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Abciximab (ReoPro®)

Restricted Units	Yes, See Grid		
Special Information	Withdraw the bolus dose through a 0.22-micron filter into a syringe, then administer. Effects of abciximab on platelets last for up to four hours. In the advent of bleeding giving platelets will only expose the new platelets to the medication and they will be unable to participate in coagulation.		
IV Line Information	Central line preferred. May be given peripherally. **Should be administered in a separate IV line whenever possible and not mixed with other medications.**		
Therapeutic Use	Adjunct to percutaneous transluminal coronary angioplasty or atherectomy (PTCA) for the prevention of acute cardiac ischemic complications in patients at high risk for abrupt closure of the treated coronary vessel. Used as an adjunct to heparin to prevent cardiac ischemic complications in patients with unstable angina not responding to conventional therapy when PTCA is scheduled within 24 hours.		
Dose	Loading Dose: 0.25 mg/kg Continuous Infusion: 0.125 mcg/kg/min with a max of 10 mcg/min		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Loading dose	No	Yes
Concentration	Vial: 2 mg/mL Drip: 0.0288 mg/mL (7.2 mg/250 mL)		
Stability	24 hours		
Monitoring	Before infusion of abciximab, platelet count, prothrombin time, ACT, and APTT should be measured to identify preexisting hemostatic abnormalities.		
Mechanism of Action	Inhibits platelet aggregation and clot formation.		
Adverse Reactions	Hypotension, pain, nausea, bleeding, bradycardia, peripheral edema, thrombocytopenia, anemia, and pleural effusions		
Dispensing Category	Yellow		

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Acetaminophen (Ofirmev®)

Restricted Units	None. May be administered on any unit or floor if verified by pharmacy		
Special Information	**Restrictions** - Perioperative dosing not to exceed 24 hours post-operative **AND** - Administered in the OR, PACU or in the ICU (when serving as PACU) **AND** - Dispense from Pharmacy; if applicable OR Pharmacy during OR pharmacy hours (UCMC), otherwise central pharmacy (WCH and UCMC) **AND** - Patient must meet criteria for use prior to dispensing drug: • Patient not a candidate for NSAID • Minimize opiate use - **OR**, when none of the above apply, Trauma patients ≥65 years of age with ≥2 rib fractures for 24 hours scheduled dosing		
IV Line Information	Peripheral or Central		
Therapeutic Use	Acetaminophen is indicated for use in the management of mild to moderate pain, management of moderate to severe pain with adjunctive opioid analgesics, and the reduction of fever.		
Dose	>50kg: 1000mg every 6 hours or 650mg every 4 hours [MAXIMUM: single dose 1000mg, total daily dose 4000 mg (any route)] <50kg: 15mg/kg every 6 hours or 12.5mg/kg every 4 hours [MAXIMUM: single dose 15mg/kg every 4 hours; total daily dose 75mg/kg per day (any route)]		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes- Infuse over 15 minutes	No
Concentration	10 mg/mL (1000 mg/100 mL)		
Stability	6 hours once vial has been penetrated or contents transferred to another container (for doses smaller than 1000 mg)		
Monitoring	Monitor the end of infusion to prevent the possibility of air embolus; relief of pain or fever; serum levels if overdose suspected		
Mechanism of Action	Mechanism is not fully established. Acetaminophen is believed to act centrally through the inhibition of prostaglandin synthesis and peripherally by blocking pain impulse generation. Its antipyretic effects are thought to result from inhibition of the hypothalamic heat-regulating center.		
Adverse Reactions	Nausea, vomiting, headache, insomnia, hepatic injury, allergy and hypersensitivity. Doses higher than recommended may result in hepatic injury, severe hepatotoxicity, and death.		
Dispensing Category	Yellow		

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AcetaZOLAMIDE (Diamox®)

Restricted Units	None		
Special Information	Use with caution in patients with sulfa allergy.		
IV Line Information	Peripheral or Central IM administration is not recommended due to alkaline pH of solution.		
Therapeutic Use	For adjunctive treatment in edema due to congestive heart failure, drug-induced edema, epilepsies (petit mal, unlocalized seizures), glaucoma or metabolic alkalosis.		
Dose	250 – 500 mg		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Push over 30 seconds	No	No
Concentration	100 mg/ mL (500mg/5mL) Reconstitute vial with 5 mL sterile water or normal saline.		
Stability	12 hours at room temp; administer within 24 hours		
Monitoring	Vital signs, electrolytes, CBC with differential, liver function, blood glucose in diabetic patients		
Mechanism of Action	A potent carbonic anhydrase inhibitor, effective in the control of fluid secretion (e.g., some types of glaucoma), in the treatment of certain convulsive disorders (e.g., epilepsy) and in the promotion of diuresis in instances of abnormal fluid retention (e.g. cardiac edema). May increase renal chloride absorption and increase bicarbonate excretion (e.g. metabolic alkalosis).		
Adverse Reactions	Metabolic acidosis, tinnitus, anaphylaxis, blood dyscrasias, erythema multiforme, fulminant hepatic necrosis, Stevens-Johnson syndrome, toxic epidermal necrolysis, weight loss, diarrhea, loss of appetite, nausea, taste sense altered, vomiting, confusion, paresthesia, somnolence, depression, polyuria, malaise		
Dispensing Category	Green		

Acetylcysteine (Acetadote)

Restricted Units	None		
Special Information	Determination of acetaminophen toxicity should be done prior to giving IV acetylcysteine using an appropriate assay.		
IV Line Information	Central or Peripheral		
Therapeutic Use	To prevent or lessen hepatic injury caused by overdose of acetaminophen.		
Dose	**Three Bag Method :** 1. 150 mg/kg in 200 mL over 1 hour 2. 50 mg/kg in 500 mL over 4 hours 3. 100 mg/kg in 1000 mL over 16 hours		
Titration Guidelines	NONE		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infusion rate depends on which bag patient is receiving	Yes
Concentration	Vial: 200 mg/mL (30 mL vial)		
Stability	24 hours		
Monitoring	Vital signs, acetaminophen level, AST, ALT, bilirubin, PT, Scr, BUN, Glucose, electrolytes		
Mechanism of Action	Unknown		
Adverse Reactions	Anaphylactic reaction, hypotension, vasodilation, flushing, angioedema		
Dispensing Category	Red		

Adenosine (Adenoscan, Adenocard)

Restricted Units	Yes, See Grid		
Special Information	May give IVP over 1-2 seconds followed by a saline flush		
IV Line Information	Central or Peripheral		
Therapeutic Use	**Adenocard:** Conversion of PSVT including that associated with Wolff-Parkinson-White Syndrome. **Adenoscan:** Pharmacologic stress agent used in myocardial perfusion thallium-201 scintigraphy.		
Dose	**Adenocard:** 6 mg rapid IV push. If no response in 1-2 minutes, 12 mg may be given. May repeat 12 mg bolus if needed. **Adenoscan:** IV continuous infusion of 140 mcg/kg/min for 6 minutes.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 –2 seconds	No	Yes
Concentration	3 mg/mL given undiluted		
Stability	48 hours Do not refrigerate		
Monitoring	Vital signs, cardiac monitoring		
Mechanism of Action	Slows conduction time through the AV node, interrupting the re-entry pathways through the AV node, restoring normal sinus rhythm.		
Adverse Reactions	Facial flushing, headache, lightheadedness, shortness of breath, chest pressure, discomfort of neck, throat or jaw, AV block.		
Dispensing Category	Green		

Albumin (Buminate)

Restricted Units	Yes, See Grid		
Special Information	Solution may darken with exposure to light. Does not affect activity of drug.		
IV Line Information	Central or Peripheral No special tubing required. Do not filter.		
Therapeutic Use	Albumin is used for treatment in conditions in which there is severe hypoalbuminemia. Used in the treatment of hypovolemia and for large volume paracentesis. **See UC Health Guidelines**		
Dose	Dose is variable and is based on therapeutic use. Dose is in grams/hour. Infuse as mL/hr.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infuse over 1 hour	Yes
Concentration	5%, 25%		
Stability	Use IVPB within 4 hours of puncturing bag/bottle		
Monitoring	Rapid infusion may cause vascular overload with resultant pulmonary edema. Patients should be closely monitored for signs of increased venous pressure. A rapid rise in blood pressure following infusion necessitates careful observation of injured or postoperative patients to detect and treat severed blood vessels that may not have bled at a lower pressure.		
Mechanism of Action	It will increase the circulating plasma volume of albumin by an amount approximately equal to the volume infused. This reduces hemoconcentration and decreases blood viscosity.		
Adverse Reactions	Fever, chills, rash, nausea, vomiting, headache, tachycardia, and hypotension		
Dispensing Category	Green		

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Alcohol (Ethanol 10%)

Restricted Units	Yes, See Grid		
Special Information	Diluted to a 10% solution. Dispense in glass bottles only.		
IV Line Information	Central line only		
Therapeutic Use	Treatment of methanol or ethylene glycol overdose		

Dose	Initial: 600-700 mg/kg IV infusion (equivalent to 7.6-8.9 mL/kg using 10% solution)
	Maintenance: Goal of therapy to maintain serum ethanol levels of ≥100 mg/dL.
	• Nondrinker: 66 mg/kg/hour (equivalent to 0.83 mL/kg/hour using a 10% solution)
	• Chronic drinker: 154 mg/kg/hour (equivalent to 1.96 mL/kg/hour using a 10% solution)
	• Adjustment for use with hemodialysis:
	  • Nondrinker: 169 mg/kg/hour (equivalent to 2.13 mL/kg/hour using a 10% solution)
	  • Chronic drinker: 257 mg/kg/hour (equivalent to 3.26 mL/kg/hour using a 10% solution)		

Titration Guidelines	Goal of therapy to maintain serum ethanol levels of 100-150 mg/dL, titrations must be ordered by physician.		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infuse initial dose over 1 hour	Yes, 1000 mL
Concentration	10% solution		
Stability/Preparation	Dilute with D5W, dispense in glass bottle. Specific gravity of alcohol is 0.79, reflected below: Initial dose: Calculate 10% dilution for 600-700 mg/kg dose based on $C_1V_1 = C_2V_2$: C_1 = 0.7742 g/mL (98% ethyl alcohol) V_1 = Patient weight (kg) * dose (mg/kg) * 1g/1000mg * 1 mL/0.7742g ethanol C_2 = 0.079 g/mL (10% ethanol) V_2 = Unknown volume of final preparation (V1 + mL of D5W for dilution) Continuous Infusion: diluted from 98% stock, 102 mL of 98% ethanol diluted with 898 mL D5W to make a 1000 mL 10% solution. Beyond use date of 24 hours at room temperature.		
Monitoring	Monitor blood ethanol levels ever 1-2 hours until steady state is reached, then every 2-4 hours. Monitor blood glucose, electrolytes (including magnesium), serum pH, blood gas, and methanol or ethylene glycol levels. Continue therapy until levels are ≤ 20 mg/dL **and** patient is asymptomatic **and** metabolic acidosis is corrected.		
Mechanism of Action	Ethyl alcohol competitively inhibits alcohol dehydrogenase, the enzyme that catalyzes the metabolism of ethylene glycol and methanol to their toxic metabolites.		
Adverse Reactions	Flushing, hypotension, agitation, CNS depression, come, disorientation, drowsiness, hypoglycemia, nausea, vomiting, urinary retention, phlebitis, polyuria, intoxication.		
Dispensing Category	Yellow		

Allopurinol (Aloprim)

Restricted Units	None		
Special Information	Hydration to yield 2 liters of urine output per day is recommended. Maintain neutral or slightly alkaline urine pH.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Decrease serum uric acid levels in patients with leukemia, lymphoma, and solid tumor malignancies who are receiving specific types of cancer chemotherapy.		
Dose	200 to 400 mg/m^2 day. Max dose of 600 mg/day.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infuse over 15-60 minutes	Yes
Concentration	Final concentration not to exceed 6 mg/mL		
Stability	10 hours. Do not refrigerate.		
Monitoring	Vital signs, CBC, Serum Uric Acid, I's & O's, LFTs, BUN, Scr		
Mechanism of Action	Reduces the production of uric acid by inhibiting the biochemical reactions immediately preceding its formation.		
Adverse Reactions	Rash, renal insufficiency, nausea, vomiting, Stevens-Johnson Syndrome		
Dispensing Category	Green		

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Alprostadil (Prostin VR)

Restricted Units	Yes, See Grid		
Special Information	Concurrent anticoagulant treatment may potentiate bleeding, concurrent vasoactive agents leads to increased hypotension and dizziness.		
IV Line Information	Central or Peripheral.		
Therapeutic Use	Prostaglandin is used for temporary maintenance of patency of ductus arteriosus in neonates. Other uses of alprostadil in adults have included peripheral obstructive arterial disease, in newly documented myocardial infarctions (of less than twelve hours in duration), Raynaud's phenomena, angina, ergot intoxications, pulmonary hypertension, liver transplant recipients, and as an aid in angiographic examinations.		
Dose	Adults: 20 – 40 mcg/hr with a max of 80 mcg/hr for liver transplant patients		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	Adult Standard: 2 mcg/mL (500 mcg/250mL) NICU Standard: 10 mcg/mL (500 mcg/50 mL)		
Stability	24 hours		
Monitoring	Vital signs, signs and symptoms of bleeding		
Mechanism of Action	Alprostadil is a naturally occurring prostaglandin that has a multitude of actions including vasodilation, inhibition of platelet aggregation, intestinal and uterine smooth muscle stimulation, and a reflex increase in cardiac output and rate accompanying blood pressure reduction		
Adverse Reactions	Seizures, priapism, CHF, second degree heart block, supraventricular tachycardia, ventricular fibrillation, disseminated intravascular coagulation, cortical proliferation of long bones, bradycardia, fever, hypotension, tachycardia		
Dispensing Category	Green		

Alteplase (Activase, tPA)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	See **UC Health Guidelines** for use		
IV Line Information	Central or Peripheral. Vascular arterial line for catherter directed thrombolysis of peripheral occlusive disease.		
Therapeutic Use	Alteplase is indicated for use in the management of acute myocardial infarction (AMI), for use in the management of acute ischemic stroke, for the management of acute massive pulmonary embolism (PE) in adults Alteplase may also be used to lyse a clot that is obstructing an intravenous line or a chest tube.		
Dose	Acute myocardial infarction: Total dose = 100 mg Pulmonary embolus: 100 mg Ischemic stroke: 0.9 mg/kg with a max of 90 mg Intra-arterial for peripheral occlusive disease: 0.02 – 0.1 mg/kg/hour Catheter clearance: Up to 2 mg per port, may repeat x 1		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Push over 1 minute	Yes – Infuse over 1 – 2 hours according to therapeutic use	Yes – Catheter directed thrombolysis
Concentration	1 mg/mL (100 mg/ 100 mL) Catheter directed thrombolysis: 0.024 mg/mL (6 mg/ 250mL)		
Stability	24 hours		
Monitoring	Vital signs, signs and symptoms of bleeding.		
Mechanism of Action	Alteplase is a thrombolytic agent known as tissue-type plasminogen activator. It initiates local fibrinolysis by binding to fibrin in a thrombus and converts entrapped plasminogen to plasmin.		
Adverse Reactions	Bleeding, hypotension, fever, nausea, vomiting, arrhythmias.		
Dispensing Category	≤ 2 mg doses: Green >2 mg doses: Red		

Aminocarpoic Acid (Amicar®)

Restricted Units	Yes, See Grid		
Special Information			
IV Line Information	Central or Peripheral		
Therapeutic Use	Hemostatic agent used in the treatment of excessive bleeding		
Dose	Loading dose: 4 – 5 grams over 1 hour Continuous infusion: 1 – 1.25 grams/hr for 8 hours or bleeding stops		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infuse over 1 hour	Yes
Concentration	Loading dose: 50 mg/mL (5 grams/100 mL) Continuous Infusion: 40 mg/mL (10 grams/250 mL)		
Stability	24 hours		
Monitoring	Vital signs, signs and symptoms of bleeding and neurological deficits		
Mechanism of Action	Aminocaproic acid is a specific antifibrinolytic agent that helps prevent the breakdown of clots that would lead to increased bleeding.		
Adverse Reactions	Bradycardia, hypotension, myopathy, rhabdomyolysis, rash, renal failure, thrombosis headache, dizziness, weakness, nausea, vomiting		
Dispensing Category	Green		

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Aminophylline

Restricted Units	None		
Special Information	Theophylline 0.8 mg = Aminophylline 1 mg		
IV Line Information	Central or Peripheral		
Therapeutic Use	Relief of bronchospasm or to reduce apnea.		
Dose	Continuous infusion: 0.2 – 0.7 mg/kg/hr (Do not exeed 21 mg/hour in patients with cor pulmonale, cardiac decompensation, hepatic impariment, patients >60 years, or patients taking medications which reduce aminophylline/theophylline clearance.)		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infuse over 30 – 60 minutes	Yes
Concentration	1 mg/mL (500 mg/500 mL)		
Stability	48 hours		
Monitoring	Vital signs, lung sounds, cardiac status. Daily aminophylline level until therapeutic levels established, then on as needed basis. Refer also to UC Health Med Mgmt Policy 068: Pharmacy Appropriate Ordering of Labs and Appendix.		
Mechanism of Action	Causes bronchial dilation. Acts as a myocardial stimulant by increasing cardiac output by increasing contractility and peripheral vasodilation. Diuretic effect by direct effect on renal tubules. Stimulates gastric secretion of acid and pepsin.		
Adverse Reactions	Tachycardia, nausea, vomiting, seizures, hypotension, arrhythmias, nervousness, tremors. If extravasation occurs, stop infusion immediately and disconnect (leave needle/cannula in place); gently aspirate extravasated solution (do **NOT** flush the line); initiate hyaluronidase antidote; remove needle/cannula; apply dry cold compresses; elevate extremity. See UC Health Med Mgmt Extravasation Policy 075 and Appendix B.		
Dispensing Category	Green		

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Amiodarone (Cordarone®)

Restricted Units	Yes, See Grid		
Special Information	Cardiology consult is recommended.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Used in the treatment of atrial fibrillation, ventricular arrhythmias and in cardiac patients with shock-refractory ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT).		
Dose	Loading dose: 150 – 300 mg Continuous infusion: 1 mg/min		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Code only	Yes – Loading dose over 10 minutes	Yes
Concentration	Loading dose: 1.5 mg/mL (150 mg/100 mL) Continuous Infusion: 1.8 mg/mL (450 mg/250 mL)		
Stability	24 hours		
Adverse Reactions	Sinus bradycardia; hypotension; second/third degree AV block, increased liver function tests		
Monitoring	Vital signs, electrolytes, liver function Monitor for hypotension, especially during the first few hours of infusion and QTc prolongation Closely monitor FiO2 and determinants of oxygen delivery to the tissues in patients.		
Mechanism of Action	Class III antiarrhythmic agent which inhibits adrenergic stimulation, prolongs the action potential and refractory period in myocardial tissue; decreases AV node conduction and sinus node function.		
Dispensing Category	Green		

Amphotericin B (Fungizone®)

Restricted Units	None		
Special Information	Conventional amphotericin formulation May premedicate patient for infusion related reactions with acetaminophen, diphenhydrAMINE, and/or hydrocortisone. See **UC Health Amphotericin B Guidelines**		
IV Line Information	Peripheral or Central		
Therapeutic Use	Treatment of severe systemic and CNS infections caused by susceptible fungi.		
Dose	1 to 1.5 mg/kg/day over 2 to 6 hours See **UC Health Amphotericin B Guidelines**		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Intrathecal Only	Yes – over 2 to 6 hours	No
Concentration	Dose / 250 mL D5W		
Stability	24 hours Protect from light.		
Monitoring	Vital signs, serum electrolytes (especially calcium, magnesium, potassium); CBC; hepatic/renal function		
Mechanism of Action	Changes permeability of fungal cell wall causing leakage of components leading to cell death.		
Adverse Reactions	Hyptotension, tachypnea, fever, chills, headache, malaise, hypokalemia, hypomagnesemia, nausea, vomiting, diarrhea, epigastric pain, decreased renal function, injection site pain		
Dispensing Category	Red		

Amphotericin B Liposomal (Ambisome®)

Restricted Units	None		
Special Information	See **UC Health Amphotericin B Guidelines** Patients should be observed under close clinical observation during initial dosing. Anaphylaxis has been reported. Acute reactions (fevers and chills) may occur 1-2 hours after starting infusions. May premedicate patient for infusion related reactions with acetaminophen, diphenhydrAMINE, and/or hydrocortisone May use in-line filter with mean pore diameter not less than 1 micron. **Infuse over 120 min**; infusion time may be reduced to 60 min if previous infusions well tolerated.		
IV Line Information	Peripheral or Central Use separate line or flush line with D5W before infusion.		
Therapeutic Use	Treatment of severe systemic and CNS infections caused by susceptible fungi.		
Dose	3-5 mg/kg/day IV once daily, depending on indication See **UC Health Amphotericin B Guidelines**		
Route	IVP	IVPB	Continuous Infusion
	No	Yes , over 2 hours	No
Concentration	IVPB: Dose/250 mL		
Stability	Must be used within 6 hours of reconstitution and preparation Must be mixed with D5W only; not compatible with saline-containing products		
Monitoring	Vital signs, serum electrolytes (especially calcium, magnesium, potassium); CBC; hepatic/renal function		
Mechanism of Action	Binds to ergosterol in cell membranes of sensitive fungi, the disruption of which results in cell death		
Adverse Reactions	Hyptotension, tachypnea, fever, chills, headache, malaise, hypokalemia, hypomagnesemia, nausea, vomiting, diarrhea, epigastric pain, decreased renal function, injection site pain		
Dispensing Category	Red		

