gravis
Adverse Effects	Tremor, tachycardia, headache, hypokalemia, hypoglycemia, palpitations, anxiety, dizziness, dry mouth, sinusitis, bitter taste, bronchitis
Adult Dose	*Metered Dose Inhaler:* 2-3 puffs every 20 minutes x 3 doses. *Nebulization solution:* 1 ampule (3mL) per nebulizer x 3 doses
Pediatric Dose	Only if prescribed for home use and helping patient self-administer prescribed dose.
Route/Administration	Multi-dose inhaler, nebulization solution
Monitoring	Blood pressure, heart rate, CNS stimulation, hypersensitivity reactions, shortness of breath
Special Considerations	-Older adults more susceptible to side effects -Pregnancy category C

Amiodarone (Cordarone)

Class	Antiarrhythmic agent, class III
Mechanism of Action	-Prolongs action potential and refractory period. -Slows the sinus rate; increases PR and QT intervals
Indications	-Recurring or life-threatening dysrhythmias such as VFib and VTach -Hemodynamically unstable and/or pulseless VTach and VFib -Atrial arrhythmias such as AFib
Contraindications	-Hypersensitivity to iodine -Severe sinus node dysfunction -2nd or 3rd degree heart block -Bradycardia-associated syncope -Pregnancy or breastfeeding
Precautions	-Heart failure
Adverse Effects	Hypotension (especially if pushed too quickly), nausea, vomiting, sinus bradycardia, second/third degree AV block, increased liver function tests, prolonged QTc, arrythmia
Adult Dose	*VF/VTach Arrest:* 300 mg bolus IV/IO; repeat 150 mg IV/IO in 3-5 minutes if still in VF/VTach *Wide Complex Tachycardia:* 150 mg IV/IO over 10 minutes
Pediatric Dose	*VF/VTach Arrest:* 5mg/kg IV/IO (max dose 300mg); may repeat up to a total of 15mg/kg if needed
Route/Administration	IV, IO Pulseless – IV Push; perfusing rhythm – 10-20 minutes Hypotension is related to rate of administration
Monitoring	Vital signs, monitor for hypotension
Special Considerations	-Not ideal for patients with pulmonary, hepatic, or thyroid disease -In-line filter needed for continuous infusion. -Pregnancy Class D – should only be used if refractory to all other treatments

Aspirin (Bufferin)

Class	Antiplatelet agent, Nonsteroidal anti-inflammatory agent, salicylate
Mechanism of Action	Inhibits platelet aggregation, also has antipyretic, analgesic and anti-inflammatory properties
Indications	-New onset chest pain suggestive of MI -Signs/symptoms suggestive of or recent CVA
Contraindications	-Salicylate or NSAID hypersensitivity -Children with viral infection
Precautions	-GI bleeding -Bleeding disorders
Adverse Effects	Heartburn, nausea, vomiting, tinnitus, ulcer, urticaria, anaphylaxis, angioedema, bronchospasm
Adult Dose	81-324 mg PO, chewed (Do not use enteric-coated products) 324mg po chewed should be used for MI
Pediatric Dose	Not recommended
Route/Administration	PO, should be chewed for ACS
Monitoring	None
Special Considerations	Pregnancy – should be avoided, if possible. Low dose aspirin use for ACS or VTE prevention may be used during the second and third trimesters. One-time dose ok when benefit outweighs risk.

Atropine (AtroPen)

Class	Anticholinergic agent
Mechanism of Action	Blocks acetylcholine receptors, increasing heart rate and decreasing secretions
Indications	-Anticholinesterase overdose -Acute symptomatic bradyarrhythmia Cardiac arrest (removed from ACLS protocol) -Organophosphate poisoning -Reversal of muscarinic activity and toxic effect of eating mushrooms
Contraindications	None when used in emergency situations
Precautions	-Glaucoma -Paralytic ileus -Myasthenia gravis -Asthma -Tachycardia, hypertension
Adverse Effects	Constipation, dry mouth, tachyarrhythmia, palpitations, cardiac dysrhythmia, respiratory depression, urinary retention, pupil dilation, elevated intraocular pressure, blurred vision, light intolerance, coma
Adult Dose	*Bradycardia:* 0.5 mg IV/IO every 3-5 minutes to maximum of 3 mg 1 mg IVP every 5 minutes to a maximum of 3 mg 1 mg IVP every 5 minutes to a maximum of 3 mg *Organophosphate poisoning:* 2-5 mg IVP every 5 minutes titrated to relief of symptoms
Pediatric Dose	*Bradycardia:* 0.02 mg/kg IV/IO may repeat once in 5 minutes. Maximum single dose: child-0.5 mg, adolescent-1 mg Maximum total dose: child-1 mg, adolescent-2 mg 0.04 mg/kg (max 2 mg) ETT *Organophosphate poisoning:* Infants and children: 0.05 – 0.1 mg/kg, repeat every 5-10 minutes prn Adolescents: 1-3 mg/dose; repeat every 3-5 minutes prn
Route/Administration	**Rapid** IVP, IO, IM, ET
Monitoring	Vital signs, cardiac monitoring, mental status
Special Considerations	-Can see paradoxical bradycardia (if administered slowly, give more than 3mg) -Protect from light (AtroPen) - Antidotes should be administered to pregnant women if there is a clear indication for use and should not be withheld because of fears of teratogenicity

Atropine (AtroPen)

	-Ineffective in treatment of bradycardia in patients who have received a heart transplant due to lack of vagal innervation)