Antithrombin III (Atryn®)

Restricted Units	None		
Special Information	Restricted to Cardiothoracic Surgery Service to reduce blood products transfused and reduce fluid requirements Administer with a 0.22 micron inline filter; Do not shake		
IV Line Information	Peripheral or Central		
Therapeutic Use	For prevention of thrombosis or treatment of thromboembolism in patients with Antithrombin deficiency		
Dose	Loading dose: [(100 – baseline AT level)/2.3] * body weight (kg) = units antithrombin required Maintenance dose: [(100 – baseline AT level)/10.2] * body weight (kg) = units antithrombin required/hour		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Push over 15 minutes	Yes, loading dose may be made as a IVPB over 15 minutes	Yes
Concentration	Powder is reconstituted with 10 mL sterile water for injection. May be further diluted in 0.9% sodium chloride to concentration of 100 units/mL		
Stability	Store vials refrigerated Use within 8-12 hours after reconsitution		
Monitoring	AT level (baseline, 2 hours after initiation, and once-twice daily thereafter); signs of bleeding; signs of thrombosis		
Mechanism of Action	Antithrombin is an inhibitor of in vivo coagulation. Actions include inhibition of thrombin, plasmin, factors IXa, Xa, XIa, and XIIa		
Adverse Reactions	Chest pain, dizziness, hemorrhage, hematoma, liver enzyme abnormalities, hemarthrosis, hematuria, infusion-site reaction		
Dispensing Category	Red		

Anti-thymocyte Globulin, Rabbit (Thymoglobulin®)

Restricted Units	None		
Special Information	Pre-medication with acetaminophen and diphenhydrAMINE (with or without a corticosteroid) is recommended		
IV Line Information	Central line is preferred due to the potential for thrombophlebitis; infusions intended for peripheral administration should be prepared as instructed below.		
Therapeutic Use	Immunosuppressant; for the prevention or treatment of acute rejection		
Dose	Usual dose: 1.5 mg/kg (typically rounded to nearest 25 mg); may be given daily for up to 14 days; the first dose should be administered over at least 6 hours; subsequent doses should be administered over at least 4 hours; doses should be infused via an in-line 0.22 micron filter		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	Standard: Dose/250 mL For peripheral use, doses should be diluted in 500 ml NS, and 1000 units heparin and 20 mg hydrocortisone should be added to the solution		
Stability	24 hours		
Monitoring	Monitor vital signs frequently when initiating infusions, particularly for a patient's first or second dose (e.g., baseline, q1h x 2 hours, then q4h). Infusions should be slowed or stopped if the patient develops an infusion reaction (see below). Other monitoring parameters include WBC, lymphocyte subsets (e.g., CD3), platelets, signs/symptoms of rejection.		
Mechanism of Action	Antibody to various T cell antigen; results in T cell depletion and modification of T cell activity		
Adverse Reactions	Infusion reactions include dyspnea, chills, wheezing, backache, or fever. Other potential adverse reactions include anaphylaxis, hypo/hypertension, tachycardia, pulmonary edema, leucopenia, thrombocytopenia, malaise, abdominal pain, and diarrhea		
Dispensing Category	Black		

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Antithymocyte Globulin Equine (Atgam®)

Restricted Units	Yes, See Grid		
Special Information	Infuse over at least 4 hours Administer using a 0.2 to 1 micron in-line filter Pre-medicate patient for first dose: diphenhydrAMINE orally 30 minutes prior, hydrocortisone IV 15 minutes prior, and acetaminophen 2 hours prior to infusion		
IV Line Information	Peripheral or Central		
Therapeutic Use	Prevention and treatment of Renal Transplant Rejection , Aplastic Anemia		
Dose	Aplastic anemia: 10 to 20 mg/kg once daily Renal transplant rejection: 10 to 15 mg/kg/day once daily Renal transplant rejection: Prophylaxis: 15 mg/kg/day once daily		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes - Infuse over at least 4 hours	No
Concentration	Max concentration of 4mg/mL		
Stability	Stable for 24 hours if refrigerated; 12 hours at room temperature		
Monitoring	Vital signs, LFTs, Renal function, CBC, signs and symptoms of rejection		
Mechanism of Action	Antithymocyte globulin equine, is a lymphocyte-selective immunosuppressant, which reduces the number of circulating, thymus-dependent lymphocytes. The antilymphocytic action is believed to alter the function of T lymphocytes, which are involved in humoral immunity and are liable in part for cell-mediated immunity.		
Adverse Reactions	Fever, Rash, Thrombocytopenia/Leukopenia, Shivering, Nausea/Vomiting, Diarrhea, Back Pain, Dyspnea, Sepsis, Serum Sickness due to the drug		
Dispensing Category	Black		

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Argatroban

HIGH ALERT DRUG

Restricted Units	None		
Special Information	No reversal agent is available. Hold 4 hours before surgery and 2 hours before line insertion. **See UC Health Guidelines**		
IV Line Information	Central or Peripheral		
Therapeutic Use	For use as an anticoagulant for prophylaxis or treatment of thrombosis in patients with heparin-induced thrombocytopenia or use in patients with or at risk for heparin-induced thrombocytopenia (HIT) .		
Dose	0.5 – 2 mcg/kg/min		
Titration Guidelines	Consult with prescriber. Titrate to the PTT goal of 1.5 – 3 times patient's baseline PTT (per argatroban weight-based protocol – see UC Health Guidelines above).		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	Standard: 1 mg/mL (250 mg/250 ml or Premade Bag 50 mg/50 ml) Minimum: 0.5 mg/ml (125 mg/250 ml)		
Stability	24 hours for infusion mixed by pharmacy Premade Bag: See manufacturer expiration date on label (Premade 50 mg/50mL bag stable 48 hours when not protected from light) Protect from Light		
Monitoring	Vital signs, signs and symptoms of bleeding Monitor therapy using the aPTT. It should be 1.5 to 3 times the baseline aPTT, not exceeding 100 seconds. Check the aPTT 4 hours after initiation of therapy to confirm that the aPTT is within the desired therapeutic range then 4 – 6 hours after dose changes.		
Mechanism of Action	Argatroban is a direct thrombin inhibitor that decreases the generation of a fibrin clot.		
Adverse Reactions	Bleeding, hypotension, cardiac arrest, atrial fibrillation, ventricular tachycardia, dyspnea, pneumonia, abnormal renal function, multisystem and disseminated intravascular coagulation, abdominal pain, diarrhea, nausea, vomiting, coughing, urinary tract infection, fever, infection, pain, headache		
Dispensing Category	Yellow		

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Aripiprazole (Abilify®)

Restricted Units	Restricted to behavioral health and emergency department.		
Special Information	**Black Box Warning**: Elderly patients with dementia-elated psychosis treated with atypical antipsychotic drugs are at tan increased risk of death compared to placebo. Ziprasidone mesylate is not approved fro the treatment of patients with dementia-related psychosis. **Black Box Warning**: Antidepressants increased the risk of suicidal thinking and behaviors in children, adolescents, and young adults in short-term studies with major depressive disorder and other psychiatric disorders. The risk must be balanced with the clinical need. Monitor patients closely for clinical worsening, suicidality or unusual changes in behavior. **Dosing adjustments**: Concomitant use with strong CYP3A4 or CYP2D6 inhibitors: reduce aripiprazole dose to one-half the normal dose and increase dose upon withdrawal of CYP3A4 or CYP2D6 inhibitors Concomitant use with strong CYP3A4 or CYP2D6 inducers: double aripiprazole dose; decrease dose to 10 to 15mg upon withdrawal of the CYP3A4 or CYP2D6 inducer.		
IV Line Information	IM only		
Therapeutic Use	Agitation associated with bipolar disorder or schizophrenia		
Dose	Initial: 9.75mg IM (range 5.25mg-15mg); if a second dose is required, wait at least 2 hours after initial dose. Max cumulative daily dose 30mg/day. Oral therapy of 10mg-30mg should replace IM aripiprazole injection as soon as possible		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	No	No
Concentration	IM use only; do not administer intravenously or subcutaneously Solution concentration is 7.5mg/ml		
Stability	Discard unused portion of reconstituted solution		
Monitoring	Monitor patients closely for clinical worsening, suicidality or unusual changes in behavior. Improvements in mental status, ECG changes, blood pressure, heart rate, blood glucose, S/S hyperglycemia, S/S of dehydration, S/S of neuroleptic malignant syndrome (hyperpyrexia, muscle rigidity, altered mental status), S/S of extrapyramidal effects and/or tardive dyskinesia		
Mechanism of Action	Aripiprazole is an atypical antipsychotic agent (quinolinone derivative). It exhibits relatively high affinity for dopamine D2 and D3 receptors and serotonin 5HT1A and 5HT2A receptors. The efficacy of the drug in schizophrenia appears related to partial agonist activity at D2 and 5HT1A receptors and antagonist activity at 5HT2A receptors.		
Adverse Reactions	Orthostatic hypotension, QT prolongation, hyperglycemia, weight gain, syncope, akathisia, Extrapyramidal effects, somnolence, tremor, injection site pain, GI upset (constipation, diarrhea, indigestion, nausea), and Agitation		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Atenolol (Tenormin®)

Restricted Units	Yes, See Grid		
Special Information	Protect from light; Store at room temperature; Decrease dose in patients with renal insufficiency		
IV Line Information	Peripheral or Central		
Therapeutic Use	Hypertension (HTN), Acute Myocardial Infarction (AMI), Angina		
Dose	IV - AMI - 5 mg IV over 5 mins, followed by a second 5 mg IV dose 10 mins later; after second IV dose begin PO dosing with 50 mg, followed by another 50 mg PO dose 12 hrs later, then 100 mg PO daily for 10 days PO - HTN/Angina - 50-100 mg PO daily		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – rate NTE 1 mg/min	No	No
Concentration	Vial: 0.5 mg/mL		
Stability	Dextrose and Sodium Chloride admixtures stable for 48 hrs		
Monitoring	Vital signs, EKG, blood glucose (in diabetic patients), reduction of anginal pain		
Mechanism of Action	β-blocker; Selectively blocks cardiac β-1 receptors to slow heart rate		
Adverse Reactions	Fatigue, dizziness, hypotension, bradycardia		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Atropine

Restricted Units	Yes, See Grid		
Special Information	When administered in conjunction with cyclopropane, doses less than 0.4 mg should be used and should be given slowly to prevent ventricular arrhythmias		
IV Line Information	Peripheral or Central		
Therapeutic Use	Anticholinesterase Overdose, Acute Symptomatic Bradyarrhythmia, Cardiac Arrest (ACLS Protocol), Irritable Bowel Syndrome (failed other therapy), Organophosphate Poisoning, Adjunct for Peptic Ulcer Disease, Premedication of Anesthetic Procedure, Reversal of Muscarinic Activity, and Toxic Effect of Eating Mushrooms		
Dose	Anticholinesterase overdose: 2-4 mg IV initially, then 2 mg repeated every 5-10 min until muscarinic symptoms disappear or signs of atropine toxicity appear Acute Symptomatic Bradyarrhythmia: 0.5 mg IV every 3-5 min, MAX total dose 3 mg Cardiac arrest (ACLS protocol): 1 mg IV every 3-5 min to MAX total dose of 3 mg Irritable bowel syndrome (Failed other therapies): 0.4-0.6 mg (range 0.3-1.2 mg) IV/SC/IM every 4-6 hr Organophosphate poisoning: 2-3 mg repeated in 20-30 min as soon as cyanosis has cleared, continue dosage until definite improvement has occurred and is maintained, sometimes for 2 days or more Peptic ulcer disease, Adjunct: 0.4-0.6 mg (range 0.3-1.2 mg) IV/SC/IM every 4-6 hr Premedication for anesthetic procedure: 0.4 to 0.6 mg prior to induction of anesthesia Reversal of muscarinic activity, From agents used for neuromuscular blockade reversal: 0.02-0.03 mg/kg with neostigmine 0.5 mg/kg OR 0.6-1.2 mg with 0.5-2 mg neostigmine (using separate syringes) Toxic effect from eating mushrooms, Rapid type poisoning: 1-2 mg IV/IM every hour until respiratory effects subside		
Route	IVP	IVPB	Continuous Infusion
	Yes - rapid	No	No
Concentration	Vials: 0.5 mg/mL and 1 mg/mL		
Stability	Protect from light		
Monitoring	Vital signs, cardiac monitoring, urine output, mental status		
Mechanism of Action	Atropine sulfate is an anticholinergic agent that specifically antagonizes the muscarine-like activity of acetylcholine and other choline esters. It is a competitive antagonist of acetylcholine on the effector cells. Therapeutic action stems from inhibition of smooth muscles/glands innervated by postganglionic cholinergic nerves		
Adverse Reactions	Constipation, Xerostomia, Tachyarrhythmia, Cardiac Dysrhythmia, Respiratory Depression, Immune Hypersensitivity Reaction, Raised Intraocular Pressure, Blurred Vision, Light Intolerance, and Coma		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Benztropine (Cogentin®)

Restricted Units	Yes, See Grid		
Special Information	None		
IV Line Information	Peripheral or Central		
Therapeutic Use	Anticholinergic agent used in the treatement of drug-induced extrapyramidal side effects, Parkinson's disease, and acute dystonia		
Dose	Extrapyramidal disease - drug-induced movement disorder: 1 to 4 mg IV/IM once or twice a day Parkinsonism: 1 to 2 mg/day IV/IM (range 0.5 to 6 mg/day) Acute Dystonia: 1-2 mg IV/IM		
Titration Guidelines	Increases should be made in increments of 0.5 mg to a max of 6 mg		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 1 – 2 minutes	No	No
Concentration	1 mg/mL		
Stability			
Monitoring	Vital signs, anticholinergic effects, extrapyramidal symptoms, rigidity, tremor, gait disturbances		
Mechanism of Action	Benztropine mesylate is a synthetic drug with similar structural features and activities found in atropine and diphenhydrAMINE. The anticholinergic activity of this drug is utilized in the treatment of parkinsonism.		
Adverse Reactions	Tachyarrhythmia, constipation, nausea, xerostomia, ileus, blurred vision, confusion, urinary retention, heat stroke, hyperpyrexia, raised intraocular pressure, and drug-induced psychosis (higher doses)		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Belatacept (Nulojix®)

Restricted Units	None		
Special Information	Restricted to EBV seropositive renal transplant recipients in either of the following: 1. Inpatient when used at the time of transplant in combination with basilizimab induction, mycophenolate mofetil and corticosteroids 2. When used post-transplant for calcineurin inhibitor intolerance, following confirmation of payor status		
IV Line Information	Peripheral or Central, must use a 0.2-1.2 micron low protein-binding filter		
Therapeutic Use	Prevention of organ rejection in kidney transplant recipients		
Dose	Induction: 10 mg/kg/dose on Day 1(prior to implantation) and on Day 5 (~96 hours after Day 1 dose), followed by 10 mg/kg/dose at the end of Week , Week 4, Week 8, Week 12 following transplane Maintenance: 5 mg/kg/dose every 4 weeks beginning at Week 16 post-transplantation		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	2-10 mg/mL final concentration (usually administered in 100 mL IVPB)		
Stability	NS, D5W 4 hours at room temperature, 24 hours refrigerated Infusion must be complete within 24 hours of reconstitution		
Monitoring	TB screening and EBV seropositive verification prior to initiation New onset or worsening neurological, cognitive or behavioral symptoms; sings/symptoms of infection		
Mechanism of Action	Fusion protein that binds CD80 and CD86 receptors on antigen presenting cells (APC), which inhibits CD28-mediated interaction between APCS and T cells, leading to inhibition T-cell co-stimulation. This prevents production and proliferation of cytokines that lead to immunologic rejection.		
Adverse Reactions	Increased susceptibility to infection, Hypertention, hypotension, peripheral edema, fever, headache, insomnia, hypo- or hyperkalemia, hypophosphatemia, hyperlipidemia, hyperglycemia, hypocalcemia, diarrhea, constipation, nausea/vomiting, urinary tract infection, proteinuria, hematuria, anemia, leukopenia		
Dispensing Category	Black		

Appendix C - Guidelines for IV Medication Administration

Bezlotoxumab (Zinplava®)

Restricted Units	None		
Special Information	Formulary with Restriction (must meet ALL of the following): 1. Outpatient Use Only 2. Confirmed third party payer approval and/or payment 3. Documented recurrent *C. difficile* infection (CDI) with ≥2 failures of conventional CDI therapy (microbiological and clinical diagnosis) **AND** 4. Receiving concurrent antibacterial agents for treatment of CDI.		
IV Line Information	Peripheral or Central, must use a 0.2-1.2 micron low protein-binding filter		
Therapeutic Use	Adjunctive therapy to reduce recurrence of *Clostridium difficile* infection (CDI) in patients ≥18 years of age who are receiving antibacterial drug treatment of CDI and are at a high risk for CDI recurrence. NOTE: **Not** indicated for the treatment of CDI. Bezlotoxumab is **not** an antibacterial drug and should only be used in conjunction with antibacterial drug treatment of CDI.		
Dose	IV: 10 mg/kg as a single dose administered over 60 minutes. Repeat doses have not been studied. Must be receiving concomitant antibacterial treatment for *Clostridium difficile* infection.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	1-10 mg/mL final concentration (usually administered in 250 mL IVPB)		
Stability	NS, D5W 16 hours at room temperature, 24 hours refrigerated Infusion must be complete within 24 hours of reconstitution		
Monitoring	Monitor for symptoms of worsening heart failure, infection, and respiratory failure in patients with underlying heart failure.		
Mechanism of Action	Human IgG1 monoclonal antibody which binds to *C. difficile* toxin B and neutralizes it to prevent its toxic effects; bezlotoxumab does not bind to *C. difficile* toxin A.		
Adverse Reactions	Exacerbation of congestive heart failure; infusion-related reaction (nausea, fatigue, fever, dizziness, headache, dyspnea, hypertension)		
Dispensing Category	Black		

Appendix C - Guidelines for IV Medication Administration

Bivalirudin (Angiomax®)

Restricted Units	Yes, See Grid		
Special Information	No reversal agent is available. Hold 4 hours before surgery and 2 hours before line insertion. Clearance was reduced approximately 20% in patients with moderate and severe renal impairment and was reduced approximately 80% in dialysis-dependent patients.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Bivalirudin is as an anticoagulant used in patients with unstable angina undergoing PTCA or PCI.		
Dose	Loading dose: 0.75 mg/kg Continuous infustion: 1.75 mg/kg/hr		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Loading dose over 1-2 minutes	No	Yes
Concentration	5 mg/mL (250 mg/50 mL)		
Stability	24 hours		
Monitoring	Vital signs, signs and symptoms of bleeding (especially in renally impaired patients)		
Mechanism of Action	Bivalirudin directly inhibits thrombin by specifically binding both to the catalytic site and to the anion-binding exosite of circulating and clot-bound thrombin.		
Adverse Reactions	Bleeding, ventricular fibrillation, thrombotic disorder, confusion, renal failure,sepsis, bradyarrhythmia, hypertension, hypotension, dyspepsia, nausea, vomiting, headache, insomnia, pain, anxiety, nervousness, fever		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Brivaracetam (Briviact®)

Restricted Units	None		
Special Information	Restricted to: - failure to control seizures despite current therapy of greater than or equal to 2 antiepileptic medications (including failure of levetiracetam) AND neurology/neurosurgery/neurocritical care recommendation OR - Continuation of home therapy C-V controlled substance. Use of parenteral brivaracetam is limited to 4 consecutive days of therapy.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Adjunctive therapy for treatment of partial-onset seizures in patients with epilepsy.		
Dose	25-100 mg BID (maximum dose is 200 mg daily) Dose should be adjusted (up to 100% of existing dose) if patient is started on rifampin.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Loading dose over 2-15 minutes	Yes – administer over 2-15 minutes	No
Concentration	10 mg/mL (50 mg/5 mL vial)		
Stability	4 hours at room temperature May administer undiluted as IVP, or can dilute with NS, LR, or D5W		
Monitoring	CBC with differential, liver and renal function, symptoms of depression and suicidality as indicated		
Mechanism of Action	Unknown, but brivaracetam displays high affinity for synaptic vesicle protein 2A in the brain, which may contribute to antiepileptic activity.		
Adverse Reactions	Fatigue, hypersomnia, lethargy, malaise, drowsiness, sedation, dizziness, abnormal giat, ataxia, vertido, psychiatric disturbance, euphoria, infusion-site pain, irritability, suicidal ideation, nausea/vomiting, dysgeusia, constipation, decreased white blood cell count, hypersensitivity reaction, weakness, nystagmus		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Bumetanide (Bumex®)

Restricted Units	Yes, See Grid		
Special Information	Risk for allergic reaction is increased in patients with allergies to furosemide or sulfa drugs May cause significant electrolyte disturbances or volume depletion		
IV Line Information	Peripheral or Central		
Therapeutic Use	Edema		
Dose	IVP: 0.5-1 mg IV or IM; can give a second and third dose at intervals of 2-3 hr to maximum of 10 mg/day		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes - over 1-2 minutes	No	No
Concentration	0.25 mg/mL		
Stability	Protect from light		
Monitoring	Vital signs, urine output, serum and urine electrolytes (e.g., potassium, sodium, magnesium), renal function, hepatic function, CBC, serum uric acid, blood glucose		
Mechanism of Action	Bumetanide, a potent loop diuretic with a rapid onset and short duration of action, inhibits the reabsorption of sodium and chloride in the ascending limb of the loop of Henle and enhances the excretion of potassium in a dose-related manner. It exerts effects on the proximal tubule causing phosphaturia. It also increases serum uric acid and reduces uric acid excretion.		
Adverse Reactions	Hypotension, headache, dizziness, nausea, cramps, hyperuricemia, hypokalemia, and thrombocytopenia		
Dispensing Category	Yellow		

Butorphanol (Stadol®)

Restricted Units	None		
Special Information	Schedule IV controlled substance		
IV Line Information	Central or Peripheral		
Therapeutic Use	Pain management, preoperative/preanesthesia , balanced anesthesia, labor pain		
Dose	Pain management: IM: 2 mg q3-4hrs (range 1-4 mg) IV: 1 mg q3-4hrs (range 0.5-2 mg) Preoperative/preanesthesia: 2 mg IM 60-90 minutes before surgery Balanced anesthesia: 2 mg IV shortly before induction and/or 0.5-1 mg IV increments during anesthesia (dose can be as high as 0.06 mg/kg or 4 mg/70 kg) Labor pain: 1-2 mg IV/IM, may repeat after 4 hours		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes - Each 2 mg or fraction thereof over 3-5 minutes	No	No
Concentration	Vial: 1 mg/mL or 2 mg/mL		
Stability	N/A		
Monitoring	Vital signs, pain scores, bowel function		
Mechanism of Action	Interacts with opioid receptors in the CNS, resulting in analgesic effect.		
Adverse Reactions	Palpitations, anxiety, confusion, dizziness, drowsiness, pruritis, constipation, nausea, vomiting, dry mouth, dyspnea, and blurred vision.		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

C1 Esterase Inhibitor, Human (BERINERT®)

Restricted Units	Yes- see site specific unit listings Emergency room , Cardiac Unit		
Special Information	Allow vial and diluent to come to room temperature prior to reconstitution, though does not require refrigeration for storage purposes (can be stored for up to 30 months) Do not use in patients less than 12 years of age		
IV Line Information	Central or Peripheral Administer by a separate infusion line. Do not mix with other products.		
Therapeutic Use	Berinert is used for treatment of hereditary angioedema, both abdominal and facial attacks. It is also used for hereditary angioedema prophylaxis. ****Off Label**** Acute ST segment elevation myocardial infarction - Emergency CABG		
Dose	Dose is variable and is based on therapeutic use. o Hereditary angioedema, Abdominal or facial attacks: 20 units/kg slow IV injection at a rate of approximately 4 mL/min o Hereditary angioedema; Prophylaxis: 1000 units IV infusion over 10 minutes every 3 to 4 days		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes (see dose above)	No
Concentration	Intravenous Powder for Solution: 500 U		
Stability	Use IVPB within 8 hours of puncturing bag/bottle		
Monitoring	Monitor patient for symptoms of hypersensitivity (urticaria, tightness of chest, wheezing, hypotension, anaphylaxis) during or after infusion. Look to reduce the number, severity and duration of swelling attacks. Monitor patient for signs of thrombosis (pain in chest, limbs, or abdomen, shortness of breath, altered levels of consciousness)		
Mechanism of Action	The primary function of C1 inhibitor is to regulate the activation of the complement and intrinsic coagulation (contact system) pathway. C1 inhibitor also regulates the fibrinolytic system. It is hypothesized that increased vascular permeability and the clinical manifestation of hereditary angioedema attacks are primarily mediated through contact system activation. Suppression of contact system activation by C1 inhibitor through the inactivation of plasma kallikrein and factor XIIa is thought to modulate this vascular permeability by preventing the generation of bradykinin .		
Adverse Reactions	Rash, nausea, headache, thrombosis, hypersensitivity reaction, pain, diarrhea, abdominal pain, muscle spasms, upper respiratory tract infections		
Dispensing Category	Black		

Caffeine (Cafcit®)

Restricted Units	None		
Special Information	Dose expressed as caffeine base is one-half the dose when expressed as caffeine citrate.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Short-term treatment of apnea of prematurity in infants between 28-33 weeks gestational age Acute respiratory depression Headache		
Dose	Headache: 500 mg – 1000 mg Apnea of prematurity Loading: 1 mL/kg (20 mg/kg) IV over 30 min using a syringe infusion pump Maintenance : 0.25 mL/kg (5 mg/kg) IV over 10 min using a syringe infusion pump Give maintenance dose every 24 hours, beginning 24 hours after the loading dose Maintenance dose may also be given orally		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 60 minutes (adults)	No
Concentration	Vial: 20 mg/mL (3 mL) 500 mg/500 mL		
Stability	24 hours at room temperature		
Monitoring	Vital signs, serum glucose (hypo/hyperglycemia), bowel/stomach problems, serum caffeine levels		
Mechanism of Action	The mechanism of action of caffeine in the treatment of headache is thought to be due to cerebral vasoconstriction. The mechanism of action of caffeine in apnea of prematurity is not known, but several mechanisms have been hypothesized. These include: stimulation of the respiratory center; increased minute ventilation; decreased threshold to hypercapnia; increased response to hypercapnia; increased skeletal muscle tone; decreased diaphragmatic fatigue; increased metabolic rate; increased oxygen consumption.		
Adverse Reactions	Restlessness, jitteriness or shakiness; faster heart beat; increased urination; bowel/stomach problems (bloated abdomen, bloody stools)		
Dispensing Category	Green		

Calcitriol (Rocaltrol®)

Restricted Units	No		
Special Information	None		
IV Line Information	Central or Peripheral Most common is to administer as a bolus dose into venous line at end of hemodialysis		
Therapeutic Use	Management of hypocalcemia in patients undergoing chronic renal dialysis. It has been shown to significantly reduce elevated parathyroid hormone (PTH) levels. Hyperparathyroidism.		
Dose	1-2 mcg administered 3 times weekly, approximately every other day (range 0.5-4 mcg)		
Titration Guidelines	The dose may be increased by 0.5 to 1 mcg at 2- to 4-week intervals. During this titration period, serum calcium and phosphorus levels should be obtained at least twice weekly. The dose may need to be decreased as PTH levels decrease in response to therapy: PTH decreasing less than 30%: Increase calcitriol dose PTH decreasing by more than 30% but less than 60%: Maintain calcitriol dose PTH decreasing by more than 60%: Decrease calcitriol dose PTH 1.5-3 times the upper limit of normal: Maintain calcitriol dose		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1-2 minutes	No	No
Concentration	Vial: 1 mcg/mL or 2 mcg/mL		
Stability	Can be drawn into syringe up to 8 hours before administration. Protect from direct sunlight.		
Monitoring	Vital signs, serum calcium, serum phosphorus, PTH level, hydration		
Mechanism of Action	Calcitriol is the active form of vitamin D3. It increases serum calcium by promoting calcium absorption from the intestines and decreasing loss from the kidneys. It also decreases excessive serum phosphorus, PTH and loss of calcium from the bones		
Adverse Reactions	Weakness, headache, somnolence, nausea, vomiting, dry mouth, constipation, muscle pain, bone pain, and metallic taste		
Dispensing Category	Green		

Calcium Chloride – CRRT Protocol

Restricted Units	Yes - See Grid		
Special Information	Overdosage or too rapid administration may produce serious cardiac effects, including bradycardia, arrhythmia, and ventricular fibrillation.		
IV Line Information	**Must be administered through a Central line except in emergent situations.**		
Therapeutic Use	Calcium replacement due to calcium-citrate binding during continuous renal replacement therapy (CRRT)		
Dose	25 – 50 mL/hr		
Titration Guidelines	See CRRT Protocol		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	8 mg/mL (8 grams/1000 mL)		
Stability	48 hours		
Monitoring	Vital signs, cardiac monitoring, serum and circuit ionized calcium		
Mechanism of Action	Calcium is necessary for normal cardiac function and muscle contraction. It is one of the factors involved in the coagulation of the blood.		
Adverse Reactions	Peripheral vasodilation, hypotenstion, bradycardia, arrhythmias, hypomagnesemia		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Calcium Chloride

Restricted Units	Yes, See Grid for IV Push		
Special Information	See unit specific protocols.		
IV Line Information	**Must be administered through a Central line except in emergent situations.**		
Therapeutic Use	Calcium chloride is used for the treatment of hypocalcemic.		
Dose	Depends upon patient's serum calcium levels. Dosed in grams.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 3-5 minutes	Yes	No
Concentration	20 mg/mL (1 gram/50 mL, 2 grams/100 mL)		
Stability	72 hours		
Monitoring	Vital signs, serum calcium		
Mechanism of Action	Calcium is necessary for normal cardiac function and muscle contraction. It is one of the factors involved in the coagulation of the blood.		
Adverse Reactions	Peripheral vasodilation, hypotenstion, bradycardia, arrhythmias, hypomagnesemia, IV site burning		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Calcium Gluconate

Restricted Units	No		
Special Information	See unit specific protocols.		
IV Line Information	Central or peripheral		
Therapeutic Use	Calcium gluconate is used for the treatment of hypocalcemic.		
Dose	Depends upon patient's serum calcium levels. Dosed in grams.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	20 mg/mL (1 gram/50 mL, 2 grams/100 mL)		
Stability	72 hours		
Monitoring	Vital signs, serum calcium		
Mechanism of Action	Calcium is necessary for normal cardiac function and muscle contraction. It is one of the factors involved in the coagulation of the blood.		
Adverse Reactions	Peripheral vasodilation, hypotenstion, bradycardia, arrhythmias, hypomagnesemia		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Cangrelor (Kengreal®)

Restricted Units	UCMC: ED, adult ICUs, OR/SDS/PACU, CSD, 6S, 4NW, and specialty units. WCH: ED, ICU, step down, cath lab, dialysis, OR/PACU		
Special Information	Stop infusion before transitioning to oral $P2Y_{12}$ receptor antagonists (clopidogrel, prasugrel, ticagrelor): **Transitioning patients to oral $P2Y_{12}$ antagonist therapy:** *Conversion to clopidogrel:* Administer 600 mg of clopidogrel immediately after discontinuing cangrelor infusion. Do not administer clopidogrel prior to cangrelor discontinuation. *Conversion to prasugrel:* Administer 60 mg of prasugrel immediately after discontinuing cangrelor infusion. Do not administer prasugrel prior to cangrelor discontinuation. *Conversion to ticagrelor:* Administer 180 mg of ticagrelor at any time during cangrelor infusion or immediately after discontinuing cangrelor infusion.		
IV Line Information	Peripheral or central		
Therapeutic Use	Platelet activity inhibition in patients undergoing percutaneous coronary intervention (PCI)		
Dose	30 mcg/kg bolus prior to PCI, followed immediately by an infusion of 4 mcg/kg/minute continued for at least 2 hours, or for the duration of the PCI, whichever is longer. Patients ≥ 100 kg will require a minimum of 2 infusion bags. See dosing guides: Patients up to 152 kg Patients greater than 152 kg		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes, rapid over <1 minute	No	Yes
Concentration	Vial: 50 mg / 10 mL vial (powder, must be reconstituted with 5 mL sterile water and diluted prior to bolus/infusion) Infusion: 50 mg/250 mL 0.9% sodium chloride or dextrose 5% (concentration 200 mcg/mL)		
Stability	0.9% sodium chloride: 24 hours stability Dextrose 5%: 12 hours stability		
Monitoring	Signs/symptoms of bleeding		
Mechanism of Action	$P2Y_{12}$ receptor antagonist which reversibly inhibits platelet activity		
Adverse Reactions	Hemorrhage, renal insufficiency, dyspnea, hypersensitivity reactions		
Dispensing Category	Red		

Chlorothiazide (Diuril®)

Restricted Units	None		
Special Information	For IVP: Add 18 mL of sterile water for injection to the vial to prepare the solution, with the resulting concentration being 28 mg/mL. Do not give subcut or IM.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Hypertension and edema		
Dose	0.5-2 g once or twice a day Many patients with edema respond to intermittent therapy (administration on alternate days or on 3 to 5 days each week). With an intermittent schedule, excessive response and undesirable electrolyte imbalance are less likely to occur.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes - Over 3 – 5 minutes	Yes – Infuse over 15 minutes	No
Concentration	Vial: 500 mg IVPB: Dose/50 mL		
Stability	24 hours		
Monitoring	Vital signs, urine output, reduction in edema, serum and urine electrolytes, CBC, renal function, hepatic function, serum uric acid, blood glucose		
Mechanism of Action	Chlorothiazide is a diuretic.		
Adverse Reactions	Hypotension, photosensitivity, rash, hyperglycemia, hyperuricemia, constipation, diarrhea, loss of appetite, nausea and vomiting, dizziness, headache, blurred vision		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

ChlorproMAZINE (Thorazine®)

Restricted Units	Yes, see IVP grid		
Special Information	Avoid contact with skin; may cause contact dermatitis.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Control of mania, treatment of schizophrenia, intractable hiccups		
Dose	25 – 50 mg IV/IM q 1-6 hours. May be given more often if patient remains symptomatic. May gradually increase to 400 mg q 4-6 hours until patient is controlled.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infuse 1 mg/min	No
Concentration	Vial: 25 mg/mL IVPB: Dose/50 mL		
Stability	24 hours		
Monitoring	Vital signs, mental status		
Mechanism of Action	Blocks postsynaptic mesolimbic dopaminergic receptors in the brain		
Adverse Reactions	Hypotension, tachycardia, dizziness, drowsiness, extrapyramidal side effects, seizures, blurred vision		
Dispensing Category	Green		

Cimetidine (Tagamet®)

Restricted Units	None		
Special Information	Rapid infusions may cause arrhythmias		
IV Line Information	Central or Peripheral		
Therapeutic Use	Treatment of gastroesophageal reflux, ulcers, GI bleeding Used in treatment of allergic reactions in addition to other histamine blockers		
Dose	300 mg IV q6h		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 3 – 5 minutes	Yes – Over 15 - 30 minutes	Yes
Concentration	Vial: 150 mg/mL IVPB: 300 mg/50 mL		
Stability	24 hours		
Monitoring	Vital signs, CBC, gastric pH and occult bleeding		
Mechanism of Action	Blocks histamine at H2-receptors of the gastric parietal cells resulting in reduced gastric acid secretion		
Adverse Reactions	Headsche, dizziness, agitation, drowsiness, nausea, vomiting, diarrhea		
Dispensing Category	Green		

Cisatracurium (Nimbex®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	**Patient must be intubated.** Does not possess any anxiolytic or analgesic activity, therefore, patient requires adequate sedation and/or pain control.		
IV Line Information	Central or Peripheral. Do not give IM.		
Therapeutic Use	Paralytic agent used to facilitate endotracheal intubation and for use in patients with prolonged mechanical ventilation		
Dose	IVP: initial dose 0.15 – 0.2 mg/kg over 1-2 minutes; maintenance dose of 0.03 mg/kg 40-60 minutes after initial dose and every 20 minutes thereafter based on clinical criteria Continuous Infusion: IV Bolus dose of 0.15 - 0.2 mg/kg over 1-2 minutes followed by a continuous infusion of 0.5 - 10 mcg/kg/min. Dosage is titrated to response (average starting dose = 3 mcg/kg/min)		
Titration Guidelines	Dosage is titrated to clinical endpoint or train of four.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1-2 minutes	No	Yes
Concentration	Standard: 0.8 mg/mL (200 mg/250 mL) Maximum: 1.6 mg/mL (400 mg/250 mL)		
Stability	24 hours		
Monitoring	Vital signs, may use peripheral nerve stimulator to monitor effect.		
Mechanism of Action	Non-depolarizing neuromuscular blocking agent that causes paralysis by producing a decreased response of the neurotransmitter acetylcholine at the myoneural junction.		
Adverse Reactions	Bradycardia, hypotension, flushing, itching, rash, bronchospasm		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Conivaptan (Vaprisol®)

Restricted Units	None		
Special Information	Restricted to use by Nephrology or Nephrology Consult		
IV Line Information	Central preferred, may be infused into large peripheral vein. Change infusion site every 24 hours to minimize vascular irritation. **Administered in a separate IV line, do not mixed with other medications.**		
Therapeutic Use	Euvolemic or hypervolemic hyponatremia		
Dose (mg)	**Loading dose:** 20 mg IV once **Maitenance dose:** 20 mg over 24 hours continuous infusion for 2-4 days; may increase to maximum of 40 mg over 24 hours if serum sodium increase is not sufficient (maximum serum sodium increase is 12 mEq/L/24 hours) Total duration of therapy not to exceed 4 days.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Loading dose over 30 minutes	Yes
Concentration	0.2 mg/mL in D5W		
Stability	Premixed solution, see manufacturer expiration date		
Monitoring	Rate of serum sodium increase (maximum serum sodium increase is 12 mEq/L/24 hours), blood pressure, volume status, urine output		
Mechanism of Action	Arginine vasopressin receptor antagonist of subtypes V_{1A} and V_2. Antidiuretic activity mediated through activation at the V_2 receptor, and antagonism by conivaptan promotes excretion of free water without affecting serum electrolytes. This results in net fluid loss, increased urine output, decreased urine osmolality, and increased serum sodium concentrations.		
Adverse Reactions	Vascular irritation, injection site reactions, orthostatic hypotension, fever, hypokalemia, hypertension, peripheral edema, atrial fibrillation, ECG abnormalities, constipation, nausea, vomiting, dry mouth, urinary tract infection, anemia		
Dispensing Category	Yellow		

Conjugated Estrogens (Premarin®)

Restricted Units	None		
Special Information	Black Box Warning: Estrogens with or without progestin should not be used to prevent cardiovascular disease. The risk of dementia may be increased in postmenopausal women taking estrogen. Unopposed estrogens may increase the risk of endometrial cancer in postmenopausal women. Can be given as deep IM, should be given slowly to minimize hot flashes		
IV Line Information	Peripheral or Central		
Therapeutic Use	Abnormal uterine bleeding Uremic bleeding		
Dose	Abnormal uterine bleeding: 25 mg x 1, may be repeated in 6-12 hours if needed (proceeding administration of a low dose oral contraceptive) Uremic bleeding: 0.6 mg/kg/day for 5 days		
Titration Guidelines	Not necessary; dose may be titrated based on patient response to therapy		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 1-3 minutes	No	No
Concentration	Vial: 25 mg per 5 mL		
Stability	14 days with refrigeration		
Monitoring	Resolution of abnormal bleeding, vasomotor symptoms, DVT/ PE		
Mechanism of Action	Estrogen is an endogenous hormone; conjugated estrogens supplement a patient's own estrogen.		
Adverse Reactions	Vasomotor symptoms (hot flashes, sweats), headache, abdominal pain, back pain, breast pain, vaginal hemorrhage, vaginitis, vaginal moniliasis, thromboembolic event (DVT/ PE/ CVA)		
Dispensing Category	Green		

Cosyntropin (Cortrosyn)

Restricted Units	None		
Special Information	May exhibits slight immunologic activity, does not contain foreign animal protein and is therefore less risky to use than natural ACTH.		
IV Line Information	Peripheral or Central		
Therapeutic Use	For the diagnosis of adrenal insufficiency, severe hypofunction of the pituitary, or primary adrenal insufficiency (Addison's disease).		
Dose	IV- 0.25 to 0.75 mg IM or IV over 2 min IV infusion- 0.25 mg administered at a rate of 0.04 mg/hr over a six-hour period to provide a greater stimulus to the adrenal glands		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 1 minute	No	No
Concentration	Vial: 250 mcg/mL		
Stability	250 mcg/mL solutions are stable for 24 hours at room temperature or for 21 days when refrigerated at 2 to 8 °C. After further dilution, solutions are stable for 12 hours at room temperature.		
Monitoring	Adrenal response via plasma cortisol levels or urinary steroid excretion (before and after infusion)		
Mechanism of Action	In patients with normal adrenocortical function, cosyntropin stimulates the synthesis of adrenal steroids. Cosyntropin does not significantly increase plasma cortisol concentration in patients with primary or secondary adrenocortical insufficiency.		
Adverse Reactions	Bradyarrhythmia, edema, hypertension, tachyarrhythmia, injection site pain, rash, dizziness, pancreatitis		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

cycloSPORINE (SandIMMUNE®)

Restricted Units	None		
Special Information	Dose titration to blood concentration of 100-450 ng/mL. Therapeutic ranges depend on amount of time post-transplant and type of transplant. Multiple drug interactions – check with pharmacist for specific drugs.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Immunosuppressant for prevention of solid organ or bone marrow transplant rejection.		
Dose	2-6 mg/kg/day		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infuse over 2 – 6 hours	Yes
Concentration	IVPB: Dose/100 mL Standard: 1 mg/mL (250 mg/250 mL)		
Stability	D5W: 24 hours (glass, Excel, PAB containers) NS: 12 hours (glass, Excel, PAB containers) PVC: 6 hours (D5W, NS)		
Monitoring	cycloSPORINE trough (or AUC) levels, serum electrolytes, renal function, hepatic function, blood pressure, lipid profile		
Mechanism of Action	Acts as immunosuppressant through inhibition of production and release of IL-2; inhibits IL-2 induced activation of T cells.		
Adverse Reactions	Nephrotoxicity, hypertension, neurotoxicity, hepatotoxicity, hyperkalemia, thrombocytopenia		
Dispensing Category	Red		