Calcium chloride

Class	Electrolyte supplement, parenteral
Mechanism of Action	Calcium is necessary for normal cardiac function and muscle contraction. It is one of the factors involved in blood coagulation.
Indications	Calcium chloride is used for the treatment of hypocalcemia, hyperkalemia, and calcium channel blocker overdose
Contraindications	-Known or suspected digitalis toxicity -Renal failure -Hypomagnesaemia, hyperphosphatemia, vitamin D overdose
Precautions	-Use with caution in acidosis, respiratory failure. -Vesicant, avoid extravasation
Adverse Effects	Peripheral vasodilation, hypotension, bradycardia, arrhythmias, hypomagnesemia, IV site burning, cardiac arrest
Adult Dose	*Cardiac arrest with hyperkalemia, hypocalcemia or hypermagnesemia:* Calcium chloride 500-1000mg IVP/IO over 2 minutes *Calcium channel blocker overdose:* Calcium chloride 1000-2000mg IV/IO in sodium chloride 100mL over 5-10 minutes
Pediatric Dose **(all doses expressed in terms of calcium chloride)**	*Cardiac arrest with hyperkalemia, hypocalcemia or hypermagnesemia:* Calcium chloride 20mg/kg (max 1000mg) IVP over 2 minutes *Calcium channel blocker overdose:* Calcium chloride 20mg/kg IV (max 2000mg) over 10-15 minutes
Route/Administration	IV, IO
Monitoring	Vital signs, infusion site
Special Considerations	-Central line strongly preferred; monitor for extravasation and stop infusion if this occurs. -IV line must be flushed between calcium and sodium bicarbonate administration to avoid precipitation. -Calcium gluconate preferred over chloride in non-emergent situations due to decreased potential for extravasation (3g gluconate = 1g chloride) -Should never be given subcutaneously or IM. - Antidotes should be administered to pregnant women if there is a clear indication for use and should not be withheld because of fears of teratognicity

Calcium gluconate

Class	Electrolyte supplement, parenteral
Mechanism of Action	Calcium is necessary for normal cardiac function and muscle contraction. It is one of the factors involved in blood coagulation.
Indications	Calcium gluconate is used for the treatment of hypocalcemia, hyperkalemia, and calcium channel blocker overdose
Contraindications	-Known or suspected digitalis toxicity -Renal failure -Hypomagnesaemia, hyperphosphatemia, vitamin D overdose
Precautions	-Use with caution in acidosis, respiratory failure
Adverse Effects	Peripheral vasodilation, hypotension, bradycardia, arrhythmias, hypomagnesemia, cardiac arrest, syncope
Adult Dose	*Cardiac arrest with hyperkalemia, hypocalcemia or hypermagnesemia:* Calcium gluconate 1500-3000mg IVP/IO over 2 minutes *Calcium channel blocker overdose:* Calcium gluconate 60mg/kg (max 6000mg) in sodium chloride 100mL IV/IO over 5-10 minutes
Pediatric Dose **(all doses expressed in terms of calcium gluconate)**	*Cardiac arrest with hyperkalemia, hypocalcemia or hypermagnesemia:* Calcium gluconate 100mg/kg (max 3000mg) IVP over 2 minutes *Calcium channel blocker overdose:* Calcium gluconate 60mg/kg (max 3000mg) IVP over 5 minutes
Route/Administration	IV, IO
Monitoring	Vital signs
Special Considerations	-IV line must be flushed between calcium and sodium bicarbonate administration to avoid precipitation. -Calcium gluconate preferred over chloride in non-emergent situations due to decreased risk if extravasation occurs (3g gluconate = 1g chloride) -Antidotes should be administered to pregnant women if there is a clear indication for use and should not be withheld because of fears of teratogenicity

Dextrose 50%

Class	Carbohydrate, Antidote (Hypoglycemia)
Mechanism of Action	Dextrose elevates blood glucose level rapidly. When combined with insulin, dextrose stimulates the uptake of potassium by cells, especially in muscle tissue.
Indications	Treatment of hypoglycemia and adjunctive treatment of hyperkalemia
Contraindications	None in emergency setting
Precautions	- Document hypoglycemia (FSBS) before administering. - May be vesicant, avoid extravasation
Adverse Effects	Fever, mental confusion, unconsciousness, hyperosmolar syndrome, hyperglycemia, hypokalemia, acidosis, hypophosphatemia, hypomagnesaemia, vein irritation, tissue necrosis
Adult Dose	25 g (50 mL) IVP/IO
Pediatric Dose	0.5 gram/kg (max 25 grams) slow IVP 1 mL/kg D50 IV/IO 2 mL/kg D25W IV/IO 5 mL/kg D10W IV/IO If <15 kg, only use D10W or D25W. D25W is made by mixing D50 1:1 with normal saline or sterile water. D10W is made by mixing D50 1:1 with normal saline or sterile water.
Route/Administration	IV (in large vein), IO
Monitoring	-Vital signs, glucose, infusion site
Special Considerations	-Dextrose 50% is a hypertonic solution. -Should never be given IM or SQ

Diazepam (Valium, DiaStat)

<table>
<tr><td>Class</td><td>Benzodiazepine</td></tr>
<tr><td>Mechanism of Action</td><td>Its primary action is the facilitation of GABA, an inhibitory neurotransmitter. Works as an anticonvulsant, sedative and skeletal muscle relaxant.</td></tr>
<tr><td>Indications</td><td>-Generalized seizures
-Status epilepticus
-Premedication prior to cardioversion
-Acute anxiety</td></tr>
<tr><td>Contraindications</td><td>-Myasthenia gravis
-Acute narrow angle glaucoma</td></tr>
<tr><td>Precautions</td><td>-Vesicant, avoid extravasation.
-Paradoxical reactions, such as aggressive behavior may occur.
-Use with caution in hepatic impairment, respiratory depression and renal impairment.
-Avoid use or use cautiously with opioids</td></tr>
<tr><td>Adverse Effects</td><td>Respiratory depression, hypotension, mental status depression, apnea, drowsiness, vasodilation, rash, diarrhea, dizziness, headache, bradycardia, anterograde amnesia</td></tr>
<tr><td>Adult Dose</td><td>Status Epilepticus: 5-10 mg PR or IVP/IO over 2 minutes
Acute Anxiety: 2-5 mg IM or IVP/IO over 1 minute
Premedication before cardioversion: 5-10 mg IVP over 2 minutes 5-10 minutes prior to cardioversion</td></tr>
<tr><td>Pediatric Dose</td><td>Status Epilepticus: 0.1-0.2 m~~l~~g/kg ~~IV~~ (max 10 mg) slow IVP

PR Dosing:

<table>
<tr><th colspan="2">2 - 5 Years
0.5 mg/kg</th></tr>
<tr><th>Weight
(kg)</th><th>Dose
(mg)</th></tr>
<tr><td>6 to 10</td><td>5</td></tr>
<tr><td>11 to 15</td><td>7.5</td></tr>
<tr><td>16 to 20</td><td>10</td></tr>
<tr><td>21 to 25</td><td>12.5</td></tr>
<tr><td>26 to 30</td><td>15</td></tr>
<tr><td>31 to 35</td><td>17.5</td></tr>
<tr><td>36 to 44</td><td>20</td></tr>
</table>
</td></tr>
</table>

Diazepam (Valium, DiaStat)

<table>
<tr><td>Pediatric Dose (cont.)</td><td>
<table>
<tr><th colspan="2">6-11 Years
0.3 mg/kg</th></tr>
<tr><th>Weight
(kg)</th><th>Dose
(mg)</th></tr>
<tr><td>10 to 16</td><td>5</td></tr>
<tr><td>17 to 25</td><td>7.5</td></tr>
<tr><td>26 to 33</td><td>10</td></tr>
<tr><td>34 to 41</td><td>12.5</td></tr>
<tr><td>42 to 50</td><td>15</td></tr>
<tr><td>51 to 58</td><td>17.5</td></tr>
<tr><td>59 to 74</td><td>20</td></tr>
</table>
Children ≥12 years and Adolescents: 0.2 mg/kg (max dose 20 mg/dose)
</td></tr>
<tr><td>Route/Administration</td><td>Slow IV push over at least 2 minutes, IO, IM, PR</td></tr>
<tr><td>Monitoring</td><td>-Vital signs
-Level of consciousness</td></tr>
<tr><td>Special Considerations</td><td>-Accumulates in patients with hepatic and renal dysfunction.
-IV form may be used PR.
-Pregnancy class D
-Not compatible with other fluids including normal saline, lactated ringers and D5W</td></tr>
</table>

Diphenhydramine (Benadryl)

Class	Antihistamine
Mechanism of Action	Blocks histamine receptors in the gastrointestinal tract, blood vessels, and respiratory tract; anticholinergic and sedative effects are also seen.
Indications	-Anaphylaxis -Allergic reactions -Dystonic reactions due to phenothiazines
Contraindications	-Neonates or premature infants -Breast-feeding women
Precautions	-Asthma -Cardiovascular disease, hypertension and ischemic heart disease -Increased intraocular pressure, glaucoma. -Prostatic hyperplasia, urinary obstruction -Thyroid dysfunction
Adverse Effects	Sedation, dizziness, paradoxical excitation, hallucinations, anticholinergic effects, hypotension, palpitations, confusion, blurred vision, tremor
Adult Dose	25-50 mg PO, IM or slow IVP
Pediatric Dose	1mg/kg (max 50 mg) PO, IM or slow IVP over at least 10 minutes
Route/Administration	Slow IV push, deep IM, PO, IO
Monitoring	Vital signs (causes hypotension with rapid IV administration), CNS depression or excitation, anticholinergic side effects
Special Considerations	-Caution in patients where anticholinergic effects may aggravate pre-existing condition (e.g., narrow angle glaucoma, urinary retention, pyloric obstruction) -Always give epinephrine first when treating anaphylaxis. -May cause necrosis with SQ administration. -Pregnancy category B

Epinephrine (Adrenaline)

Class	Sympathomimetic, alpha and beta agonist
Mechanism of Action	Stimulates α_1- and β_1-adrenergic receptors to produce vasoconstriction and improve cardiac output, raising the blood pressure. Also causes bronchodilation.
Indications	-Cardiac arrest -Anaphylactic shock -Hypotension (continuous infusion) -Severe reactive airway disease
Contraindications	**-No absolute contraindications in life-threatening situations** -Underlying cardiovascular disease (coronary insufficiency) -Pregnancy -Tachydysrhythmias
Precautions	-Hypertension -Nonanaphylactic shock -Diabetes -Hypovolemia (correct before using as a pressor) -Thyroid disorder -Parkinson's Disease
Adverse Effects	Arrhythmias, tachycardia, gangrene of the extremities, hyperglycemia, hypokalemia, gastric atony
Adult Dose	*Cardiac Arrest:* 1 mg IV/IO repeated every 3-5 minutes. *Severe Anaphylaxis:* 0.3-0.5 mg IM *Push Dose (Hypotension/Shock)* -Draw 1mL of 1mg/10mL epinephrine (cardiac epi amp) into 9mL of sodium chloride 0.9% for total volume of 10mL (concentration 10mcg/mL or 0.01mg/mL) -0.5-2mL of 10mcg/mL solution IVP/IO every 2-5 minutes
Pediatric Dose	*Newborn Resuscitation:* 0.04 mg of 0.1 mg/mL (0.4 mL) IV; preterm give 0.2 mL IV q 3-5 minutes No vascular access: 0.08 mg of 0.1 mg/mL (0.8 mL) ETT; preterm give 0.4 mL ETT q 3-5 minutes *Pediatric Cardiac Arrest:* 0.01 mg/kg IV/~~,~~IO (max 1 mg) using 0.1 mg/mL every 3 to 5 minutes. *Severe Anaphylaxis:* 0.01 mg/kg IM0.3 mg/0.3 mL) using 1 mg/mL product every 5-15 minutes ≥10 kg and <25 kg: EpiPen JR (0.15 mg) ≥25 kg: EpiPen (0.3 mg)

Epinephrine (Adrenaline)

	Nebulized: 0.5 mg of 1 mg/mL mixed in 2.5 mL NS
Route/Administration	IV, IO, IM
Monitoring	Vital signs, cardiac monitor, infusion site for blanching or extravasation, blood glucose
Special Considerations	-Can cause atrial and ventricular arrhythmias. -Watch infusion site for infiltration, which can cause sloughing and necrosis at injection site. -Check for photosensitivity reaction resulting in discoloration of the drug. Protect from light.

Fentanyl (Sublimaze)

Class	Opioid, analgesic
Mechanism of Action	A synthetic opiate agonist that increases the pain threshold, alters pain perception, inhibits ascending pain pathways. Less histamine release than other opioids results in potentially less hypotension.
Indications	Analgesia and sedation
Contraindications	Hypersensitivity
Precautions	-Hypotension, bradycardia -Drug abuse history, patients who are receiving benzodiazepines. -Hepatic disease, renal impairment -Respiratory disease, respiratory depression (especially in opioid naïve patients) -Rapid administration of large doses (>200mcg) may cause chest wall rigidity. -May cause serotonin syndrome if given in setting of serotonergic agents (SSRIs, SNRIs, triptans, TCAs, lithium, St John's Wort, MAO inhibitors, etc)
Adverse Effects	Hypotension, respiratory depression, chest wall rigidity, constipation, diaphoresis, hallucination, anxiety, fear, vomiting, respiratory depression
Adult Dose	25-100 micrograms IV/IO/IN/IM/SC, repeated every 5 minutes as needed (IV/IO/IN) or every 15 minutes as needed (IM/SC)
Pediatric Dose	IV/IO/IM/SC: 5-16 years of age – 1 mcg/kg (max 50 mcg/dose) slow IVP over 3-5 minutes to prevent rigid chest. IN: 2 micrograms/kg (max 100 mcg; max 1 mL per nostril) Call medical control for patients less than 5 years of age
Route/Administration	Slow IV push over at least ~~2~~3-5 minutes, IM, IO, SC, IN
Monitoring	Vital signs and pain or sedation score
Special Considerations	-Effects can be reversed with naloxone. -Rigid chest can only be reversed with a paralytic (succinylcholine, rocuronium) -Can be used in morphine allergic patients. -Use with caution in patient's intolerant to meperidine. -Pregnancy class C – risk versus benefit

Glucagon (Glucagen)

Class	Antihypoglycemic agent, antidote
Mechanism of Action	Breaks down liver glycogen stores, releasing glucose from the liver.
Indications	-Severe hypoglycemic reactions -Anaphylaxis (refractory to epinephrine) in patients on beta-blockers -Beta blocker and calcium channel blocker overdoses (second line)
Contraindications	-Patients with pheochromocytoma or insulinoma
Precautions	-Only effective if there are sufficient stores of glycogen. within the liver (may not work in patients with adrenal insufficiency, chronic hypoglycemia, fasting/starving, or very young patients – neonates/infants) -Use with caution in patients with cardiovascular or renal disease -Obtain blood glucose before administration
Adverse Effects	Nausea, vomiting, headache, edema, hypotension, tachycardia, hypertension, pruritis, hypersensitivity
Adult Dose	*Hypoglycemia:* 1mg IM/IV/SQ *Refractory anaphylaxis in patients on beta-blockers:* 1-5mg IV
Pediatric Dose	<6 years of age: 0.5 mg IM ≥6 years of age: 1 mg IM
Route/Administration	IV, IO, IM, Subcutaneous
Monitoring	-Vital signs and blood glucose. -Nausea and vomiting (high incidence – less frequent with IM dosing)
Special Considerations	-Patients should be given supplemental carbohydrates (which may include IV dextrose) as soon as possible. -Pregnancy Class B

Glucose, Oral

Class	Antidote, hypoglycemia
Mechanism of Action	Dextrose, a monosaccharide, is a source of calories and fluid for patients unable to obtain an adequate oral intake; may decrease body protein and nitrogen losses; promotes glycogen deposition in the liver.
Indications	-Treatment of hypoglycemia
Contraindications	-Hypersensitivity to dextrose, corn -Unresponsive patient
Precautions	-In patients with impaired consciousness, oral glucose administration may increase the risk of aspiration; use only when no alternatives (e.g., parenteral dextrose, glucagon) are available
Adverse Effects	Confusion, loss of consciousness, dehydration, glycosuria, hyperglycemia, hypokalemia
Adult Dose	15 to 20 g as a single dose; repeat in 15 minutes if continued hypoglycemia
Pediatric Dose	
Route/Administration	PO
Monitoring	Blood glucose
Special Considerations	Onset of action is 10 minutes

Hydroxocobalamin (Cyanokit)

Class	Antidote, water soluble vitamin
Mechanism of Action	Hydroxylated active form of VitB12. It binds with cyanide ion ~~by~~ to form cyanocobalamin, which is nontoxic and excreted from the body.
Indications	Cyanide poisoning
Contraindications	Hypersensitivity
Precautions	-Use with caution in severely hypertensive patients or patients in which a sudden increase in BP would result in harm
Adverse Effects	Hypertension (transient), erythema, rash, nausea, headache, urine discoloration (red), nephrolithiasis, infusion site reaction, hypersensitivity
Adult Dose	5g IV/IO over 15 min (15m~~l~~L/min), may repeat 5g IV over 15 min to 2 hours as needed (rarely needed)
Pediatric Dose	70 mg/kg (maximum: 5 g) IV/IO as a single infusion over 15 minutes. May repeat 70 mg/kg (max 5 g) IV/IO x 1 dose
Route/Administration	IVPB over 15 minutes
Monitoring	Vital signs, hypersensitivity reactions
Special Considerations	-Known anaphylactic reactions. - Reconstitute 5 gm vial with 200 mL normal saline. Invert or rock each vial repeatedly for at least 30 seconds prior to infusion; do not shake; do not administer if the final product is not dark red or if particulate matter is present. -Greater than 95% of patients will turn red or develop a red rash and urine will be red for up to 6 weeks; inform patient of this -Will interfere with some lab assays; inform receiving facility of such

Ipratropium (Atrovent)

Class	Anticholinergic
Mechanism of Action	Blocks the action of acetylcholine at parasympathetic sites in bronchial smooth muscle causing bronchodilation; local application to nasal mucosa inhibits serous and seromucous gland secretions.
Indications	-COPD -Reactive airway disease
Contraindications	Hypersensitivity to ipratropium or atropine
Precautions	-Caution warranted in patients with narrow-angle glaucoma, prostatic hypertrophy, or bladder neck obstruction due to anticholinergic properties. -Not indicated for treatment of acute bronchospasm
Adverse Effects	Dry mouth, sinusitis, bitter taste, bronchitis, headache, dyspepsia, dizziness, blurred vision, nausea, cough
Adult Dose	-*Metered Dose Inhaler* 1-2 puffs -*Small Volume Nebulizer* 2.5 mL (0.5 mg) over 5-15 minutes -*In-Line CPAP:* 2.5mL (0.5mg) placed in-line with CPAP circuit tubing and breathed by the patient
Pediatric Dose	500 mcg (2.5 mL) nebulized for all patient sizes
Route/Administration	Inhaled – MDI, nebulizer, inline CPAP
Monitoring	Vitals, hypersensitivity
Special Considerations	-Not indicated alone for the initial treatment of acute episodes of bronchospasm where rescue therapy is required for rapid response. -Should only be used in acute exacerbations of asthma in conjunction with short-acting beta-adrenergic agonists for acute episodes