Cytomegalovirus Immune Globulin (CMVIG), Human (Cytogam®)

Restricted Units	None		
Special Information	Do not shake or dilute Administer through a 15 micron in-line filter and a constant infusion pump; a smaller 0.2 micron in-line filter is also acceptable Vital signs should be taken pre-infusion, mid-way and post-infusion, as well as before any increase in infusion rate		
IV Line Information	Central or Peripheral		
Therapeutic Use	Cytomegalovirus infection; Prophylaxis - Transplantation of heart, liver, pancreas, kidney or lung. Cytomegalovirus (CMV) immune globulin increases levels of antibody against CMV which reduces the incidence of serious CMV disease.		
Dose	Dosing must begin within 72 hours of transplantation. Kidney transplant: Initial dose of 150 mg/kg should be administered; this is followed by 100 mg/kg at 2, 4, 6, and 8 weeks, then 50 mg/kg at 12 and 16 weeks post-transplantation Liver, pancreas, lung and heart transplants: 150 mg/kg is given initially and repeated at 2, 4, 6, and 8 weeks, then 100 mg/kg at 12 and 16 weeks post-transplant		
Titration Guidelines	Begin infusion at 15 mg/kg/hr and increase to 30 mg/kg/hr, then 60 mg/kg/hr as tolerated; infusion not to exceed 75 mL/hr During the initial dose, rate increases may be made every 30 minutes as tolerated by the patient; subsequently, rate increases may be made every 15 minutes as tolerated		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	Yes
Concentration	Vial: 50mg/mL		
Stability	12 hours		
Monitoring	Vital signs, renal function, urine output,signs and symptoms of hemolysis, signs and symptoms of aseptic meningitis syndrome, signs and symptoms of non-cardiogenic pulmonary edema especially with high dosing		
Mechanism of Action	Cytomegalovirus (CMV) immune globulin increases levels of antibody against CMV which reduces the incidence of serious CMV disease.		
Adverse Reactions	Diaphoresis, facial flushing, shivering, nausea, vomiting, arthralgia, back pain, cramping, wheezing, fever, anaphylaxis, aseptic meningitis		
Dispensing Category	Black		

Appendix C - Guidelines for IV Medication Administration

Dantroline (Ryanodex®)

Restricted Units	Yes, See Grid		
Special Information	Mix by adding 5 mL sterile water for injection USP, ONLY and shake (suspension is orange in color). Do not dilute. Patients should be well hydrated to avert possibility of crystalluria Tell patients that receive intravenous dantrolene that they may experience decreased grip strength and weakness in leg muscles, and lightheadedness. These side effects can be expected post-operatively for up to 48 hours. Patients should not operate a vehicle or engage in hazardous activity at that time. See UC Health Malignant Hyperthermia guidelines.		
IV Line Information	Central or Peripheral. Administer into an IV catheter while an IV infusion of normal saline is freely running. May be administered into an indwelling catheter without a freely running infusion. Avoid extravasation – vesicant. If extravasation occurs, stop IV push and leave cannula/needle in place; gently aspirate extravasated solution. Do NOT flush line. Remove needle/cannula and elevate extremity.		
Therapeutic Use	Malignant Hyperthermia (used pre-operatively and post-operatively)		
Dose	Prophylaxis of Malignant Hypertheramia (Pre-operatively): 2.5 mg/kg IVP given 75 minutes before anticipated anesthesia. Treatment of Malignant hyperthermia: 1 mg/kg; up to a maximum cumulative dose of 10 mg/kg if physiologic and metabolic abnormalities continue. If symptoms reappear, repeat dosing starting with 1 mg/kg.		
Titration Guidelines	Repeat regimen if needed up to a maximum cumulative dose of 10 mg/kg		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 1 minute	No	No
Concentration	Vial: 250 mg		
Stability	6 hours; Mix immediately prior to use Protect from light		
Monitoring	Vital signs, signs of malignant hyperthermia: hypercarbia, metabolic acidosis, skeletal muscle rigidity, cyanosis, mottling of the skin, and fever.		
Mechanism of Action	Induces skeletal muscle relaxation by directly affecting the contractile response causing increased calcium which activates acute cellular catabolism causing hyperthermia.		
Adverse Reactions (rev. 01/09/15)	Hepatotoxicity, loss of grip strength and weakness in the legs, drowsiness, dizziness, pulmonary edema, thrombophelibitis, urticaria, erythema, constipation, fatigue, malaise, phlebitis, aplastic anemia, leukopenia		
Dispensing Category	Green		

Deferoxamine Mesylate (Desferal®)

Restricted Units	Yes, See Grid		
Special Information	Administer immediately following reconstitution; treatment should be completed in 3 hours Vials are for single use only because reconstituted with Sterile Water for Injection For acute iron intoxification, the preferred route is IM and should be given to all patients not in shock		
IV Line Information	Central or Peripheral		
Therapeutic Use	Acute iron toxicity; Chronic iron toxicity due to transfusion-dependent anemias		
Dose	Iron toxicity, acute and adjunct: 1 g IV/IM initially, then 500 mg every 4 hour for 2 doses, then subsequent doses of 500 mg every 4 to 12 hours as needed; MAX 6 g/day; initial IV rate not to exceed 15 mg/kg/hr, subsequent infusion not to exceed 125 mg/hr Iron toxicity, chronic, due to transfusion-dependent anemias: 0.5 to 1 g/day IM, plus 2 g IV per unit of blood; MAX 1 g/day with no transfusion, 6 g/day if 3 or more units of infused blood or packed red blood cells Iron toxicity, chronic, due to transfusion-dependent anemias: 1 to 2 g (20 to 40 mg/kg/day) SubCut infused over 8 to 24 hr		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	Vial: 500 mg, 2 grams IVPB: Dose/250 mL		
Stability	3 hours immediately after reconstitution; 24 hours if diluted in an intravenous solution		
Monitoring	Vital signs, serum iron, visual acuity		
Mechanism of Action	Deferoxamine mesylate is a chelating agent that readily chelates iron from ferritin and hemosiderin. It prevents the iron from entering into further chemical reactions.		
Adverse Reactions	Injection site pain, cardiac complications, hypertension, shock, immune hypersensitivity reaction, ototoxicity, eye/vision findings, flushing, abdominal discomfort, vomiting, or diarrhea. May turn urine to orange-rose color		
Dispensing Category	Red		

Appendix C - Guidelines for IV Medication Administration

Defibrotide (Defitelio®)

Restricted Units	No		
Special Information	Restricted to severe or very severe sinusoidal obstruction syndrome (SOS)/veno-occlusive disease		
IV Line Information	Central or Peripheral		
Therapeutic Use	Sinusoidal obstruction syndrome/veno-occlusive disease		
Dose	6.25 mg/kg q6h for at least 21 days, up to max of 60 days (until SOS resolution or hospital discharge). Infuse over 2 hours using a 0.2 micron in-line filter. Flush IV line with D5W or NS immediately before and after administration. Do not administer in the same line with other medications.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	Final concentration 4-20 mg/mL in D5W or NS		
Stability	4 hours at room temperature; 24 hours if refrigerated		
Monitoring	Hypersensitivity reactions, bleeding, resolution of SOS symptoms		
Mechanism of Action	Augments plasmin enzymatic activity to hydrolyze fibrin clots. Reduces endothelial cell (EC) activation and increases EC-mediated fibrinolysis by increasing tissue plasminogen activator and thrombomodulin expression. Decreases von Willebrand factor and plasminiogen activator inhibitor-1 expression.		
Adverse Reactions	Hemorrhage (any type), hypotension, diarrhea, vomiting, nausea, hyperuricemia, hypersensitivity reaction, graft versus host disease, sepsis, infection, pulmonary infiltrates, pneumonia		
Dispensing Category			

Appendix C - Guidelines for IV Medication Administration

Desmopressin (DDAVP®)

Restricted Units	None		
Special Information	Use is contraindicated in patients with CrCl below 50 mL/min.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Indicated for the prevention or control of polydipsia, polyuria, and dehyrdration associated with central diabetes insipidus caused by insufficient antidiuretic hormone. Also indicated to manange temporary polydipsia and polyuria associated with trauma to, or surgery in, the pituitary region. Indicated for patients with mild hemophilia A or mild to moderate classic von Willebrand's disease (Type I), with factor VII concentrations greater than 5%.		
Dose	Antidiuretic: 2 to 4 mcg/day or 0.025 micrograms/kg, usually in 2 divided doses Antihemorrhagic: 0.3 mcg/kg diluted 50mL 0.9% NaCl and infused slowly over 15-30 minutes		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes - Infuse over 15-30 minutes	No
Concentration	Vial: 4 mcg/mL IVPB: Dose/50 mL		
Stability	24 hours		
Monitoring	Vital signs, fluid ins & outs, renal function Antidiuretic use: Electrolytes, urine osmolality, urine volume Antihemorrhagic use: Activated partial thromboplastin time (aPTT), coagulation factor assay, von Willebrand factor antigen, von Willebrand factor assay		
Mechanism of Action	Antidiuretic- Increases water reabsorption in the kidney by increasing the cellular permeability of the collecting ducts and distal tubules, resulting in an increase in urine osmolality with a concurrent decrease in urine output. Antihemorrhagic- Increases plasma concentrations of clotting factor VIII (antihemophilic factor) and von Willebrand's factor activity causing increased platelet spreading and adhesion at sites of injury.		
Adverse Reactions	Hypertension, hyponatremia, water intoxication, headache, nausea, flushing, injection site reaction, vuval pain		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Dexamethasone Sodium Phosphate (Decadron®)

Restricted Units	None		
Special Information	Can be administered directly from the vial or can be added to NS or D5W for intravenous infusion. Acetate formulation is NOT for IV use		
IV Line Information	Central or Peripheral		
Therapeutic Use	Corticosteroid that is used as an anti-inflammatory and immunosuppressant. Also used as diagnostic aid (Cushing's syndrome) and antiemetic (cancer chemotherapy)		
Dose	Dosage is variable. Usual maximum dose is 80 mg/day.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – 10 mg or less over 1 minute	Yes- over 15-30 minutes	No
Concentration	Vial: 4 mg/mL, 10 mg/mL IVPB: Dose/50 mL		
Stability	24 hours		
Monitoring	Vital signs, blood glucose, electrolytes, hemoglobin, occult blood		
Mechanism of Action	Corticosteroids decrease formation, release and activity of the mediators of inflammation (e.g., kinins, histamine, liposomal enzymes, prostaglandins, leukotrienes), inhibit margination and subsequent cell migration to the area of injury, and also reverse the dilation and increased vessel permeability in the area, resulting in decreased access of cells to the sites of injury. Their immunosuppressive properties decrease the response to delayed and immediate hypersensitivity reactions. Additionally, the access of sensitized T lymphocytes and macrophages to target cells may also be prevented by corticosteroids.		
Adverse Reactions	May increase serum glucose, especially in patients with underlying hyperglycemic conditions. May also cause mood swings, psychoses, sodium and water retention, nausea/vomiting/indigestion, and peptic ulceration.		
Dispensing Category	Green		

Dexmedetomidine (Precedex®)

HIGH ALERT DRUG

Restricted Units	ICU, PACU, OR		
Special Information	Dexmedetomidine may provide "wakeful" sedation and mild analgesia with minimal effects on respiratory function. Should not typically be relied on as a sole agent for analgesia. May need to administer additional analgesia or as needed sedation to maintain goal comfort level. Consider dosage reduction with renal or hepatic impairment. No specific guidelines. Transient HYPERtension during loading dose infusion has been reported.		
IV Line Information	Central line preferred, Peripheral		
Therapeutic Use	Continuous infusion sedation, anxiolysis, and mild to moderate analgesia in critically ill patients Procedural sedation in non-intubated patients and sedation during awake craniotomy		
Dose	Continuous Sedation: Loading dose of 1 mcg/kg infusion over 10 minutes (optional if patient already sedated) followed by 0.2 to 0.7 mcg/kg/hr for 24 hours. Start infusion at 0.2 mcg/kg/hr, then titrate to effect. Unapproved dosages ranging 0.15 to 1.5 mcg/kg/hr have been studied and proven safe and effective for up to 120 hours (5 days). Procedural Sedation: Initial loading infusion of 0.5 to 1 mcg/kg IV over 10 minutes, followed by a maintenance infusion of 0.2 to 1 mcg/kg/hour IV titrated to desired clinical effect.		
Titration Guidelines	Titrate infusion to goal sedation level (e.g., light-to-moderate level sedation) Titrate off slowly to allow adequate transition to full awakening.		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	Standard: 4 mcg/mL (400 mcg /100 mL or 200 mcg/50 mL NS) Maximum: unknown		
Stability	Store at 25 C (77 F) with excursions allowed from 15 to 30 C (59 to 86 F). Expiration date: 48 hours, or as dated by manufacturer for premade bags Compatible with midazolam, fentaNYL, D5W, LR, D5LR, NS. Incompatible with Amphotericin B and Diazepam May adsorb to certain types of natural rubber.		
Monitoring	Sedation level; analgesia score; vital signs		
Mechanism of Action	A selective alpha-2 adrenoceptor agonist with sedative properties. Acts at the locus ceruleus and spinal cord to produce sedation and analgesia. Has alpha-1 activity at high doses or after rapid infusion. Decreases norepinephrine levels, brain noradrenergic activity, blood pressure, heart rate, and inhibits sympathetic activity.		
Adverse Reactions	Bradycardia, hypotension (infusion), hypertension (bolus), atrial fibrillation		
Dispensing Category	Yellow		

Dextran (Gentran®)

Restricted Units	None		
Special Information	Do not add any drugs to dextran solution. To prevent coagulation of blood, flush tubing well or change I.V. tubing before infusing blood after dextran Use filter with administration set. Dextran should not be administered unless it is a clear solution. Observe patients closely for anaphylactic reaction. Use with extreme caution in patients with renal or hepatic failure.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Blood volume expander used in treatment of shock or impending shock when blood or blood products are not available		
Dose	Dextran 40: 500-1000 mL at a rate of 20-40 mL/minute (maximum: 20 mL/kg/day for first 24 hours); 10 mL/kg/day thereafter; therapy should not be continued beyond 5 days The initial dose of 10 milliliters/kilogram may be infused as rapidly as necessary for improvement with the remaining dose being administered more slowly.		
Titration Guidelines	Infuse initial 500 mL at a rate of 20-40 mL/minute if hypervolemic. Reduce rate for additional infusion to 4 mL/minute		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	10% Dextran 40 /500mL		
Stability	If flakes or crystals do appear, they can be dissolved by heating in a water bath. No antibacterial preservative is present so partially used containers should be discarded.		
Monitoring	Fluid status including urine output should be monitored closely. Observe for signs of bleeding. Observe patients closely during the first minute of infusion and have other means of maintaining circulation should dextran therapy result in an anaphylactoid reaction; monitor hemoglobin and hematocrit, electrolytes, serum protein		
Mechanism of Action	Produces plasma volume expansion by virtue of its highly colloidal starch structure, similar to albumin		
Adverse Reactions	Mild hypotension, tightness of chest, wheezing, anaphylaxis		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Dextrose 50% Injection

Restricted Units	None		
Special Information	Dextrose 50% is a hypertonic solution.		
IV Line Information	Peripheral or Central Not for SubQ or I.M. administration. Dilute concentrated dextrose solutions for peripheral venous administration to a maximum concentration of 12.5%; in emergency situations, 25% dextrose has been used peripherally		
Therapeutic Use	Treatment of insulin-induced hypoglycemia (hyperinsulinemia or insulin shock) and adjunctive treatment of hyperkalemia in adolescents and adults		
Dose	Hypoglycemia (Doses may be repeated in severe cases): Infants > 6 months and Children: 0.5-1 g/kg/dose (1-2mL/kg of 50% solution) Max: 25 grams/dose Adolescents and Adults: 10-25 g (20-50mL of 50% solution) Treatment of Hyperkalemia: I.V. (in combination with insulin): Infants and Children: 0.5-1 g/kg (50% solution) combined with regular insulin 1 unit for every 4-5 g dextrose given; infuse over 2 hours (infusions as short as 30 minutes have been recommended); repeat as needed Adolescents and Adults: 25 g dextrose (50 mL D50W) combined with 5-10 units regular insulin infused over 5 minutes; repeat as needed		
Titration Guidelines	More rapid infusions (<30 minutes) may be associated with hyperglycemia and hyperosmolality and will exacerbate hyperkalemia; avoid use in patients who are already hyperglycemic For direct I.V. infusion, infuse at a maximum rate of 200 mg/kg over 1 minute; continuous infusion rates vary with tolerance and range from 4.5-15 mg/kg/minute		
Route	IVP	IVPB	Continuous Infusion
	Yes- in Code	No	No
Concentration	Dextrose 50% (500 grams/liter)		
Stability	24 hours		
Monitoring	Vital signs, blood and urine sugar, serum electrolytes, I & O, caloric intake		
Mechanism of Action	Dextrose is a monosaccharide which provides calories. When combined with insulin, dextrose stimulates the uptake of potassium by cells, especially in muscle tissue		
Adverse Reactions	Fever, mental confusion, unconsciousness, hyperosmolar syndrome, hyperglycemia, hypokalemia, acidosis, hypophosphatemia, hypomagnesemia, polyuria, glycosuria, ketonuria, vein irritation, tissue necrosis, polydipsia		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Diazepam (Valium®)

Restricted Units	Yes, See Grid		
Special Information	Can give undiluted		
IV Line Information	Central or Peripheral		
Therapeutic Use	Anxiolytic Prevention and treatment of alcohol/sedative withdrawal Sedation in ICU patients Anesthesia (induction and maintenance) Status epilepticus		
Dose	Dosage is variable. Dose usually ranges 2.5 to 5 mg IV, with schedule ranging every 8 to 12 hours. Continuous infusion is discouraged due to prolonged half-life and duration.		
Titration Guidelines	Patient-specific titration of intermittent dosage.		
Route	IVP	IVPB	Continuous Infusion
	Slowly, no faster than 5 mg/minute	No	No
Concentration	Vial: 5 mg/mL		
Stability	Per manufacture date on vial.		
Monitoring	Vital signs, Level of consciousness		
Mechanism of Action	Diazepam is a quick-onset (5-10 minutes), long-acting (12-24 hours) benzodiazepine derivative. Its primary action is the facilitation of GABA, an inhibitory neurotransmitter.		
Adverse Reactions	Respiratory depression, hypotension, mental status depression		
Dispensing Category	Green		

Diazoxide (Hyperstat IV®)

Restricted Units	Yes, See Grid		
Special Information	Administer IV only; must not be given intramuscularly or subcutaneously, as injection is strongly alkaline (pH 11.6).		
IV Line Information	Central or Peripheral		
Therapeutic Use	Hypertension (severe or pregnancy-related) Hyperinsulinism		
Dose	1 to 3 milligrams/kilogram (150 milligrams maximum) repeated at intervals of 5 to 15 minutes (maximum daily dose of 1200 mg) Alternative: 15 to 30 milligrams/minute, over 20 to 30 minutes		
Titration Guidelines	Repeat until a diastolic blood pressure below 100 mmHg is achieved up to 1200 mg daily. Maximal blood pressure reduction is usually within 5 minutes and lasts for 2 to 12 hours.		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 2 to 5 minutes	No	No
Concentration	Vial: 15 mg/mL		
Stability	Per manufacturer recommendations on vial		
Monitoring	Blood pressure, mental status, blood sugar, IV line integrity		
Mechanism of Action	Combination of direct arterial vasodilation and reflex sympathetic venoconstriction		
Adverse Reactions	Hypotension (acute, delayed, or prolonged), hyperglycemia, extravasation		
Dispensing Category	Green		

Digoxin (Lanoxin®)

Restricted Units	None		
Special Information	Hypokalemia may worsen adverse effects.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Supraventricular tachycardia; chronic heart failure		
Dose	**Loading dose** 0.5 mg IV once, then 0.25 mg every 6 hours x 2 doses **Maintenence** 0.125 to 0.25 mg IV once a day		
Titration Guidelines	Patient and condition-specific		
Route	IVP	IVPB	Continuous Infusion
	Yes – NTE 0.25 mg/min	No	No
Concentration	Amp: 250 mcg/mL Can be administered undiluted or diluted with a 4-fold or greater volume.		
Stability	Per manufacturer date on vial.		
Monitoring	Heart rate, blood pressure, serum digoxin concentrations		
Mechanism of Action	Digoxin exerts a positive inotropic effect on both the normal and failing heart through inhibition of active mycocardial transport of sodium and potassium, increasing influx of calcium into the myocardium for increased muscle contraction. Rate control is achieved through vagal stimulation.		
Adverse Reactions	Bradycardia, hyperkalemia, mental status changes		
Dispensing Category	Green		

Digoxin Immnue Fab (OVINE) (Digibind®)