Ketamine (Ketalar)

Class	Anesthetic agents and analgesic agent
Mechanism of Action	A noncompetitive NMDA receptor antagonist that blocks glutamate, which produces a cataleptic-like state in which the patient is dissociated from the surrounding environment. Low (subanesthetic) doses produce analgesia, and modulate central sensitization, hyperalgesia and opioid tolerance.
Indications	-Pain management ONLY
Contraindications	-Significant elevation in blood pressure -Known hypersensitivity to the medication. -Pregnancy
Precautions	-Can cause hallucinations– avoid in severe psychiatric disease. -Use with caution in patients with coronary artery disease, hypertension, heart failure and tachycardia
Adverse Effects	Hallucinations, delirium, hypertension, tachycardia, increased ICP, salivation, increased skeletal muscle tone, nausea and vomiting, bronchospasm
Adult Dose	0.1 mg/kg **SLOW** IVP/IO (over 1-2 minutes)~~;~~ or 0.5-0.7 mg/kg IMIN May repeat dose after 15 minutes
Pediatric Dose	Not given in the field
Route/Administration	IV, IO, IM
Monitoring	Vital signs, cardiac monitoring, EtCO2
Special Considerations	Can cause hallucinations, excitability, or irrational behavior.

Lidocaine (Xylocaine)

Class	Antiarrhythmic Agent, Class Ib
Mechanism of Action	Suppresses automaticity of conduction tissue, by increasing electrical stimulation threshold of ventricle, His-Purkinje system, and spontaneous depolarization of the ventricles during diastole by a direct action on the tissues; blocks both the initiation and conduction of nerve impulses by decreasing the neuronal membrane's permeability to sodium ions, which results in inhibition of depolarization with resultant blockade of conduction.
Indications	-Ventricular tachyarrythmias, including cardiac arrest due to ventricular fibrillation or pulseless ventricular tachycardia. -Local anesthesia
Contraindications	-Adam-Stokes syndrome -Wolff-Parkinson-White syndrome -Severe degrees of heart block (except in patients with a functioning artificial pacemaker)
Precautions	-Monitor for central nervous system toxicity. -In cardiac arrest, use only bolus therapy. -Use with caution in bradycardia and liver failure. -Correct hypokalemia and hypomagnesemia prior to use
Adverse Effects	Hypotension, headache, shivering, drowsiness, nausea and vomiting, bradycardia, agitation, dizziness, heart block, arrhythmias, convulsions, widening of QRS, cardiovascular collapse, dyspnea, respiratory depression or arrest
Adult Dose	*Cardiac arrest due to v fib or v tach:* 1.5 mg/kg IV/IO; additional boluses of 0.5 - 0.75mg/kg can be repeated at 3-5-minute intervals (max dose 3 mg/kg) *Pain associated with IO placement:* Slowly administer 1-2mL (20-40mg) 2% Lidocaine
Pediatric Dose	1 mg/kg (max dose 100 mg) IV/IO
Route/Administration	IV, IO
Monitoring	Vital signs, cardiac monitoring
Special Considerations	-Endotracheal administration is 2-2.5 times the intravenous dose -Pregnancy class C – appropriate lifesaving medications should not be withheld in pregnant patients in code situations due to concerns of fetal teratogenicity.

Magnesium Sulfate

Class	Electrolyte supplement, parenteral
Mechanism of Action	Decreases acetylcholine in motor nerve terminals and acts on myocardium by slowing rate of S-A node impulse formation and prolonging conduction time. Magnesium is necessary for the movement of calcium, sodium, and potassium in and out of cells, as well as stabilizing excitable membranes. Intravenous magnesium may improve pulmonary function in patients with asthma; causes relaxation of bronchial smooth muscle independent of serum magnesium concentration
Indications	-Electrolyte Replacement Ventricular tachycardia associated with or torsade's de pointes. -Pre-eclampsia or eclampsia -Asthma (acute severe exacerbations) -Tocolytic (inhibit uterine contractions)
Contraindications	-Heart block -Myocardial damage
Precautions	-Use with extreme caution in patients with myasthenia gravis or other neuromuscular disease. -Use with caution in patients with renal impairment. -Use with caution in patients receiving digoxin. -Avoid overcorrection –can lead to cardiovascular arrest
Adverse Effects	Hypotension (rate related), muscle and respiratory paralysis, heart block, respiratory depression, drowsiness, flushing, vasodilation, hypermagnesemia
Adult Dose	*Torsades de pointes:* -with pulse: magnesium sulfate 2 g IV/IO diluted in at least 10mL normal saline over 10-15 minutes. -without pulse: magnesium sulfate 2g IV/IO diluted in at least 10mL normal saline given as bolus *-Asthma (acute, severe exacerbation):* -magnesium sulfate 2 g IV/IO diluted in 100 ml normal saline over 20 minutes. *-Eclampsia/preeclampsia (severe)*: *IV preferred* magnesium sulfate 4-6 grams IV/IO in 100 ml of normal saline and run in over 20-25 minutes -magnesium sulfate 10 grams deep IM "Z track" in 2 divided 5-gram injections with a 3 inch 20 gauge needle in each buttock. Gently massage site after administration. **IV preferred**
Pediatric Dose	*Pulseless Vtach associated with Torsades de pointes:* 50 mg/kg (max 2 g) IV over 3-5 minutes

Magnesium Sulfate

	Vtach with pulses associated with Torsades de pointes: 50 mg/kg (max 2 g) IV over 10-20 minutes
Route/Administration	IV, IO, IM
Monitoring	Vital signs, deep tendon reflexes
Special Considerations	-Should only be given IVP in code situation. -Calcium chloride should be readily available as an antidote if respiratory depression ensues. -Slower infusions lead to better absorption