Restricted Units	None		
Special Information	Must use an in-line 0.22 micron filter for IV infusion. If cardiac arrest is imminent, give as a bolus injection without filter. Doses greater than 10 vials more likely to result in febrile reactions. Each vial of Digibind(R) (38 milligrams purified digoxin-specific Fab fragments) will bind approximately 0.5 to 0.6 milligram of digoxin. Erroneous calculations may result from inaccurate estimates of the amount of digitalis ingested or absorbed or from nonsteady-state serum digitalis concentrations. May have marginal benefit if patient given dogoxin immune FAB in past.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Digoxin (digitais) overdosage		
Dose	**Acute Ingestion** Initial dose: Twenty (20) vials (760 milligrams); OR ten (10) vials, with close monitoring of clinical response, and repeat dosing of 10 vials as required. **Chronic Ingestion** Calculation based on Steady-State digoxin concentration Digibind Vials (#) = [Serum digoxin (ng/mL) x weight (kg)]/1000		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes (cardiac arrest only)	Yes – over 30 minutes	No
Concentration	Reconstitute with 4 mL of Sterile Water for Injection by gentle mixing. Resultant solution should be clear and colorless. Approximate protein concentration is 9.5 mg/mL		
Stability	Reconstituted product should be used within 4 hours.		
Monitoring	Digoxin levels (may be falsely elevated due to Digoxin Immune FAB antibodies), electrocardiogram, serum potassium level		
Mechanism of Action	Digoxin immune antigen-binding fragments (FAB) are specific antibodies for the reversal of the toxic effects of digitalis through active binding of digoxin.		
Adverse Reactions	Hypokalemia, febrile reaction, serum sickness (rare)		
Dispensing Category	Red		

Appendix C - Guidelines for IV Medication Administration

Dihydroergotamine (DHE)

<table>
<tr><td>Restricted Units</td><td colspan="3">None</td></tr>
<tr><td>Special Information</td><td colspan="3">Contraindications:
Hemiplegic or basilar type migraines
Black Box Warning – serious and/or life-threatening peripheral ischemia has been associated with the co-administration of DHE with potent CYP3A4 inhibitors such as protease inhibitors (ritonavir), clarithromycin, erythromycin, and azole antifungals
Use of serotonin $5HT_1$ receptor agonists (sumatriptan, zolmitriptan, rizatriptan, naratriptan, almotriptan, eletriptan, frovatriptan), ergot-like agents, or other serotonin agonists within 24 hours
Use of a monoamine oxidase (MAO) inhibitor (phenelzine, selegiline, tranylcypromine, isocarboxazid) and linezolid within 2 weeks
Underlying cardiac conditions including uncontrolled hypertension, ischemic heart disease, angina, coronary artery vasospasms (Prinzmetal’s angina), and peripheral vascular disease
Pregnancy or breast feeding
Severe renal or hepatic failure
Warning: Weakness, hyperreflexia, and incoordination have been reported rarely when $5\text{-}HT_1$ agonists have been co-administered with SSRIs (citalopram, escitalopram, fluoxetine, fluvoxamine, paroxetine, sertraline) and SNRIs (desvenlafaxine, duloxetine, levomilnacipran, milnacipran, venlafaxine).</td></tr>
<tr><td>IV Line Information</td><td colspan="3">Peripheral or central</td></tr>
<tr><td>Therapeutic Use</td><td colspan="3">Acute severe migraines (migraines unresponsive to non-opioid analgesics) or status migrainosus/intractable migraines (headache duration greater than 72 hours)</td></tr>
<tr><td>Dose</td><td colspan="3">Up to 1 mg IV/IM/subcutaneous at the first sign of headache. May repeat hourly to a maximum dose of: 3 mg per day IM or subcutaneously, 2 mg per day IV and 6 mg per week

<u>Intractable migraines</u>[i,ii,iii,iv]
0.5mg IV once. May increase dose to 1 mg IV every 8 hours based on response
Maximum dose in 24 hours = 3mg, Recommended maximum weekly dose = 15mg
Continuous IV infusion
Most patients will respond within 3 days, therefore if no benefit after 72 hours discontinue therapy</td></tr>
<tr><td>Titration Guidelines</td><td colspan="3">If significant nausea occurs at any time during continuous infusion, reduce the rate to 21 to 30 mL/hr</td></tr>
<tr><td rowspan="2">Route</td><td>IVP</td><td>IVPB</td><td>Continuous Infusion</td></tr>
<tr><td>Slowly over 2-5 minutes</td><td>No specific data on IVPB, but has been given at UH 1mg in 100mL normal saline infused over 1 hour</td><td>3 mg in 1,000 mL normal saline at 42 mL/hr</td></tr>
<tr><td>Concentration</td><td colspan="3">1 mg/mL</td></tr>
<tr><td>Stability</td><td colspan="3">Make sure solution is clear of particulate matter and clear; stable for 24-96 hours[ii]</td></tr>
<tr><td>Monitoring</td><td colspan="3">Patient should be placed on continuous cardiac monitoring (CMU/telemetry)
Monitor for chest pain or signs and symptoms of angina, blood pressure, relief of headache</td></tr>
<tr><td>Mechanism of Action</td><td colspan="3">Alpha-adrenergic blocking agent that exerts a direct stimulatory effect on smooth muscle of peripheral and cranial blood vessels leading to vasoconstriction of the intracranial blood vessels. Also binds to 5HT and dopamine receptors.</td></tr>
<tr><td>Adverse Reactions

(rev. 12/31/16)</td><td colspan="3">Nausea/vomiting – pre-medicate with metoclopramide or ondansetron prior to dose
Cardiac adverse effects including coronary vasospasm, myocardial ischemia/infarction, arrhythmias, anxiety, jitteriness (akathisia), dystonic reactions, hypertension,
Other – diarrhea, dizziness
Ergot syndrome – paresthesias, dry gangrené, skin desquamation</td></tr>
<tr><td>Dispensing Category</td><td colspan="3">Yellow</td></tr>
</table>

Diltiazem (Cardizem®)

Restricted Units	Yes, See Grid		
Special Information	Store in refrigerator.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Used in the treatment of paroxysmal supraventricular tachycardia (PSVT) and to decrease rapid ventricular heart rates in atrial fibrillation/flutter (not effective in converting atrial fibrillation/flutter to sinus rhythm)		
Dose	Initial Bolus Dose of 0.25 mg/kg over 2 minutes (usual is a **10-20 mg** initial bolus dose) If no response within 15 minutes and patient is not hypotensive, repeat with 0.35 mg/kg (maximum 25 – 35 mg) Continuous Infusion: If bolus dose is successful, begin maintenance IV infusion of 5 to 15 mg/hr for 24 hours. Doses above 20 mg/hr are not considered beneficial.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 2 minutes	No	Yes
Concentration	1 mg/mL (100 mg/100mL)		
Stability	Mixed: 24 hours Unmixed Advantage® bags: 30 days		
Monitoring	Vital signs, cardiac monitoring, liver function tests		
Mechanism of Action	Inhibits the influx of calcium ions during membrane depolarization of cardiac and vascular smooth muscle. Slows AV nodal conduction time and prolongs AV nodal refractoriness.		
Adverse Reactions	Hypotension, AV block, bradycardia, edema, vasodilation, extrasystoles, palpitations.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

dimenhyDRINATE (Dramamine®)

Restricted Units	None		
Special Information	Caution in patients where anticholineric effects may aggravate pre-existing condition (e.g, narrow angle glaucoma, urinary retention, pyloric obstruction)		
IV Line Information	Central or Peripheral May be given IM		
Therapeutic Use	Antiemetic, antihistamine, antivertigo		
Dose	12.5-50 mg		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes - over 2 min	No	No
Concentration	50 mg/mL dilute to 10 mL with normal saline for injection		
Stability	Stable for 10 days in normal saline or D5W.		
Monitoring	CNS depression, anticholinergic side effects.		
Mechanism of Action	dimenhyDRINATEconsists of equimolar proportions of diphenhydrAMINE and chlorotheophylline. dimenhyDRINATE inhibits labyrinthine stimulation.		
Adverse Reactions	Sedation, dizziness, anticholineric effects (dry mouth, blurred vision, diplopia, constipation, tachycardia).		
Dispensing Category	Green		

diphenhydrAMINE (Benadryl®)

Restricted Units	None		
Special Information	Caution in patients where anticholinergic effects may aggravate pre-existing condition (e.g., narrow angle glaucoma, urinary retention, pyloric obstruction)		
IV Line Information	Peripheral or Central May be given IM		
Therapeutic Use	Treatment or prophylaxis of hypersensitivity reactions or dystonic reactions to other medications, esp antipsychotics. Occasionally as bedtime sleep aid or anxiolytic.		
Dose	6.25-50 mg		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes over 1 min	No	No
Concentration	Vial: 50 mg/mL		
Stability	Store at room temperature. Protect from light.		
Monitoring	Vital signs, CNS depression or excitation, anticholinergic side effects.		
Mechanism of Action	Histamine-1 receptor blocker.		
Adverse Reactions	Sedation, dizziness, paradoxical excitation, hallucinations, anticholinergic effects.		
Dispensing Category	Green		

DOBUTamine (Dobutrex)

Restricted Units	Yes, See Grid		
Special Information	Correct hypovolemia prior to administration.		
IV Line Information	Central line preferred. Peripheral line can be used in urgent situations.		
Therapeutic Use	Severe heart failure, cardiogenic shock.		
Dose	2.5 - 20 mcg/kg/min		
Titration Guidelines	Start with 2.5 - 5 mcg/kg/min initially; increase gradually in increments of 2.5 mcg/kg/min up to 20 mcg/min until desired response.		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	4 mg/mL (1000 mg/250 mL)		
Stability	Compounded: 48 hours Premixed: 30 days out of wrapper		
Monitoring	Vital signs, cardiac monitoring, CVP, MAP, urine output, and serum potassium. If Swan-Ganz catheter in place: CI, PCWP, SVR		
Mechanism of Action	Directly stimulates $beta_1$-adrenergic receptors. Also stimulates $beta_2$-adrenergic and alpha-adrenergic receptors, but to a much lesser degree. Unlike DOPamine, DOBUTamine does not release stored catecholamines, nor does it have any effect on dopaminergic receptors.		
Adverse Reactions	Ventricular arrhythmias, increased heart rate, hypotension, nausea, headache, angina, shortness of breath, increased shunt fraction (pulmonary vasodilation)		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Dolasetron (Anzemet®)

Restricted Units	None		
Special Information	Caution in patients with hypokalemia, hypomagnesemia, prolonged QT_c or AV block II or III or those receiving class I or III antiarrhythmic agents		
IV Line Information	Central or peripheral		
Therapeutic Use	Anti-emetic for chemotherapy-induced or post-operative nausea and vomiting		
Dose	12.5-100 mg		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes- rate NTE 200 mg/min	No	No
Concentration	20 mg/mL		
Stability	Protect from light. After dilution in normal saline or D5W stable for 24 hours at room temperature and 48 hours in refrigerator		
Monitoring	Vital signs		
Mechanism of Action	5-HT_3 (serotonin) receptor antagonist which acts on the receptors in the lining of the GI tract blocking signals to the CNS		
Adverse Reactions	Cardiac dysrhythmias, hypotension, abdominal pain, diarrhea, headache, blurred vision		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

DOPamine (Intropin)

Restricted Units	Yes, See Grid		
Special Information	Watch infusion site for infiltration, which can cause sloughing and necrosis at injection site. If infiltration happens, apply cold compress and use supportive care. Can consider nitroglycerin ointment topically OR phentolamine IV or subcut around the injection site.		
IV Line Information	Central line highly recommended to prevent possibility of extravasation. Peripheral line can be used but rate should not exceed 5 mcg/kg/min unless an emergency..		
Therapeutic Use	Hypotension, heart failure		
Dose	Hemodynamic effects are dose-dependent: **1-5 mcg/kg/min**. - Stimulation of dopaminergic receptors, causing renal & mesenteric artery dilation, increasing renal blood flow. (controversial) Usually no change in cardiac output(CO), stroke volume (SV), heart rate(HR), or contractility. Systemic vascular resistance(SVR) no change to slight decrease. **5-10mcg/kg/min**. - Stimulation of beta-receptors. Predominant effects are to increase CO, SV and contractility. No change to slight increase in HR. No change to slight increase in SVR. Renal blood flow may still increase. **10mcg/kg/min**. - Stimulation of alpha-receptors. Predominant effect is to increase SVR by peripheral vasoconstriction. Although SV and contractility increase, CO decreases due to increased SVR. Renal blood flow decreases. No change in HR.		
Titration Guidelines	Increase by 1-4 mcg/kg/min every 10-30 minutes until desired effect.		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	1.6 mg/mL (400 mg/250 mL)		
Stability	Compounded: 48 hours Premixed: 30 days out of wrapper		
Monitoring	Blood pressure, EKG, heart rate, CVP, MAP, urine output. If Swan-Ganz catheter in place: CI, PCWP, SVR, and PVR.		
Mechanism of Action	A precursor of norepinephrine, which acts directly on peripheral dopaminergic receptors to produce renal and mesenteric vasodilation as well as beta- and alpha-adrenergic receptors, depending on the dosage used. Additionally, it acts indirectly by releasing norepinephrine from sympathetic nerve storage sites.		
Adverse Reactions	Ventricular arrhythmias, increased heart rate, gangrene of the extremities (occurs with large doses for long periods of time), nausea, vomiting and angina pectoris		
Dispensing Category	Green		

Doxapram (Dopram®)

Restricted Units	Yes, See Grids		
Special Information	Caution with history of seizure disorder, mechanical respiratory obstruction, severe hypertension, head injury or CVA.		
IV Line Information	Peripheral or central.		
Therapeutic Use	Stimulation of respiration in patients with drug-induced (post anesthesia or overdose) respiratory depression or in patients with COPD and hypercapnia.		
Dose	1-2 mg per min		
Titration Guidelines	Adjust rate to desired level of respiratory stimulation and lack of adverse effects.		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 1 minute	No	No
Concentration	Vial: 20 mg/mL.		
Stability	Stable in D5W or Normal saline. Incompatible with alkaline solutions.		
Monitoring	Vital signs, cardiac rhythm, DTRs		
Mechanism of Action	Respiratory stimulation mediated through peripheral carotid chemoreceptors resulting in increased tidal volume and to a lesser extent increase in respiratory rate.		
Adverse Reactions	CNS overstimulation, seizures, thrombophebitis secondary to extravasation, hemolysis, chest pain, dyspnea, cardiac dysrhythmias.		
Dispensing Category	Green		

Doxercalciferol (Hectorol®)

Restricted Units	None		
Special Information	IV injection should be protected from light		
IV Line Information	Central or peripheral		
Therapeutic Use	Treatment of secondary hyperparathyroidism in patients with chronic kidney disease		
Dose	Initial dose: iPTH level >400 pg/mL: 4 mcg 3 times per week after dialysis		
Titration Guidelines	Dose should be titrated to lower iPTH to 150-300 pg/mL. Dose is adjusted at 8 week intervals • If iPTH level decreased by <50% and is >300 pg/mL: Increase by 1-2 mcg at 8 week intervals • If iPTH level decreased by >50% and is >300 pg/mL: Maintain current dose • If iPTH level is 150-300 pg/mL: Maintain current dose • If iPTH level is <100 pg/mL: Hold doses for 1 week, then resume at a lower dose		
Route	IVP	IVPB	Continuous Infusion
	Yes	No	No
Concentration	Amp: 2 mcg/mL		
Stability	N/A		
Monitoring	Vital signs Hyperparathyroidism, on dialysis: serum calcium, phosphorus, intact PTH at baseline, then weekly for 12 weeks, then periodically Hyperparathyroidism, pre-dialysis: serum calcium, phosphorus, & intact PTH every 2 weeks for 3 months after initiation or dose adjustment, then monthly for 3 months, and every 3 months thereafter		
Mechanism of Action	Doxercalciferol is a synthetic analogue of vitamin D(2) that regulates blood calcium levels, stimulates bone growth, and suppresses parathyroid hormone (PTH) synthesis and secretion. These therapeutic effects are mediated by the drug's biologically active metabolites that interact with specific receptor proteins in target tissues.		
Adverse Reactions	Edema, malaise, headache, nausea, vomiting, itching, dyspnea		
Dispensing Category	Green		

Droperidol (Inapsine®)

Restricted Units	Yes, See Grid		
Special Information	Doses greater than 1.25 mg require continuous cardiac monitoring. Doses of less than or equal to 1.25 mg do not require monitoring. Droperidol is contraindicated in patients with known or suspected QT prolongation.		
IV Line Information	Central or peripheral		
Therapeutic Use	Droperidol is used to reduce the incidence of nausea and vomiting associated with surgical and diagnostic procedures.		
Dose	Initial maximum dose 2.5 mg IM/IV, may repeat 1.25 mg dose based on patient response. Caution should be exercised in giving additional doses due to the potential risk for cardiac arrhythmias.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 1 – 2 minutes	No	No
Concentration	2.5 mg/mL		
Stability	N/A		
Monitoring	Vital signs and ECG should be monitored routinely.		
Mechanism of Action	Droperidol centrally blocks the action of dopamine by binding to dopamine receptors and when reuptake is prevented, a strong antidopaminergic, antiserotonic response occurs with a decrease in affective behavior. Additionally, inhibition of the chemoreceptor trigger zone also occurs.		
Adverse Reactions	QT interval prolongation, cardiac arrhythmias, tachycardia, hypotension, extrapyramidal side effects (i.e. dystonias, akathisia)		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Ecallantide (Kalbitor®)

Restricted Units	None		
Special Information	Black Box Warning: Anaphylaxis has been reported after administration of Ecallantide. Should only be administered with appropriate medical support to manage anaphylaxis and hereditary angioedema.		
IV Line Information Administration Guidelines	Not To Be Administered Intravenously Inject Ecallantide into the skin of the abdomen, thigh, or upper arm. Repeat the procedure for each of the 3 vials comprising the Ecallantide dose. The injection site for each of the injections may be in the same or in different anatomic locations (abdomen, thigh, upper arm). There is no need for site rotation. Injection sites should be separated by at least 2 inches (5 cm) and away from the anatomical site of attack.		
Therapeutic Use	Ecallantide is indicated for treatment of acute attacks of hereditary angioedema (HAE) in patients 16 years of age and older.		
Dose	The recommended dose of Ecallantide is 30 mg (3 mL), administered subcutaneously in three 10 mg (1 mL) injections. If the attack persists, an additional dose of 30 mg may be administered within a 24 hour period.		
Titration Guidelines	None		
Route	IV	IVPB	Continuous Infusion
	No	No	No
Concentration	10 mg/mL		
Stability	Keep refrigerated (2ºC to 8ºC/36ºF to 46ºF). Vials removed from refrigeration should be stored below 86ºF/30ºC and used within 14 days or returned to refrigeration until use. Protect vials from light until use.		
Monitoring	Anaphylaxis has been reported after administration of Ecallantide. Because of the risk of anaphylaxis, Ecallantide should only be administered with appropriate medical support to manage anaphylaxis and hereditary angioedema. Healthcare professionals should be aware of the similarity of symptoms between hypersensitivity reactions and hereditary angioedema and patients should be monitored closely.		
Mechanism of Action	Ecallantide is a potent, selective, reversible inhibitor of plasma kallikrein. It binds to plasma kallikrein and blocks its binding site, inhibiting the conversion of HMW kininogen to bradykinin. By directly inhibiting plasma kallikrein, Ecallantide reduces the conversion of HMW kininogen to bradykinin and thereby treats symptoms of the disease during acute episodic attacks of HAE.		
Adverse Reactions	Headache, nausea, diarrhea, fever, injection site reactions, such as redness, rash, swelling, itching, or bruising and stuffy nose.		
Dispensing Category	Black		

Edaravone (Radicava®)

Restricted Units	None		
Special Information	Restricted to outpatient use for ALS with verification of payor source		
IV Line Information	Peripheral or Central		
Therapeutic Use	Amyotrophic lateral sclerosis (ALS)		
Dose	60 mg (2 x 30 mg IVPB bags) Initial cycle: daily dosing for 14 days, then 14-day drug-free period Subsequent cycles: daily dosing for 10 out of 14 days, followed by a 14-day drug-free period		
Titration Guidelines	Administer total 60 mg dose over ~60 minutes (3.33 mL/min)		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	IVPB: 0.3 mg/mL		
Stability	Use within 24 hours of opening outer-wrap. DO NOT USE if oxygen indicator in unopened outer-wrap bag has turned blue/purple		
Monitoring	Monitor for hypersensitivity reactions – discontinue if any signs/symptoms of hypersensitivity.		
Mechanism of Action	Unknown. Edaravone is a free radical and peroxynitrite scavenger that prevents oxidative damage to cell membranes, may contribute to inhibiting progression of ALS.		
Adverse Reactions	Abnormal gait, bruising, headache, dermatitis, eczema, tinea, glycosuria, dyspnea, hypoxia, respiratory failure, hypersensitivity/anaphylaxis		
Dispensing Category	Red		

Edrophonium (Reversol®)

Restricted Units	None		
Special Information	Atropine should be administered along with edrophonium when reversing neuromuscular blockers to prevent excessive cholinergic effects.		
IV Line Information	Central or peripheral		
Therapeutic Use	Edrophonium is used to reverse the effects of nondepolarizing neuromuscular blockers. Edrophonium can also be used to diagnose myasthenia gravis.		
Dose	The recommended dose of edrophonium for reversal of neuromuscular blockers is 10 mg IV, given slowly over 30 to 45 seconds. The dosage may be repeated as needed until a cholinergic response is detected, but should not exceed 40 mg.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 30 seconds	No	No
Concentration	Vial: 10 mg/mL		
Stability	N/A		
Monitoring	Pre- and post-injection strength; heart rate, respiratory rate, blood pressure		
Mechanism of Action	Edrophonium binds the enzyme acetylcholinesterase, thus preventing the enzyme from binding acetycholine. This action causes the accumulation of acetycholine at cholinergic synapses.		
Adverse Reactions	Bradycardia, hypotension, nausea, vomiting, salivation, diarrhea, constricted pupils, diaphoresis		
Dispensing Category	Yellow		

Enalaprilat (Vasotec®)

Restricted Units	None		
Special Information	None		
IV Line Information	Central or Peripheral		
Therapeutic Use	Management of hypertension and congestive heart failure		
Dose	0.625 mg-1.25 mg IVP over 5 minutes q6hrs		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 5 minutes	No	No
Concentration	1.25 mg/mL		
Stability	N/A		
Monitoring	Blood pressure, renal function		
Mechanism of Action	Angiotensin-converting enzyme inhibitor that prevents the conversion of angiotensin I to angiotensin II (a potent vasoconstrictor)		
Adverse Reactions	Hypotension, chest pain, syncope, headache, dizziness, cough, dyspnea, worsening of renal function, angioedema, nausea, fatigue, rash		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Ephedrine

Restricted Units	Yes, See Grid		
Special Information			
IV Line Information	Peripheral or central		
Therapeutic Use	Hypotension due to spinal anesthesia		
Dose	5-25 mg/dose slow IVP, repeated every 5-10 min; Max 150 mg/day		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 3-5 minutes	No	No
Concentration	50 mg/mL Dilute to 5 mg/mL with 10 mL normal saline.		
Stability	Store at room temperature. Protect from light.		
Monitoring	Vital signs, EKG changes, urine output		
Mechanism of Action	Stimulates alpha and beta adrenergic receptors resulting in increased systolic and diastolic blood pressure and increased heart rate and contractility		
Adverse Reactions	Hypertension, palpitations, nausea and vomiting, tremor, anxiety		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

EPINEPHrine (Epifrin)

Restricted Units	Yes, See Grid		
Special Information	Watch infusion site for infiltration, which can cause sloughing and necrosis at injection site. If infiltration happens, apply cold compress and consider nitroglycerin ointment topically OR phentolamine IV or SC around the injection site. Check for photosensitivity reaction resulting in discoloration of the drug. Protect from light.		
IV Line Information	Infuse through central line only unless emergent situation.		
Therapeutic Use	Treatment of bronchospasms, anaphylactic reactions, cardiac arrest, hypotension		
Dose	Infusion: 1-10 mcg/min with titration to desired response Hypersensitivity Reaction: 0.3-0.5 mg IM or subcutaneously, may repeat in 10-15 minute intervals Asthma: 0.2-0.5 mg subcutaneously every 15-20 minutes for maximum 3 doses CODES: 1 mg IVP every 3-5 minute (Endotracheal administration: 2mg)		
Titration Guidelines	Per physician order.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 30 seconds	No	Yes
Concentration	40 mcg/mL (10 mg/ 250mL)		
Stability	48 hours		
Monitoring	Vital signs, cardiac monitor, infusion site for blanching or extravasation, blood glucose		
Mechanism of Action	Acts directly on both alpha and beta receptors. At lower doses (1-3 mcg/min), primarily beta receptors are stimulated. Higher doses (>3 mcg/min) result in alpha receptor stimulation. Hemodynamic Effects - direct stimulation of beta-1 receptors in the heart produces a positive inotropic and chronotropic effect. This results in an increase in cardiac output and oxygen consumption. Cardiac efficiency is decreased and the irritability of the heart muscle is increased resulting in alteration of the rhythmic function of the ventricles (i.e. fibrillation). Alpha receptors are stimulated resulting in increased peripheral vascular resistance thereby increasing perfusion pressure to the vital organs (heart and brain).		
Adverse Reactions	Arrhythmias, tachycardia, gangrene of the extremities, hyperglycemia, hypokalemia, gastric atony		
Dispensing Category	Green		

Erythropoietin (Epogen®, Procrit®)

Restricted Units	None		
Special Information	Subcutaneous administration is preferred. Epogen is restricted to patients receiving outpatient hemodialysis. Procrit is restricted to patients undergoing elective orthopedic procedures. All other patients will be therapeutically interchanged to darbepoietin.		
IV Line Information	Peripheral or central		
Therapeutic Use	Anemia of chronic renal failure Surgical procedure prophylaxis		
Dose	Anemia of chronic renal failure - 50-100 units/kg IV/SC 3 times per week; maintenance 12.5 – 525 units/kg 3 times per week Surgical procedure prophylaxis – 300 units/kg/day SC 10 days before surgery, day of surgery, and for 4 days after OR 600 units/kg once weekly (21, 14, 7 days prior to surgery) plus a fourth dose on the day of surgery		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes	No	No
Concentration	2,000 units/mL, 3,000 units/mL, 4,000 units/mL, 10,000 units/mL, 20,000 units/mL, 40,000 units/mL		
Stability	Do not dilute. Store at 36 – 46^0 F. Do not freeze or shake.		
Monitoring	Vital signs, CBC with differential		
Mechanism of Action	Erythropoietin is a glycoprotein that exerts the same biological effects as endogenous erythropoietin that is produced in the kidney. It stimulates the division and differentiation of committed erythroid progenitors in the bone marrow increasing red blood cell production.		
Adverse Reactions	Common: iron deficiency, arthralgia, headache Serious: HF, DVT, HTN, AMI, PE, thrombotic disorder, CVA, seizure, TIA		
Dispensing Category	Red		

Appendix C - Guidelines for IV Medication Administration

Epoprostenol (Flolan®, Veletri®)

HIGH ALERT DRUG

Restricted Units	No		
Special Information	See **UC Health Guidelines** **FLOLAN must be diluted with sterile diluent for Flolan only and must be placed on ice throughout infusion. VELETRI may be used at room temperature.** Infusion cannot be acutely discontinued secondary to life-threatening refractory pulmonary hypertension When changing from one line to another, it is imperative to instill the appropriate amount of solution into the new line to avoid interruption in therapy Must not be mixed with other drugs prior to or during administration		
IV Line Information	Central line preferred due to more reliable access; peripheral line may be used for initiation prior to placement of central line, or for brief periods when central access is lost Use a 0.22 micron filter		
Therapeutic Use	Primary pulmonary hypertension		
Dose	2 nanogram/kg/min initially then adjusted per patient response		
Titration Guidelines	Dose adjustments by physician order		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	0.5 - 1.5 mg/100 mL Sterile Diluent Higher concentrations may be appropriate for patients with higher dose requirements		
Stability	FLOLAN: Protect from light, use with cold pouch; IV infusion must be changed every 24 hours. If refrigerated, stable 48 hours. Room temperature only 8 hours. VELETRI: Protect from light, use at room temperature; When administered immediately following preparation, maximum administration duration is 48 hours for drug concentrations of <60,000 ng/mL and 72 hours for concentrations ≥60,000 ng/mL; Veletri may be stored for up to 8 days refrigerated, and then administered for up to 24 hours for drug concentrations of <15,000 ng/mL and 48 hours for drug concentrations ≥15,000 ng/mL		
Monitoring	Standing and supine blood pressure after dose adjustments		
Mechanism of Action	Direct vasodilation of pulmonary and systemic arterial vessels, inhibition of platelet activation.		
Adverse Reactions	Nausea, vomiting, headache, hypotension, flushing, chest pain, bradycardia, dyspnea, dizziness, jaw pain, flu-like symptoms		
Dispensing Category	Black		

Eptifibitide (Integrilin®)

Restricted Units	Yes, See Grid		
Special Information	None		
IV Line Information	Central or Peripheral		
Therapeutic Use	For the treatment of patients with acute coronary syndrome, including patients who are to be managed medically and those undergoing percutanuous intervention (PCI).		
Dose	ACS: Bolus of 180 mcg/kg over 1-2 minutes, followed by a continuous infusion of 2 mcg/kg/minute (max of 15mg/hour). Percutaneous Intervention: (Not in patients presenting with ACS) Bolus of 180 mcg/kg administered immediately before the initiation of PCI followed by a continuous infusion of 2 mcg/kg/minute and a second 180 mcg/kg bolus 10 minutes after the first bolus. Infusion should be continued for up to 18-24 hours. Dose adjustments for creatinine clearance less than 50 mL/min		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 2 minutes	No	Yes
Concentration	Vial: 20 mg/10 mL Drip: 75 mg/100 mL		
Stability	Stable for 2 months at room temperature (77° F)		
Monitoring	Monitor CBC and coagulation parameters at least every 12 hours if not more frequently. Also monitor for any signs/symptoms of excessive bleeding.		
Mechanism of Action	Blocks the glycoprotein IIb/IIIa receptor, the binding site for fibrinogen, von Willebrand factor, and other ligands. Inhibition of binding at this common receptor reversibly blocks platelet aggregation and prevents thrombus.		
Adverse Reactions	Hypotension, injection site reaction, major bleeding, thrombocytopenia, intracranial hemorrhage and anaphylaxis		
Dispensing Category	Yellow		

Esmolol (Brevibloc®)

Restricted Units	Yes, See Grid		
Special Information	Monitor heart rate and blood pressure Use with caution in patients with bronchospastic disease		
IV Line Information	Central or Peripheral		
Therapeutic Use	Supraventricular tachyarrhythmias Tachyarrhythmias post MI Dissecting aortic aneurysm		
Dose	Loading dose of 500 mcg/kg over 1-2 minutes followed by an infusion of 25 - 50 mcg/kg/min. If there is no response after 5 minutes, repeat 500 mcg/kg bolus dose and increase infusion to 50 - 100mcg/kg/min. May increase rate to a maximum 300 mcg/kg/min.		
Titration Guidelines	Begin 25 - 50 mcg/kg/min and titrate to response by 25 - 50 mcg/kg/min increments up to 300 mcg/kg/min		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1- 2 minutes	No	Yes
Concentration	20 mg/mL (2000 mg/ 100 mL)		
Stability	Premade: 30 days Admixed: 48 hours		
Monitoring	Blood pressure, heart rate, cardiac monitor		
Mechanism of Action	Short acting beta-adrenergic blocking agent. At low doses, has little effect on $beta_2$ receptors of bronchial and vascular smooth muscle.		
Adverse Reactions	Hypotension, bradycardia, CNS disturbances, wheezing/bronchoconstriction, AV block, phlebitis		
Dispensing Category	Yellow		

Ethacrynic Acid (Edecrin®)

Restricted Units	None		
Special Information	Restricted at UC Health to patients with documented allergy to sulfa or other loop diuretics. Do not give subQ or IM.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Edema		
Dose	0.5/1 mg/kg/dose (max 100 mg/dose); repeat dosing not routinely recommended; however, if indicated, repeat every 8-12 hours		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – infuse at rate of 10 mg/minute	Yes – infuse at rate of 10 mg/minute	No
Concentration	Vial: 50 mg Injection : Dilute to concentration of 1 mg/mL		
Stability	24 hours in NS, D5W, LR		
Monitoring	Vital signs, urine output, reduction in edema, serum electrolytes, fluid status, renal function		
Mechanism of Action	Diuretic that inhibits reabsorption of sodium and chloride in the ascending loop of Henle and distal renal tubule, causing increased excretion of water, sodium, chloride, magnesiu, and calcium		
Adverse Reactions	Thrombophlebitis (rotate injection sites if repeat dosing is needed), hypokalemia, apprehension, brain disease, chills, confusion, fatigue, headache, vertigo, rash, vasculitis, electrolyte abnormalities, diarrhea, dysphagia, hematuria, thrombocytopenia, neutropenia, abnormal hepatic function, local pain, blurred vision, tinnitus, deafness, increase serum creatinine, fever		
Dispensing Category	Red		

Etidronate (Didronel®)

Restricted Units	Yes, See Grid		
Special Information	None		
IV Line Information	Central or peripheral.		
Therapeutic Use	Symptomatic treatment of Paget's disease and heterotopic ossification due to spinal cord injury or after total hip replacement, hypercalcemia associated with malignancy		
Dose	Hypercalcemia of malignancy: 7.5 mg/kg/day over at least 2 hours for 3 successive days.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes-over 2 hours	No
Concentration	Vial: Dose/250 mL		
Stability	48 hours		
Monitoring	Vital signs, calcium, serum creatinine, BUN, phosphate		
Mechanism of Action	Etidronate acts primarily on bone by modifying the crystal growth of calcium hydroxyapatite by absorption onto the crystal surface. Depending upon concentration, the drug may either inhibit crystal resorption or crystal growth. Etidronate also slows the rate of bone by inducing osteoclast apoptosis and other osteoclast changes in the marrow.		
Adverse Reactions	Loss of taste, skin reactions, hyperphosphatemia, arthralgias, bone necrosis of the jaw, bone pain, myalgias		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Etomidate (Amidate®)

Restricted Units	Yes, see grid		
Special Information	IVP: use only in intubated patients or patients being emergently intubated		
IV Line Information	Avoid administration into small vessels due to severe irritation; preadministration of lidocaine may be used		
Therapeutic Use	Induction of general anesthesia		
Premedication	Lidocaine; used to reduce small vessel irritation		
Dose	Anesthesia: 0.2 – 0.6 mg/kg IV over 30-60 seconds for induction Rapid sequence intubation, induction: 0.15 – 0.3 mg/kg IVP		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes	No	No
Concentration	2mg/mL vial		
Stability	1 hour if drawn up at bedside		
Monitoring	BP, HR, telemetry, respiratory status, pulse oximetry, sedation score, infusion site for irritation		
Mechanism of Action	Ultrashort-acting nonbarbiturate hypnotic. Produces rapid anesthesia with minimal cardiovascular effects		
Adverse Reactions	Adrenal suppression, nausea, vomiting, pain at injection site, myclonus, transient skeletal movement, uncontrolled eye movements, huccups, arrhythmia, hemodynamic derangements, hypotension		
Dispensing Category	Green		

Factor VIIa Recombinant (NovoSeven RT®)

Restricted Units	None		
Special Information	See **UC Health Guidelines**		
IV Line Information	Central or peripheral		
Therapeutic Use	Treatment of bleeding episodes, or for the prevention of bleeding in surgery in patients with hemophilia A or B or congenital factor VII deficiency Off label indications (trauma, coagulopathy, bleeding in cardiac surgery, warfarin or other anticoagulant acute bleeting reversal): See **UC Health Guidelines**		
Dose	Dependent upon indication, see **UC Health Guidelines**		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes over 2-5 minutes	No	No
Concentration	1 mg/mL		
Stability	Use within 3 hours of reconstitution Protect from light		
Monitoring	Monitor for clinical hemostasis, may use prothrombin time, INR, aPTT, and/or factor VII clotting activity		
Mechanism of Action	Factor VII is a vitamin K-dependent clotting factor that activates the extrinsic pathway of the coagulation cascade and promotes hemostasis. It also activates coagulation factors X to Xa and IX to IXa.		
Adverse Reactions	Hypertension, hypotension, edema, fever, headache, pruritis, rash, decreased plasma fibrinogen, disseminated intravascular coagulation, fibrinolysis		
Dispensing Category	Black		

Factor VIII (Advate, Helixate, Kogenate, Recombinate, FeFacto, Xyntha)

Restricted Units	Yes, See Grid		
Special Information	See guidelines		
IV Line Information	Central or peripheral.		
Therapeutic Use	Management of hemophilia A for patients in whom a deficiency in factor VIII has been demonstrated; prevention and control of bleeding episodes.		
Dose	See guidelines		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	See guidelines	No
Concentration	Varies from manufacturer		
Stability	Use within 3 hours of reconstitution.		
Monitoring	Heart rate and blood pressure (before and during IV administration), AHF levels prior to and during treatment, development of factor VIII inhibitors, bleeding.		
Mechanism of Action	Antihemophilic factor is a high molecular weight glycoprotein which functions as a cofactor in the blood coagulation cascade.		
Adverse Reactions	Anaphylaxis, angina, dyspnea, fever, headache		
Dispensing Category	Black		

Appendix C - Guidelines for IV Medication Administration

Factor IX – Four Factor Activated (FEIBA NF®)

<table>
<tr><td>Restricted Units</td><td colspan="3">None</td></tr>
<tr><td>Special Information</td><td colspan="3">Also referred to as Prothrombin Complex Concentrate (PCC). Restricted: see <u>UC Health PCC Guidelines</u></td></tr>
<tr><td>IV Line Information</td><td colspan="3">Central or peripheral line. Administer in a separate IV line, do not mix with other medications.</td></tr>
<tr><td>Therapeutic Use</td><td colspan="3">For the control of spontaneous bleeding episodes or to cover surgical interventions in hemophilia A and hemophilia B patients with inhibitors

May be used off-label for a variety of bleeding conditions, including the reversal of the new oral anticoagulant, dabagitran. See <u>UC Health PCC Guidelines</u> for restrictions and use.</td></tr>
<tr><td>Dose</td><td colspan="3">FDA-approved dosing in hemophilia A and hemophilia B:

<table>
<tr><th>Indication:</th><th>Units/kg</th><th>Dosing interval</th></tr>
<tr><td>Joint hemorrhage</td><td>50-100</td><td>12 hours</td></tr>
<tr><td>Mucus membrane bleeding</td><td>50-100</td><td>6 hours</td></tr>
<tr><td>Soft tissue hemorrhage</td><td>100</td><td>12 hours</td></tr>
<tr><td>Other severe hemorrhage</td><td>100</td><td>6-12 hours</td></tr>
</table>

See <u>UC Health PCC Guidelines</u> for dosing for specific indictions, including reversal of oral anticoagulants.

Do not exceed total daily dose of 200 units/kg</td></tr>
<tr><td>Titration Guidelines</td><td colspan="3">None</td></tr>
<tr><td rowspan="2">Route</td><td>IVP</td><td>IVPB</td><td>Continuous Infusion</td></tr>
<tr><td>Yes – Do not exceed rate of 2 units/kg/min</td><td>No</td><td>No</td></tr>
<tr><td>Concentration</td><td colspan="3">Varies from manufacturer</td></tr>
<tr><td>Stability</td><td colspan="3">Must be administered within 3 hours of reconstitution, protect from light.</td></tr>
<tr><td>Monitoring</td><td colspan="3">Levels of factor IX, pTT, CBC. Monitor for signs of clinical hemostasis. Monitor for signs of disseminated intravascular coagulation (DIC) including blood pressure and heart rate changes, cough, chest pain, decreased platelet count, decreased fibrinogen.</td></tr>
<tr><td>Mechanism of Action</td><td colspan="3">Contains activated Vitamin K-dependent coagulation factors (II, VII, IX, X). Replaces deficient clotting factors in the coagulation cascade to promote hemostasis. A complex of factor VII and tissue factor (via the extrinsic coagulation pathway) and factor XIa (via the intrinsic pathway) activate factor IX which, in combination with factor VIII, activates factor X. Prothrombin is converted to thrombin which, in turn, converts fibrinogen to fibrin.</td></tr>
<tr><td>Adverse Reactions</td><td colspan="3">DIC, thromboembolic events (stroke, venous thromboembolism, myocardial infarction), hypersensitivity reactions, bronchospasm</td></tr>
<tr><td>Dispensing Category</td><td colspan="3">Black</td></tr>
</table>

Appendix C - Guidelines for IV Medication Administration

Factor IX – Four Factor Inactivated Concentrate (Kcentra®)

<table>
<tr><td>Restricted Units</td><td>None</td></tr>
<tr><td>Special Information</td><td>Also referred to as Prothrombin Complex Concentrate (PCC). Restricted: see <u>UC Health PCC Guidelines</u>
Kcentra contains heparin and is contraindicated in patients with a heparin allergy or previous incidence of heparin-induced thrombocytopenia (HIT).</td></tr>
<tr><td>IV Line Information</td><td>Central or peripheral line.
Administer in a separate IV line, do not mix with other medications.</td></tr>
<tr><td>Therapeutic Use</td><td>For urgent reversal of acquired coagulation facor deficiency induced by vitamin K antagonists (e.g., warfarin) in adults with acute major bleeding.
See <u>UC Health PCC Guidelines</u> for other indications and UC Health restrictions.</td></tr>
<tr><td>Dose</td><td>Dose based on units of factor IX in product. Individual dosing based on patient INR and actual body weight up to but not exceeding 100 kg.
<table>
<tr><td>Pre-treatment INR:</td><td>2 - < 4</td><td>4 - 6</td><td>> 6</td></tr>
<tr><td>Dose (units of factor IX/kg)</td><td>25</td><td>35</td><td>50</td></tr>
<tr><td>Maximum dose (units of factor IX)</td><td>Not to exceed 2500</td><td>Not to exceed 3500</td><td>Not to exceed 5000</td></tr>
</table>
Repeat dosing not supported by evidence, not recommended by manufacturer.</td></tr>
<tr><td>Titration Guidelines</td><td>None</td></tr>
<tr><td>Route</td><td>
<table>
<tr><td>IVP</td><td>IVPB</td><td>Continuous Infusion</td></tr>
<tr><td>Yes – Administer at rate of 0.12 mL/kg/min up to a max of 8.4 mL/min</td><td>No</td><td>No</td></tr>
</table>
</td></tr>
<tr><td>Concentration</td><td>Varies from manufacturer, range of 20-31 units/mL</td></tr>
<tr><td>Stability</td><td>Use within 4 hours. Store refrigerated if not used immediately, then rewarm to 20-25°C prior to administration.</td></tr>
<tr><td>Monitoring</td><td>CBC, INR (baseline and 30 minutes post-dose), hemostasis, clinical response.</td></tr>
<tr><td>Mechanism of Action</td><td>Contains inactivated Vitamin K-dependent coagulation factors (II, VII, IX, X), and the antithrombotic Protein C and Protein S. Replaces deficient clotting factors in the coagulation cascade to promote hemostasis. A complex of factor VII and tissue factor (via the extrinsic coagulation pathway) and factor XIa (via the intrinsic pathway) activate factor IX which, in combination with factor VIII, activates factor X. Prothrombin is converted to thrombin which, in turn, converts fibrinogen to fibrin.</td></tr>
<tr><td>Adverse Reactions</td><td>May not be suitable for patients who have had a thromboembolic events (TEE) in the prior 3 months. Monitor for TEE including myocardial ischemia/infarction, stroke, other venous thromboembolism. Hypersensitivity reactions may also occur.</td></tr>
<tr><td>Dispensing Category</td><td>Black</td></tr>
</table>