Methylprednisolone (Solu-Medrol)

Class	Corticosteroid
Mechanism of Action	Decreases inflammation by suppression of migration of polymorphonuclear leukocytes and reversal of increased capillary permeability.
Indications	-Severe anaphylaxis -Asthma/COPD Possibly effective as an adjunctive agent in the management of spinal cord injury -Adrenal insufficiency
Contraindications	-Hypersensitivity, systemic fungal infection, immune thrombocytopenia (IM)
Precautions	-May cause adrenal suppression and immunosuppression. - Use with caution following acute MI; corticosteroids have been associated with myocardial rupture. -May cause hyperglycemia in patients with diabetes
Adverse Effects	Edema, hypertension, thrombophlebitis, vasculitis, syncope, headache, nausea, vomiting, psychosis, insomnia, infection, hyperglycemia
Adult Dose	*Asthma:* -*methylprednisolone* 125 mg (2mL) IV or PO *Adrenal Insufficiency:* 125 mg (2mL) IM/IV/IO
Pediatric Dose	*Asthma/Anaphylaxis:* 3-7 years: 30 mg PO (0.5 mL of 125 mg/2 mL injectable product) 8-16 years: 60 mg PO (1 mL of 125 mg/2 mL injectable product) *Adrenal Insufficiency:* 2 mg/kg IM/IV/IO
Route/Administration	IV, IO, IM
Monitoring	Vital signs, blood glucose
Special Considerations	- Diluent for methylprednisolone sodium succinate may contain benzyl alcohol. -Avoid injection into the deltoid muscle due to a high incidence of subcutaneous atrophy. -Pregnancy category C

Midazolam (Versed)

Class	Benzodiazepine
Mechanism of Action	Exhibits anticonvulsant, anxiolytic and muscle relaxant activity by binding to GABA receptors and benzodiazepine receptors, leading to membrane hyperpolarization and neuronal inhibition.
Indications	-Premedication prior to cardioversion/RSI -Acute anxiety states -Agitation -Seizures
Contraindications	-Hypersensitivity -Acute narrow-angle glaucoma -Use of potent inhibitors of CYP3A4 (amprenavir, atazanavir, darunavir, indinavir, lopinavir, nelfinavir, saquinivir or ritonavir)
Precautions	-May cause anterograde amnesia. -May cause respiratory depression and/or hypotension, especially when used with opioids. -Paradoxical reactions, including hyperactive or aggressive behavior, have been reported. -Use with caution in patients with heart failure, respiratory disease, and renal impairment
Adverse Effects	Respiratory depression, hypotension, drowsiness, amnesia, apnea, headache, myoclonus, hiccups, nausea, vomiting, nystagmus, paradoxical reaction, cough, injection site reaction, seizure like activity
Adult Dose	*External Pacing/Cardioversion Comfort:* 5 mg IV/IO/IM until patient's speech slurs or a total of 8 mg is given. *Restraint:* 5 – 10 mg IM/IN (based on weight and agitation) *Seizure:* 10 mg IM or 2-4 mg/min IV/IN/IO until seizure resolves or a total of 10 mg is given.
Pediatric Dose	*Cardioversion Comfort:* 0.1 mg/kg (max 5 mg) IV/IO on physician order *Seizures:* IV/IO: 0.1 mg/kg (max 5 mg) Other routes (IM/IN/buccal): < 12kg= 0.2 mg/kg-IM/IN/buccal 13-40 kg= 5mg-IM/IN/buccal ≥40 kg= 10 mg IM/IN/buccal *Restraint:* 0.1 mg/kg (max 5 mg) IV/IO or 0.2 mg/kg (max 10mg) IN/IM
Route/Administration	IV over 3-5 minutes, IO, IM, intranasal
Monitoring	Vital signs, sedation scale
Special Considerations	-Dilute prior to IV administration -Pregnancy category D

Morphine Sulfate

Class	Opioid
Mechanism of Action	Binds to opiate receptors in the CNS, causing inhibition of ascending pain pathways, altering the perception of and response to pain; produces generalized CNS depression
Indications	Potent opioid analgesic used to treat acute, chronic, and severe pain, including chest pain associated with MI.
Contraindications	-Hypersensitivity -Severe respiratory depression, including acute or severe asthma. -Known or suspected paralytic ileus. -Increased intracranial pressure, head injuries, brain tumors. -Seizure disorders -During labor when a premature birth is anticipated
Precautions	-May cause CNS depression. -May cause hypotension and/or respiratory depression, particularly when given with benzodiazepines. -Use with caution in drug abusers, biliary dysfunction, hepatic or renal impairment, prostatic hyperplasia/urinary stricture
Adverse Effects	Palpitations, hypotension, bradycardia, dizziness, sedation, confusion, nausea, vomiting, constipation, pain at injection site, respiratory depression, shortness of breath, histamine release, hives, headache, edema
Adult Dose	*Acute Coronary Syndrome:* 1-5 mg IV/IO over 2 minutes as long as systolic BP greater than 100 and pain persists. May repeat every 5 minutes to a total of 10 mg. *Pain Management:* 2-10 mg IV/IO/IM/SC, repeated every 5 minutes as needed (IV/IO/IN) or every 15 minutes as needed (IM/SC) to a max dose of 10mg
Pediatric Dose	*Pain Management* (5-16 years of age): 0.1 mg/kg (max dose 5 mg) IV/IO/IM/SC
Route/Administration	IV, IM, IO, subcutaneous
Monitoring	Vital signs, pain/sedation score
Special Considerations	-Naloxone for reversal. - Use with caution in patients with hypersensitivity reactions to other phenanthrene derivative opioid agonists (codeine, hydrocodone, hydromorphone, levorphanol, oxycodone, oxymorphone). -Pregnancy category C

Naloxone (Narcan)