Factor IX – Three Factor Inactivated (Profilnine®, Benefix®)

Restricted Units	Yes, See Grid		
Special Information	Also referred to as Prothrombin Complex Concentrate (PCC). UC Health carries Profilnine® brand. Restricted: see **UC Health PCC Guidelines**		
IV Line Information	Central or peripheral.		
Therapeutic Use	Control of bleeding in patients with factor IX deficiency (hemophilia B or Christmas disease). See **UC Health PCC Guidelines** for other indications and UC Health restrictions as this product may be useful in other bleeding episodes when factor IX – four factor inactivated (Kcentra®) is contraindicated secondary to heparin allergy.		
Dose	Dose based on units of factor IX in product. Individualized based on extent of factor IX deficiency, extent/location of bleeding, and clinical status. In general, factor IX 1 unit/kg will increase plasma factor IX level by 1%. Units factor IX dose = body weight (kg) * desired factor IX increase (%) *1 unit/kg See **UC Health PCC Guidelines** for dosing for off-label indications.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	See guidelines, rate not to exceed 10 mL/min for Profilnine	No
Concentration	Varies from manufacturer		
Stability	Reconstituted solution should be used within 3 hours, do not refrigerate		
Monitoring	Levels of factor IX, pTT, CBC, clinical hemostasis, disemminated intravascular coagulation (DIC): blood pressure and heart rate changes, cough, chest pain, decreased platelet count, decreased fibrinogen.		
Mechanism of Action	Replaces deficient clotting factor IX. A complex of factor VII and tissue factor (via the extrinsic coagulation pathway) and factor XIa (via the intrinsic pathway) activate factor IX which, in combination with factor VIII, activates factor X. Through this pathway, prothrombin is converted to thrombin which, in turn, converts fibrinogen to fibrin.		
Adverse Reactions	Anaphylaxis, thromboembolic complications, DIC, flushing, angioedema, hypotension, chest tightness, fever, headache, chills, dizziness, drowsiness, nausea, vomiting.		
Dispensing Category	Black		

Appendix C - Guidelines for IV Medication Administration

Famotidine (Pepcid®)

Restricted Units	None		
Special Information	None		
IV Line Information	Central or peripheral.		
Therapeutic Use	Treatment of duodenal ulcer, gastric ulcer, control gastric pH in critically ill patients, symptomatic relief in gastritis, gastroesophageal reflux, active benign ulcer, and pathological hypersecretory conditions.		
Dose	Duodenal ulcer disease: acute, 20 mg IV every 12 hours Esophagitis - Gastroesophageal reflux disease, Short term treatment: 20 mg IV every 12 hours Gastric hypersecretion: 20 mg IV every 12 hours Gastric ulcer, Short term treatment: acute, 20 mg IV every 12 hours Gastroesophageal reflux disease, Short-term, symptom treatment: 20 mg IV every 12 hours Stress ulcer prophylaxis : 20 mg IV every 12 hours		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes, rate NTE 10 mg/min	No	No
Concentration	Vial: 10 mg/mL		
Stability	7 days		
Monitoring	None		
Mechanism of Action	Competitive inhibition of histamine at H2 receptors of the gastric parietal cells, which inhibits gastric acid secretion.		
Adverse Reactions	Dizziness, headache, constipation. diarrhea		
Dispensing Category	Green		

FentaNYL (Sublimaze®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	Effects can be reversed with naloxone. Can be used in morphine allergic patients. Use with caution in patients intolerant to meperidine.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Analgesia and sedation		
Dose	Intermittent dosing: 25-100 mcg Infusion: 25-200 mcg/hr		
Titration Guidelines	Begin 25 mcg/hour, titrate by 25- 50 mcg increments per hour up to 200 mcg, then notify physician. Titrate according to objective pain assessment or sedation score.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 2 minutes	No	Yes
Concentration	Standard: 10 mcg/mL (2000 mcg/200 mL) Maximum: 20 mcg/mL (4000 mcg/200 mL)		
Stability	48 hours		
Monitoring	Vital signs and pain or sedation score		
Mechanism of Action	A synthetic opiate agonist that increases the pain threshold, alters pain perception, inhibits ascending pain pathways. Less histamine release results in potentially less hypotension		
Adverse Reactions	Hypotension, respiratory depression, chest wall rigidity, constipation		
Dispensing Category	Green		

Fluconazole (Diflucan®)

Restricted Units	None		
Special Information	Fluconazole can interact with multiple medications (e.g., cycloSPORINE, phenytoin, warfarin, amiodarone and others). These interactions may result in toxicity manifested as elevated serum concentrations or QTc prolongation, torsades de pointes, and cardiac arrest. Do not refrigerate. Restricted. See UC Health Guidelines		
IV Line Information	Central or Peripheral		
Therapeutic Use	A triazole antifungal. Prevents and treats certain fungal infections.		
Dose	50 to 400 mg IVPB daily. A loading dose may be given for the first dose.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – 200 mg over 60 mins 400 mg over 120 mins	No
Concentration	2 mg/mL (200 mg/100 mL or 400 mg/200 mL)		
Stability	7 days at room temperature. Do not refrigerate.		
Monitoring	Vital signs, skin reactions, QTc interval, liver function tests.		
Mechanism of Action	Inhibition of cytochrome P-450-dependent ergosterol synthesis.		
Adverse Reactions	Skin rashes, increased liver function tests, hypokalemia, QTc prolongation, torsades de pointes, and cardiac arrest.		
Dispensing Category	Green		

Flumazenil (Romazicon®)

Restricted Units	None		
Special Information	Flumazenil reverses the sedative effects of benzodiazepines. Respiratory effects are NOT reversed. Flumazenil can precipitate benzodiazepine withdrawal in benzodiazepine dependent individuals. Do not use in mixed drug overdoses as seizures may occur, particularly with tricyclic antidepressants.		
IV Line Information	Central or Peripheral. Administer through a freely running IV infusion into a large vein to minimize pain at the injection site.		
Therapeutic Use	Flumazenil injection is indicated for the complete or partial reversal of the sedative effects of benzodiazepines.		
Dose	0.2 mg IVP. May be repeated every 60 seconds up to a total dose of 1 mg.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 15 seconds	No	No
Concentration	0.1 mg/mL		
Stability	24 hrs		
Monitoring	Vital signs and neurologic status		
Mechanism of Action	Flumazenil competitively inhibits the activity of the benzodiazepine recognition site on the GABA/benzodiazepine receptor complex in the central nervous system.		
Adverse Reactions	Seizures, nausea, vomiting, cutaneous flushing, agitation, dizziness, phlebitis.		
Dispensing Category	Green		

Folic Acid

Restricted Units	None		
Special Information	Doses of folic acid greater than 0.1 mg daily may obscure pernicious anemia. Vitamin B12 must also be replaced in pernicious and other megaloblastic anemia.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Treatment of anemias due to nutritional deficiency.		
Dose	Adult: 0.4 – 1 mg IV		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 60 minutes	Yes
Concentration	1 mg / 50mL (Usually given in a Rally Pack)		
Stability	24 hours Protect from light		
Monitoring	Vital signs		
Mechanism of Action	Required for nucleoprotein synthesis and maintenance of normal erythropoiesis.		
Adverse Reactions	Allergic reactions, flushing		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Fomepizole (Antizol®)

Restricted Units	None		
Special Information	Restricted: See **UC Health Guidelines**		
IV Line Information	Central or peripheral.		
Therapeutic Use	Ingestion of ethylene glycol or methanol and osmol gap ≥10 mOsm; ingestion of ethylene glycol or methanol and metabolic acidosis; osmol gap ≥10 mOsm plus metabolic acidosis; or known serum ethylene glycol or methanol level >25 mg/dL		
Dose (mg)	**Loading dose:** 15 mg/kg IV once **Maitenance dose (no dialysis):** 10 mg/kg q12h x4 doses followed by 15 mg/kg q12h until ethylene glycol or methanol levels <20 mg/dL **Maitenance dose (dialysis):** 10 mg/kg x4 doses followed by 15 mg/kg; Dosing frequency of q4h during hemodialysis, q12h when off hemodialysis; continue until ethylene glycol or methanol levels <20 mg/dL **Maitenance dose (CRRT):** 10 mg/kg q4h x4 doses followed by 15 mg/kg q4h until ethylene glycol or methanol levels <20 mg/dL		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – over 30 minutes	No
Concentration	Varies based on dosing weight, prepared in at least 100 mL NS or D5W IVPB		
Stability	24 hours		
Monitoring	Serum ethylene glycol or methanol levels, fomepizole plasma levels, urinary oxalate, plasma osmolality, anion and osmolar gaps, renal/hepatic function, arterial blood gases, clinical resolution of toxicity		
Mechanism of Action	Competitive inhibition of alcohol dehydrogenase, which metabolizes ethanol, ethylene glycol and methanol to toxic metabolites. Metabolites of ethylene glycol (glycolate and oxylate) cause metabolic acidosis and renal damage. The metabolite of methanol, formic acid, causes metabolic acidosis and visual disturbances.		
Adverse Reactions	Headache, nausea, bradycardia, hypotension, shock, dizziness, drowsiness, metallic taste, abdominal pain, anemia, disseminated intravascular coagulation, elevated LFTs, blurred vision, anuria, allergic reactions		
Dispensing Category	Red		

Appendix C - Guidelines for IV Medication Administration

Fosphenytoin (Cerebyx®)

Restricted Units	None		
Special Information	Must dilute with equal volume normal saline.		
IV Line Information	Central or Peripheral. Requires a dedicated line. Flush with NS. May be given IM.		
Therapeutic Use	Status epilepticus. Patients intolerant to parenteral phenytoin. **See UC Health Guidelines**		
Dose	IV loading dose of phenytoin equivalents: 15- 20 mg/kg. **Must always be dosed in terms of phenytoin equivalents.**		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – 150 mg/minute	Yes – 150 mg/minute	No
Concentration	Dose (mg) /100 mL NS		
Stability	48 hours after reconstitution.		
Monitoring	Vital signs, neurologic status, and total or free phenytoin levels.		
Mechanism of Action	Reduces the activity of brain stem centers responsible for grand mal seizures.		
Adverse Reactions	Pain on injection, dizziness, somnolence, ataxia, pruritus, nystagmus, hypotension, vasodilation, tachycardia, tremor, agitation, nausea, vomiting, and blurred vision.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Furosemide (Lasix®)

Restricted Units	None		
Special Information	Patients with sulfa allergies may be cross-reactive with furosemide.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Diuretic		
Dose	IVP: 10 – 100 mg Continuous infusion: 1-10 mg/hour, titrate to diuretic effect. Do not exceed infusion rates of 4 mg/min (240 mg/hour).		
Titration Guidelines	0.25 mg/kg/hr		
Route Upto 100 mg slow IVP over 5 minutes. IVPB for doses exceeding 100 mg.	IVP	IVPB	Continuous Infusion
	Yes – Up to 100 mg over 5 minutes	Yes – For doses exceeding 100 mg. Up to 20 mg/min.	Yes – max 4 mg/min (240 mg/hour)
Concentration	Vial: 10 mg/mL Standard: 1 mg/mL (100 mg/100mL) Maximum: 5 mg/mL (500 mg/ 100mL)		
Stability	24 hours Protect from light		
Monitoring	Vital signs, urine output, electrolytes		
Mechanism of Action	Inhibits the resorption of sodium and chloride in the proximal and distal tubules and the Loop of Henle in the kidneys.		
Adverse Reactions	Ototoxicity, hypotension, electrolyte abnormalities		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Glucagon

Restricted Units	None		
Special Information	Patients should be given supplemental carbohydrates as soon as possible. Do not use in patients with pheochromocytoma or insulinoma. Do not use provided diluent for doses greater than 2 mg.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Severe hypoglycemic reactions Beta blocker overdose Calcium channel blocker overdose Mesenteric ischemia		
Dose	Hypoglycemia: Adults and children > 55 lbs: 1 mg IM, Subcut, or IV. Overdose: 3 – 10 mg IVP then 1 – 5 mg/hr Mesenteric ischemia: 1 mg/h for 12-24 hours		
Titration Guidelines	Titrate to heart rate or blood pressure.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 minute	No	Yes
Concentration	1 mg/mL (50 mg/50 mL) 0.1 mg/mL (15 mg/150 mL or 25 mg/250 mL)		
Stability	24 hours Use reconstituted solution immediately.		
Monitoring	Vital signs and blood glucose. Seek emergency assistance if patient fails to respond 15 minutes after IM or Subcut administration.		
Mechanism of Action	Breaks down liver glycogen stores, releasing glucose from the liver.		
Adverse Reactions	Nausea, vomiting, hypotension, tachycardia, hypertension		
Dispensing Category	Red		

Glycopyrrolate (Robinul®)

Restricted Units	None		
Special Information	Use with caution in patients with glaucoma or who are receiving other anticholenergic type medications. May also be used for increased pulmonary secretions.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Preoperative antimuscarinic agent used to reduce salivary, tracheobronchial and pharyngeal secretions and to block cardiac vagal inhibitory reflexes during induction of anesthesia and intubation.		
Dose	Adults: preanesthesia: 0.004 mg/kg. Intraoperative: to counteract vagal reflexes: 0.1 mg every 2-3 minutes. Reversal of neuromuscular blockade: 0.2 mg for each 1.0 mg of neostigmine or 5.0 mg of physostigmine. Can be given IVP or IM.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 –2 minutes	No	No
Concentration	2 mg, 5 mg vials (0.2 mg/mL)		
Stability	24 hrs when diluted with NS		
Monitoring	Vital signs		
Mechanism of Action	Anticholinergic; inhibits the action of acetylcholine.		
Adverse Reactions	Blurred vision, drowsiness, dry mouth, urinary hesitancy and retention, tachycardia, cardiac arrhythmias, malignant hyperthermia.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Granisetron (Kytril®)

Restricted Units	None		
Special Information	Restricted to bone marrow transplant. **See UC Health 5HT3 indications and restrictions.**		
IV Line Information	Central or Peripheral		
Therapeutic Use	Chemotherapy induced nausea and vomiting: prophylaxis. Postoperative nausea and vomiting: prophylaxis. Radiation induced nausea and vomiting: prophylaxis.		
Dose	Chemotherapy-induced nausea and vomiting; Prophylaxis: 10 mcg/kg IV 30 min before chemotherapy Postoperative nausea and vomiting: 1 mg IV Postoperative nausea and vomiting; Prophylaxis: 1 mg IV before induction of anesthesia or immediately before reversal of anesthesia		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – over 30 seconds	None	No
Concentration	Vial: 1 mg / mL.		
Stability	24 hours at room temperature.		
Monitoring	Vital signs		
Mechanism of Action	An antiemetic, serotonin receptor antagonist (5-HT3).		
Adverse Reactions	Headache, somnolence, abdominal pain, constipation, diarrhea.		
Dispensing Category	Yellow		

Haloperidol (Haldol®)

Restricted Units	None		
Special Information	Only the lactate form is administered IV. The deconate form is for IM use only. Use with caution in elderly patients.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Used in the management of psychotic disorders such as agitation.		
Dose	IVP: 0.5 –1 mg max dose of 20 mg IM: 2.5 – 5 mg		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Up to 5 mg/min	No	No
Concentration	5 mg vial (5 mg/mL)		
Stability			
Monitoring	Vital signs, EKG, neurologic status		
Mechanism of Action	Precise mechanism of action is unknown.		
Adverse Reactions	Involuntary, dyskinetic movements, neuromuscular malignant syndrome, tachycardia, EKG changes, hypotension, hypertension, seizures		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Heparin

HIGH ALERT DRUG

Restricted Units	None		
Special Information	This agent should be held 4 hours prior to surgery or invasive procedures. May be reversed with protamine.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Anticoagulation		
Dose	Bolus: 60 – 80 units/kg Continuous infusion: 15 – 18 unit/kg/hr See weight based protocol.		
Titration Guidelines	Titreate to goal HPTT per physician order or protocol.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 2 minutes	No	Yes
Concentration	100 units/mL (25,000 units/250 mL)		
Stability	Premade: 30 days Admixed: 48 hours		
Monitoring	Vital signs, signs and symptoms of bleeding, CBC, and PTT. (HPTT and aPTT are the same test results, but with different reference ranges).		
Mechanism of Action	Heparin inhibits thrombus propagation and prevents thromboembolism. It has no thrombolytic activity. Heparin binds to and activates antithrombin III.		
Adverse Reactions	Bleeding, hyperkalemia, thrombocytopenia, urticaria and fever		
Dispensing Category	Green		

hydrALAZINE (Apresoline®)

Restricted Units	Yes, See Grid		
Special Information	Hypotensive effect may be delayed and unpredictable in some patients.		
IV Line Information	Central or Peripheral		
Therapeutic Use	For treatment of hypertension when oral therapy is not feasible or desirable.		
Dose	10-80 mg IVP		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 minute	No	No
Concentration	Vial: 20 mg (20 mg/mL)		
Stability	N/A		
Monitoring	Vital signs (blood pressure and heart rate)		
Mechanism of Action	hydrALAZINE lowers blood pressure by peripheral vasodilation through a direct relaxation of vascular smooth muscle.		
Adverse Reactions	Hypotension, tachycardia, palpitations, headache, nausea, vomiting, angina pectoris, edema		
Dispensing Category	Green (rev. 12/11/2015)		

Hydrochloric Acid

Restricted Units	Yes, See Grid		
Special Information	Correction of alkalosis usually requires 2-4 days. Inspect integrity of tubing at least daily. In case of spill, consult MSDS sheet.		
IV Line Information	Central line only		
Therapeutic Use	Metabolic Alkalosis		
Dose	Dose is variable based on severity of alkalosis. Contact pharmacy for dosing. Usual dose 20 – 40 mL/hr		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	0.1 Normal (0.1 mEq/mL) 1 Liter Glass bottle		
Stability	48 hours		
Monitoring	Special attention and monitoring of blood gases.		
Mechanism of Action	Correction of alkalosis.		
Adverse Reactions	Acidemia, hypokalemia, hyperchloremia.		
Dispensing Category	Yellow		

Hydrocortisone sodium succinate (Solu-CORTEF®)

Restricted Units	None		
Special Information	Must reconstitute prior to use. Dilute to 50 mg/mL.		
Therapeutic Use	Adrenal insufficiency		
Dose	200 mg – 300 mg per day in divided doses		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 2 minutes	Yes – Over 30 minutes	No
Concentration	IVP: 50 mg/mL IVPB: Dose/50mL		
IV Line Information	Central or Peripheral		
Stability	48 hours at room temperature		
Monitoring	Vital signs, electrolytes and blood glucose		
Mechanism of Action	Has the same anti-inflammatory and metabolic effects as naturally occurring hydrocortisone.		
Adverse Reactions	Hyperglycemia, sodium and fluid retention, muscle weakness, impaired wound healing.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

HYDROmorphone (Dilaudid®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	Symptoms of overdose include respiratory depression, myosis, hypotension, bradycardia, apnea, pulmonary edema. Treatment of overdose includes support of the patient's airway and administration of naloxone.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Potent opioid analgesic used to treat acute, chronic, and severe pain.		
Dose	IM*, IV, SC doses: 0.5 - 2 mg/dose every 4-6 hours as needed IV continuous infusions: 0.5 - 2 mg/hour Epidural doses: 2 - 5 mg/24 hours Dosage decrease necessary in renal failure, hepatic failure and the elderly. *IM use may result in variable absorption and lag time to peak effect, and is not recomeneded for routine use per the American Pain Society		
Titration Guidelines	Doses should be titrated to appropriate effect. Adjust dose according to severity of pain and patient response		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1- 2 minutes	No	Yes
Concentration	1 mg/mL, 2 mg/mL, 4 mg/mL, 10 mg/mL Standard: 400 mcg/mL (100 mg/250 mL) Maximum: 4 mg/mL (400 mg/100 mL) PCA Standard: 0.2 mg/mL (6 mg/30 mL) PCA Maximum: 1 mg/mL (30 mg/30 mL)		
Stability	48 hours		
Monitoring	Vital signs, pain/sedation score		
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		
Adverse Reactions	Palpitations, hypotension, bradycardia , dizziness, sedation, confusion, nausea, vomiting, constipation, pain at injection site, respiratory depression, shortness of breath, histamine release		
Dispensing Category	Green		

Hydroxocobalamin (Cyanokit®)