Class	Opioid antagonist
Mechanism of Action	Pure opioid antagonist that competes and displaces opioids at opioid receptor sites
Indications	-Overdose of opiate -Reversal of opiate activity
Contraindications	Hypersensitivity
Precautions	-Use with caution in cardiovascular disease – may cause flash pulmonary edema and potentiate ventricular arrhythmias in patients on long term therapy. -Use with caution in patients with seizures. -May cause withdrawal in patients dependent on narcotics. -Recurrence of respiratory and/or CNS depression may occur if patient ingested long acting opioid – continuous monitoring is needed
Adverse Effects	Cardiac dysrhythmia, hypertension, hypotension, ventricular fibrillation/tach, hepatotoxicity, pulmonary edema, opioid withdrawal, flushing, nausea, vomiting, agitation, confusion, disorientation, dizziness, irritability, injection site reaction, diarrhea
Adult Dose	Naloxone 0.4-4 mg IV/IM/IN/IO, repeat every 2-3 min as needed to max of 4mg
Pediatric Dose	0.1 mg/kg/dose (maximum dose: 4 mg) IV/IO/IM/IN, repeat every 2-3 minutes as needed
Route/Administration	IV, IO, IM, IN
Monitoring	Vital signs
Special Considerations	-Reversal of partial opioid agonists or mixed opioid agonist/antagonists (eg, buprenorphine, pentazocine) may be incomplete and large doses of naloxone may be required. -A lower initial dose (0.2-0.4mg) may be considered for patients with opioid dependence to avoid acute withdrawal. -Treatment should not be withheld in pregnant patients in cases of maternal overdose. -IV/IO naloxone is usually effective within 1-2 minutes, but IM/IN naloxone generally takes 5-8 minutes to see therapeutic effects

Nitroglycerin (Nitrostat, Tridil, NitroBid)

Class	Vasodilator, antianginal
Mechanism of Action	An organic nitrate that specifically relaxes vascular smooth muscle. The vasodilator effects are evident in both systemic arteries and veins, but the effects appear to be greater in the venous circulation
Indications	-Angina -Congestive heart failure -Myocardial infarction -Pulmonary edema
Contraindications	-Hypersensitivity to product or corn products -Do not use in patients who have taken a phosphodiesterase-5 (PDE-5) inhibitor (list found in appendix)
Precautions	-Avoid use in patients with myocardial insufficiency due to obstruction such as constrictive pericarditis and aortic or mitral stenosis, severe hypotension or marked bradycardia. - May precipitate or aggravate increased intracranial pressure and subsequently may worsen clinical outcomes in patients with neurologic injury. -Avoid use in hypertrophic cardiomyopathy
Adverse Effects	Headache, hypotension, reflex tachycardia, bradycardia, flushing, nausea, vomiting, palpitations, dizziness, peripheral edema
Adult Dose	*Acute Coronary Syndrome:* -nitroglycerin tabs or spray –0.4 mg sublingual every 5 minutes if SBP remains above 100(max 3 doses) -nitroglycerin paste –1/2 inches applied topically *Congestive Heart Failure (tabs or spray):* *-mild – nitroglycerin tabs or spray - 0.4 mg sublingual every 3-5 minutes (max 3 doses)* *-moderate to severe – nitroglycerin tabs or spray 0.8 mg sublingual every 3-5 minutes (max 3 doses).* *-nitropaste: 1 inch: SBP 100-150, 1.5 inch: SBP 150-200, 2 inches: SBP >200* *Eclampsia with SBP >160:* -nitroglycerin tabs or spray 0.8 mg sublingual every5 minutes (max 3 doses)
Pediatric Dose	Not indicated
Route/Administration	Sublingual, topical
Monitoring	Vital signs, continuous cardiac monitoring
Special Considerations	-Spray should not be inhaled. -Pregnancy category B/C -Tabs, spray and paste should be thrown out after use – not multi-patient

Ondansetron (Zofran)

Class	Antiemetic
Mechanism of Action	Selective 5-HT_3-receptor antagonist, blocking serotonin, both peripherally on vagal nerve terminals and centrally in the chemoreceptor trigger zone.
Indications	-Treatment and prevention of nausea and vomiting
Contraindications	-Hypersensitivity -History of prolonged QTc -ODTs should not be used in patients with phenylketonuria
Precautions	-Use with caution in patients with sensitivities to other 5-HT_3 receptor antagonists (list in appendix) - Dose-dependent QT interval prolongation may occur; more likely with rapid IVP. -Use with caution in patients with hepatic impairment
Adverse Effects	Headache, constipation, diarrhea, dry mouth, tachycardia, angina, chest pain, arrhythmias (rare), fatigue, malaise, drowsiness, rash, urinary retention, injection site reaction
Adult Dose	4 mg IV/IO/IM or PO; May repeat 4 mg dose IV/IO in 5 minutes if symptoms persist. Do not repeat PO/IM dose.
Pediatric Dose	0.15 mg/kg (max 4 mg) slow IV over 2 minutes IO/IM 4 mg ODT administered PO for patients 15 kg and above. Do not repeat
Route/Administration	IV, IO, IM, PO
Monitoring	Vital signs
Special Considerations	-More effective for prevention than rescue therapy -The risk of developing a major congenital malformation following first trimester exposure is under study. Risks related to specific birth defects (eg, cardiac anomalies, oral clefts) requires confirmation; human data are conflicting

Prednisone (Deltasone)

Class	Corticosteroid
Mechanism of Action	Decreases inflammation by suppression of migration of polymorphonuclear leukocytes and reversal of increased capillary permeability; suppresses the immune system by reducing activity and volume of the lymphatic system; suppresses adrenal function at high doses.
Indications	-Allergic conditions -Respiratory conditions
Contraindications	-Hypersensitivity, systemic fungal infections
Precautions	-May cause adrenal suppression and immunosuppression. - Use with caution following acute MI; corticosteroids have been associated with myocardial rupture. -Use with caution in hepatic impairment, diabetes and myasthenia gravis
Adverse Effects	Hyperglycemia, hypertension, mood swings, psychoses, sodium and water retention, nausea, vomiting, indigestion and peptic ulcer. (more common with long term therapy)
Adult Dose	60 mg PO x1
Pediatric Dose	*Asthma:* 3-7 years: 30 mg (1.5 tabs of 20 mg each) 8-16 years: 60 mg (3 tabs of 20 mg each)
Route/Administration	PO
Monitoring	Blood pressure
Special Considerations	-May cause GI upset if taken without food. -Although most reports describing the use of prednisone or prednisolone during gestation have not observed abnormal outcomes, four large epidemiologic studies have associated the use of corticosteroids in the 1st trimester with nonsyndromic orofacial clefts.

Proparacaine (Alcaine)

Class	Local anesthetic, opthalmic
Mechanism of Action	Prevents initiation and transmission of impulse at the nerve cell membrane by decreasing ion permeability through stabilizing
Indications	Topical anesthesia for tonometry, gonioscopy; suture removal from cornea; removal of corneal foreign body; short operative procedure involving the cornea and conjunctiva
Contraindications	-Hypersensitivity -Open globe injury
Precautions	Prolonged use may result in permanent corneal opacification and visual loss
Adverse Effects	Burning sensation of eyes, conjunctival hemorrhage, conjunctival hyperemia, corneal erosion, cycloplegia, eye redness, mydriasis, stinging of eyes, allergic contact dermatitis
Adult Dose	1-2 drops into affected eye. May repeat after 20 minutes, if needed
Pediatric Dose	
Route/Administration	Ophthalmic
Monitoring	None
Special Considerations	-Pregnancy – no human data- probably compatible -Warn the patient not to rub the eye while the cornea is anesthetized, since this may cause corneal abrasion and greater discomfort when the anesthesia wears off.

Sodium Bicarbonate

Class	Electrolyte supplement, parenteral
Mechanism of Action	Dissociates to provide bicarbonate anion which neutralizes hydrogen ion concentration and raises blood and urine pH.
Indications	-Alkalinizing agent -Treatment of hyperkalemia -Tricyclic antidepressant overdose -Cardiac arrest
Contraindications	Alkalosis -Hypernatremia, hypocalcemia -Severe pulmonary edema
Precautions	-Use with caution in patients with cirrhosis, edema, heart failure, peptic ulcer disease and renal impairment. -Vesicant – avoid extravasation
Adverse Effects	Pulmonary edema, fluid and electrolyte abnormalities, metabolic alkalosis, acidosis, cerebral hemorrhage
Adult Dose	*Hyperkalemia:* -Sodium bicarbonate 1 mEq/kg IV/IO over 2 minutes *Cardiac arrest:* -Sodium bicarbonate 1 mEq/kg IV/IO over 2 minutes (metabolic acidosis or tricyclic OD) *Prolonged extrication (equal to or greater than 60 minutes):* -Sodium bicarbonate 50 mEq (1 amp) in 1L crystalloid solution IV/IO at 1-2L/hour; immediately prior to extrication, give 1 mEq/kg bolus. *Sodium channel blocker overdose with prolonged QRS:* -Sodium bicarbonate 1 mEq/kg IV/IO over 2 minutes. May repeat 0.5 mEq/kg IV/IO after 15 minutes for persistent QRS prolongation
Pediatric Dose	1 mEq/kg/dose (max 50 mEq) slow IV/IO over 2 minutes
Route/Administration	IV, IO
Monitoring	Vital signs, urine output
Special Considerations	-Vesicant; ensure proper catheter or needle position prior to and during infusion. Avoid extravasation (tissue necrosis may occur -Can precipitate with calcium products – flush with at least 10mL of saline in between products. - If IO is used for administration and is then used to obtain blood samples for acid-base analysis, results will be inaccurate. -Medications used for the treatment of cardiac arrest in pregnancy are the same as in the nonpregnant woman

Sodium Chloride 3%

Class	Electrolyte supplement, sodium salt
Mechanism of Action	Principal extracellular cation; functions in fluid and electrolyte balance, osmotic pressure control, and water distribution
Indications	-Head injury with signs of herniation
Contraindications	-Hypersensitivity, hypernatremia, fluid retention
Precautions	-Vesicant; avoid extravasation. -Hyponatremia; may cause osmotic demyelination syndrome. -Use with caution in cirrhosis, edema, heart failure, hypertension and renal impairment
Adverse Effects	Hypotension, phlebitis, acid-base imbalance, electrolyte disturbance, hypervolemia, infusion site reaction, fever
Adult Dose	*Head trauma with signs of herniation (comatose, unilateral or bilateral blown pupil(s), posturing, decline in GCS >2)* -Sodium chloride 3% 500mL IV/IO at 1L/h
Pediatric Dose	
Route/Administration	IO/IV
Monitoring	Vital signs
Special Considerations	-Vesicant at higher osmolarities; ensure proper catheter placement and use largest catheter available; use cold compresses in case of extravasation

Tranexamic Acid (Cyklokapron)

Class	Antifibrinolytic agent
Mechanism of Action	Displaces plasminogen from fibrin to inhibit fibrinolysis to help control bleeding.
Indications	- Management of primary fibrinolysis in trauma patients to control trauma-associated hemorrhage
Contraindications	-Hypersensitivity. -Acquired defective color vision. -Active intravascular clotting. -Subarachnoid hemorrhage.
Precautions	-Seizures and thrombotic events have been reported with use. - Use with caution in patients with upper urinary tract bleeding and ureteral obstruction; clot formation has been reported. -Use with caution in patients with renal dysfunction and vascular disease.
Adverse Effects	Hypotension with rapid IV injection, blurred vision, allergic dermatitis, thrombotic events, ureteral obstruction, anaphylaxis, seizure, retinal artery occlusion, visual disturbances
Adult Dose	*Significant blunt or penetrating injury with hemodynamic instability:* 1 g in 100 mL of normal saline, give IV over 10 minutes
Pediatric Dose	< 12 years: 15 mg/kg IV over 10 mins (max 1 g) ≥ 12 years: 1 g IV over 10 mins
Route/Administration	IV/IO mix 1 g in 100 mL of normal saline; give IV over 10 minutes
Monitoring	Vitals
Special Considerations	-Should only use if anticipate use of blood products. -Should be given through dedicated line. -Cannot be given in same line as blood products. -Should only be given if injury occurred less than 3 hours prior to administration. -No adverse effects attributable to use of tranexamic acid during pregnancy, in either animals or humans, have been reported in the fetus or newborn.