Restricted Units	None		
Special Information	May increase BP, known anaphylactic reactions 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		
IV Line Information	Central or Peripheral		
Therapeutic Use	Cobalamin deficiency (treatment/prophylaxis), Cyanide poisoning		
Dose	5g IV over 15 min (15ml/min), may repeat 5g IV over 15 min to 2 hours as needed		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 15 minutes	No
Concentration	Vial: 2.5 grams		
Stability	6 hours at Room Temperature, do not freeze		
Monitoring	CBC, ABG, serum electrolyte and lactate, renal function, whole blood cyanide levels, BP, hypersensitivity signs and symptoms, chest X-ray (for inhalation exposure), EKG		
Mechanism of Action	Hydroxylated active forme of VitB12. It binds with cyanide ion by replacing the hydroxo ligand linked to the trivalent cobalt ion, to form cyanocobalamin.		
Adverse Reactions	Increased BP, erythema, rash, nausea, headache, decreased WBC lymphocyte count, urine discoloration (red)		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Hydroxyethyl Starch (Hespan®)

Restricted Units	Resctricted to use on the Operating Rooms only at UC Health		
Special Information	See UC Health **Therapeutic Interchange** Do not use in critically ill patients with sepsis due to increased risk of mortality and need for renal replacement therapy. Do not use in patients with severe liver disease, or in patients with coagulation or bleeding disorders.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Plasma volume expansion in patients with hypovolemia		
Dose	Adults: 500 – 1000 mL IV bolus		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	Yes - bolus	No
Concentration	30 g hetastarch in 500 mL of 0.9% sodium chloride		
Stability	Per package labeling		
Monitoring	Vital signs, MAP, HR, renal panel, signs of bleeding, LFTs		
Mechanism of Action	Synthetic colloid derived from waxy starch, amylopectic, that leads to plasma volume expansion wen administered		
Adverse Reactions	Hypersensitivity reactions, volume overload, heart failure, pulmonary edema, renal injury/failure, vomiting, peripheral edema, influenza-like symptoms, headache, muscle pain		
Dispensing Category	Green		

Ibutilide (Corvert®)

Restricted Units	Yes, See Grid		
Special Information	Physician MUST be present during administration. May ONLY be administered with continuous ECG monitoring by personnel trained to identify and treat acute ventricular arrhythmias.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Indicated for the rapid conversion of atrial fibrillation or atrial flutter of recent onset to sinus rhythm.		
Dose	Patients weighing greater than 60 kg : 1 mg Patients weighing less than 60 kg : 0.01 mg/kg		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 10 minutes	Yes – Over 10 minutes in 50 mL of NS or D5W	No
Concentration	IVPB – Concentration may vary		
Stability	N/A		
Monitoring	Vital signs, electrolytes, cardiac monitoring Patient MUST be on continuous ECG monitoring for at least 4 hrs after infusion or until QTc has returned to baseline.		
Mechanism of Action	Ibutilide prolongs action potential duration in cardiac myocytes and increases both atrial and ventricular refractoriness.		
Adverse Reactions	Potentially fatal ventricular arrhythmias, QT prolongation, nausea, headache.		
Dispensing Category	Green (rev. 05/03/16)		

Appendix C - Guidelines for IV Medication Administration

Immune Globulin (IVIG) (Gammagard®)

Restricted Units	No		
Special Information	Do not shake. Restricted - **See UC Health Guidelines**		
IV Line Information	Peripheral or central line in a separate line from other medications		
Therapeutic Use	Primary humoral immunodeficiency, multifocal motor neuropathy, autoimmune mucotaneous blistering diseases, B-cell chronic lymphocytic leukemia, Grave's ophthalmology, encephalomyelitis, chronic inflammatory demyelinating polyneuropathy, hepatitis A prophylaxis, idiopathic thrombocytopenia purpura, Kawasaki disease, measles prophylaxis, rubella prophylaxis (during pregnancy), varicella zoster exposure, other non-FDA approved indications (see UC Health Guidelines above)		
Dose	Based on ideal body weight in non-obese, adjusted body weight in obesity Highly variable based on indication (see UC Health Guidelines above)		
Titration Guidelines	Initial rate 0.5 mL/kg/hour for 30 minutes; increase every 30 minutes by 1 mL/kg/hour as tolerated to a maximum rate of 5 mL/kg/hour. Decrease rate if patient experiences infusion reactions. Patients ≥ 65years at risk for nephrotoxicity or thrombotics events: max rate = 2 mL/kg/hour Infuse over 2-24 hours in a separate line from other medications		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	10% solution		
Stability	48 hours when removed from original bottle from manufacturer		
Monitoring	Patient should be premedicated with acetaminophen, diphenhydramine, and/or corticosteroids. Document titration, vital signs, and side effects in the "Infusion Monitoring" Documentation Flowsheet in EPIC. Check vital signs prior to the infusion and every 15 minutes for the first hour, then every 30 minutes until the max rate is reached. Stay with the patient for the first 15-30 minutes for direct monitoring. Monitor for flushing, changes in heart rate and blood pressure, chest tightness, malaise, fever/chills, anaphylaxis, headache, backache, lightheadedness, nausea. Slow or stop infusion to alleviate minor symptoms. Apply warm compress to IV site if burning occurs.		
Mechanism of Action	Provides passive immunity by increasing antibody titer and antigen-antibody reaction potential		
Adverse Reactions	Infusion reactions (titrate IVPB infusion and decrease rate if patients experience), anaphylaxis, hypotension or hypertension, nausea, hyperglycemia, thrombosis, hemolysis, muscle spasm, headache, anemia, hemorrhage, thrombocytopenia		

Dispensing Category	Black

Indomethacin (Indocin®)

Restricted Units	Yes, See Grid		
Special Information	Dose should be held if patient has anuria or oliguria		
IV Line Information	Peripheral or central line; avoid infusion via umbilical catheter into vessels near the superior mesenteric artery		
Therapeutic Use	Closure of patent ductus ateriosus in neonates		
Dose	Initial: 0.2 mg/kg followed with : 2 doses of 0.1 mg/kg at 12- to 24-hour intervals if age less then 48 hrs at time of first dose; 0.2 mg/kg 2 times if 2-7 days old at time of first dose; 0.25 mg/kg 2 times if over 7 days at time of first dose		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes	No	No
Concentration	0.5-1 mg/mL		
Stability	Preservative-free sterile water for injection or NS; protect from light; not stable in alkaline solution; reconstitute just prior to administration and discard unused portion		
Monitoring	Vital signs, When treating patent ductus arteriosus, do not give subsequent doses if urinary output falls below 0.6 mL/kg/hr in response to indomethacin; resume therapy when renal function returns to normal		
Mechanism of Action	Inhibition of prostaglandin synthesis by indomethacin results in constriction of the ductus arteriosus		
Adverse Reactions	Decrease urinary output, bleeding, may affect platelet function		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

inFLIXimab (Remicade®)

<table>
<tr><td>Restricted Units</td><td colspan="3">None</td></tr>
<tr><td>Special Information</td><td colspan="3">Medications for the treatment of hypersensitivity reactions should be available for immediate use.
Increased risk of Hepatitis B virus (HBV) reactivation in patients with chronic hepatitis B infection or chronic HBV carriers (surface antigen positive)</td></tr>
<tr><td>IV Line Information</td><td colspan="3">Peripheral or Central. In-line, sterile, non-pyrogenic, 1.2 micrometer or less filter</td></tr>
<tr><td>Therapeutic Use</td><td colspan="3">Psoriasis, rheumatoid arthritis, Crohn’s disease, ankylosing spondylitis, ulcerative colitis, and multiple sclerosis</td></tr>
<tr><td>Premedication</td><td colspan="3">Consider administration of premedication prior to each dose to minimize risk of infusion-related reactions.</td></tr>
<tr><td>Dose</td><td colspan="3">3-5 mg/kg induction therapy (at weeks 0, 2, and 6) followed by every-8-week scheduled or as needed maintenance therapy. Dose may be increased to 10 mg/kg.
Maximum dose in heart failure NYHA Class III or IV: less than or equal to 5 mg/kg</td></tr>
<tr><td>Titration Guidelines</td><td colspan="3">IV infusions may be given at a rate of 2 mL/minute or, alternatively, a rate titration schedule may be used in an attempt to prevent infusion reactions
<table>
<tr><th colspan="2">Rate Titration Schedule</th></tr>
<tr><td>Time (minutes)</td><td>Infusion Rate</td></tr>
<tr><td>0</td><td>Start at 10 mL/hr x 15 minutes</td></tr>
<tr><td>15</td><td>Increase to 20 mL/hr x 15 minutes</td></tr>
<tr><td>30</td><td>Increase to 40 mL/hr x 15 minutes</td></tr>
<tr><td>45</td><td>Increase to 80 mL/hr x 15 minutes</td></tr>
<tr><td>60</td><td>Increase to 150 mL/hr x 30 minutes</td></tr>
<tr><td>90</td><td>Increase to 250 mL/hr for remainder of infusion</td></tr>
</table></td></tr>
<tr><td rowspan="2">Route</td><td>IVP</td><td>IVPB</td><td>Continuous Infusion</td></tr>
<tr><td>No</td><td>Yes – Infuse over at least 2 hours</td><td>No</td></tr>
<tr><td>Concentration</td><td colspan="3">IVPB: Dose/250 mL</td></tr>
<tr><td>Stability</td><td colspan="3">3 hours</td></tr>
<tr><td>Monitoring</td><td colspan="3">Monitor closely during and after each IV infusion. Measure vital signs (pulse and BP) immediately prior to infusion, during the infusion (every 30 minutes in patients without a history of acute infusion reactions and every 15 minutes in those with a history of reactions), and for 30 minutes after completion of the infusion. Monitor for signs and symptoms of infection.</td></tr>
<tr><td>Mechanism of Action</td><td colspan="3">Chimeric human/murine monoclonal antibody that binds tumor necrosis factor-alpha</td></tr>
<tr><td>Adverse Reactions</td><td colspan="3">Headache, fatigue, fever, nausea, infusion reactions, infections, hypersensitivity</td></tr>
<tr><td>Dispensing Category</td><td colspan="3">Black</td></tr>
</table>

Insulin, Regular (Humalin R, Novolin R)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	Insulin binds to IV tubing.		
IV Line Information	Central or Peripheral.		
Therapeutic Use	Hyperglycemia, diabetic ketoacidosis, hyperkalemia with acute EKG changes		
Dose	Initially 0.1 unit/kg/hr then adjusted to goal blood glucose.		
Titration Guidelines	Per physician order or protocol.		
Route	IVP	IVPB	Continuous Infusion
	Yes - For hyperkalemia	No	Yes
Concentration	1 unit/mL (100 units/100 mL and 250 units/250 mL)		
Stability	24 hours		
Adverse Reactions	Hypoglycemia, hypokalemia		
Monitoring	Vital signs, blood glucose, serum electrolytes		
Mechanism of Action	Insulin lowers blood glucose by stimulating peripheral glucose uptake and inhibiting hepatic glucose production.		
Dispensing Category	Green		

Iron Dextran (Infed®)

Restricted Units	None		
Special Information	Prior to receiving their first dose of iron dextran, all patients should receive an intravenous 25 mg test dose.		
IV Line Information	Central or Peripheral		
Therapeutic Use	For the treatment of patients with documented iron deficiency in whom oral administration is unsatisfactory or impossible.		
Dose	Based on patient weight and measured hemoglobin level. Can be given IM.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 1 – 6 hours as tolerated. Maximum infusion of 50 mg/min.	No
Concentration	Varies		
Stability	24 hours		
Monitoring	Vital signs, serum iron, total iron binding capacity and percent saturation of transferrin.		
Mechanism of Action	Iron salts are compounds used primarily for the prophylaxis and treatment of iron deficiency anemias. The body stores iron in compounds called ferritin and hemosiderin for future use in the production of hemoglobin.		
Adverse Reactions	Allergic reactions (give test dose prior to therapy), chest pain or tightness, flushing, hypotension, urticaria, rash, nausea, vomiting, abdominal pain.		
Dispensing Category	Yellow		

Iron Sucrose (Venofer®)

Restricted Units	None		
Special Information	Iron sucrose does not require a test dose.		
Therapeutic Use	For the treatment of patients with documented iron deficiency in whom oral administration is unsatisfactory or impossible.		
Dose	100 mg IVPB. Dose is expressed in terms of elemental iron.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over at least 15 minutes	No
Concentration	100 mg/100 mL		
IV Line Information	Central or Peripheral		
Stability	24 hours		
Monitoring	Vital signs, serum iron, total iron binding capacity, percent saturation of transferrin.		
Mechanism of Action	Iron salts are compounds used primarily for the prophylaxis and treatment of iron deficiency anemias. The body stores iron in compounds called ferritin and hemosiderin for future use in the production of hemoglobin.		
Adverse Reactions	Chest pain, arthralgias, pruritis, nausea, headache.		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Isoproterenol (Isuprel®)

Restricted Units	Yes, See Grid		
Special Information	May induce serious dysrhythmias. May aggravate ischemia during myocardial infarction.		
IV Line Information	Peripheral or Central		
Therapeutic Use	Isoproterenol is used to treat ventricular arrhythmias due to AV nodal block and other hemodynamically compromised bradyarrhythmias. Other uses of isoproterenol in adults have included: cardiac stimulation following heart transplantation, treatment of asthma and bronchospasm, adjunctive treatment of congestive heart failure, and cardiogenic shock.		
Dose	The recommended adult dose is 1 to 10 mcg/min by IV infusion, titrated according to heart rate and rhythm response The recommended IM or SUBCUT adult dose for AV block is 0.2 mg		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	Standard: 8 mcg/mL (2 mg/250mL)		
Stability	24 hours at room temperature		
Monitoring	When administering isoproterenol parenterally, patients should be monitored for cardiac arrhythmias. Cardiac patients would be monitored with an EKG. Heart rate, central venous pressure, blood pressure, and urine output should be monitored for improvement		
Mechanism of Action	Isoproterenol is a potent nonselective beta-adrenergic agonist having low affinity for alpha-adrenergic receptors. Systemic effects include: positive inotropic and chronotropic effects, lowering of peripheral vascular resistance and diastolic pressure, and prevention of bronchoconstriction.		
Adverse Reactions	Tachycardia, arrhythmias, hypotension, flushing, tremors, anxiety		
Dispensing Category	Red		

Appendix C - Guidelines for IV Medication Administration

Ketamine Hydrochloride (Ketalar®)

HIGH ALERT DRUG

Restricted Units	Yes – See Grid. Nursing may administer IVP per guideline Low-Dose Ketamine for Pain ; all other **IVP doses must be administered by a physician or CRNA.**		
Special Information	Increase in cerebrospinal fluid pressure has been reported following administration.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Ketamine is indicated as an anesthetic agent for diagnostic/surgical procedures that do not require skeletal muscle relaxation. Best suited for short procedures, can be used for longer procedures with additional doses. Ketamine is indicated for the induction of anesthesia prior to administration of other general anesthetic agents. It is also indicated to supplement low-potency agents. Ketamine can also be used to treat pain.		
Dose	**NURSING Restriction**: 0.1 mg/Kg –0.3 mg/Kg every 30 minutes for total dose 0.3 mg/Kg; May repeat dose every 2 hours; Slow IV push over one minute **Physician/CRNA only**: Initial dose: IVP: 1 – 2 mg/kg over a period of 60 seconds; IM Route: 3 - 8 mg/kg Maintenance Anesthesia: Adult patients induced with ketamine augmented with an intravenous diazepam may be maintained on a continuous infusion of ketamine at a rate of 0.1 to 0.5 mg/minute		
Titration Guidelines	Titrate to desired sedation		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 minute See above for additional limitations	No	Yes
Concentration	Vial: 100 mg/mL Drip: 2 mg/mL (500mg/ 250mL) Ketamine should be diluted when given IV. For IV push, dilute with an equal volume. For IV infusions, dilute to a 1 mg/mL concentration		
Stability	24 hours		
Mechanism of Action	Produces dissociative anesthesia by direct action on the cortex and limbic system.		
Monitoring	Cardiac functions should be continually monitored during use in patients that develop hypertension and tachycardia. Respiratory function and neurologic status should also be monitored after administration of the drug.		
Adverse Reactions (rev. 11/04/2015)	Blood pressure and pulse are frequently elevated following administration of ketamine. Bradycardia, hypotension and arrhythmias have occurred. Repiration is frequently stimulated, severe depression of respiration or apnea may occur following rapid IV administration of high doses of ketamine. Anorexia, nausea and vomiting have been observed. Enhanced skeletal muscle tone may occur resembling seizures. May cause anxiety, dysphoria, disorientation, insomnia, flashbacks, hallucinations, and psychotic episodes. A withdrawal syndrome with psychotic features has been described.		
Dispensing Category	Yellow		

Last revision: 10/17

Appendix C - Guidelines for IV Medication Administration

Ketorolac tromethamine (Toradol®)

Restricted Units	None		
Special Information	Ketorolac should only be administered for 5 days or less. **See UC Health Guidelines**		
IV Line Information	Central or Peripheral		
Therapeutic Use	For the short-term (less than or equal to 5 days) management of moderately severe acute pain that requires analgesia at the opiod level.		
Dose	IM or IV dosing: Patients less than 65 years of age: One dose of 60 mg (IM) / 30 mg (IV) or 30 mg IV every 6 hours. The maximum daily dose should not exceed 120 mg. Patients greater than or equal to 65 years of age, renally impaired and/or less than 50 kg of body weight: One dose of 30 mg (IM)/ 15 mg (IV) or 15 mg IV every 6 hours. The maximum daily dose should not exceed 60 mg.		
Titration Guidelines	For breakthrough pain do not increase the dose or the frequency of ketorolac.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over at least 15 seconds	No	No
Concentration	Vials: 15 mg/mL, 30 mg/mL, 60 mg/mL (1 mL)		
Stability	N/A		
Monitoring	Monitor duration of therapy, renal function, and for gastrointestinal adverse drug reactions.		
Mechanism of Action	Ketorolac is a nonsteroidal anti-inflammatory drug that exhibits analgesic activity peripherally. Ketorolac inhibits the synthesis of prostaglandins.		
Adverse Reactions	Edema, hypertension, pruritus, nausea, dyspepsia, GI pain, diarrhea, constipation, flatulence, vomiting, headache, drowsiness, dizziness, and injection-site pain.		
Dispensing Category	Green		

Labetalol Hydrochloride (Normadyne, Trandate)

Restricted Units	Yes, See Grid		
Special Information	Cardiac monitoring required. Labetalol should be used with caution in patients with impaired hepatic function since metabolism may be diminished.		
IV Line Information	Central line preferred, but can be administered peripherally.		
Therapeutic Use	Labetalol is indicated for control of blood pressure in severe hypertension.		
Dose	Intermittent intravenous administration: 5 mg IVP (over 2 minutes) and repeat with incremental doses of 10, 20, 40, 80 mg until the desired blood pressure is achieved or a total cumulative dose of 300 mg has been administered. Continouous infusion: Initial rate of 0.3-2 mg/min upto 6 mg/min.		
Titration Guidelines	Maximum effect after administration of bolus doses usually occurs within 5 minutes. Therefore, bolus doses should be administered every 10 minutes until desired effect. The continuous infusion should be titrated to desired blood pressure.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 2 minutes	No	Yes
Concentration	Vial: 5 mg/mL Infusion: 5 mg/mL (1000 mg/200 mL)		
Stability	48 hours		
Adverse Reactions	Hypotension, bradycardia, heart block and rare ventricular arrhythmia, dizziness, vertigo, nausea, vomiting, wheezing		
Monitoring	Vital signs, cardiac monitoring		
Mechanism of Action	Labetalol combines both selective, competitive, alpha$_1$-adrenergic blocking and nonselective beta-adrenergic blocking activity.		
Dispensing Category	Green		

Lacosamide (Vimpat®)

Restricted Units	No		
Special Information	Controlled substance (C-V)		
IV Line Information	Central line or Peripheral		
Therapeutic Use	Lacosamide is indicated for partial onset seizures		
Dose	Initial dose is 50 mg twice daily (100 mg/day). The dose may be increased, based on clinical response and tolerability, at weekly intervals by 100 mg/day given as two divided doses to a daily dose of 200 to 400 mg/day.		
Titration Guidelines	None.		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 30-60 miuntes	No
Concentration	Vial: 200 mg/20 mL vial IVPB: Dose/50 mL		
Stability	24 hours		
Adverse Reactions	Diplopia, headache, dizziness, nausea		
Monitoring	Vital signs, neural status		
Mechanism of Action	Unknown, but lacosamide appears to selectively enhance sodium channel slow inactivation, help normalize activation thresholds and decrease pathophysiological neuronal activity, thereby controlling neuronal hyperexcitability. In vitro, lacosamide binds to collapsin response mediator protein-2 (CRMP-2) which is part of the signal transduction cascade of neurotropic factors. The antiepileptogenic effects may be attributed to this mechanism.		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Lepirudin (Refludan®)

Restricted Units	None		
Special Information	No reversal agents is available. Hold 4 hours before surgery and 2 hours before line insertion. Both metabolism and excretion of Lepirudin take place in the kidney. Therefore, in patients with renal insufficiency, Lepirudin clearance will be reduced. Use with caution in these patients. **See UC Health Guidelines**		
IV Line Information	Central or Peripheral		
Therapeutic Use	For use as an anticoagulant for prophylaxis or treatment of thrombosis in patients with heparin-induced thrombocytopenia (HIT) or use in patients with or at risk for HIT .		
Dose	A bolus dose of 0.4 mg/kg body weight intravenously followed by 0.15 mg/kg/hour as a continous infusion. For patients greater than 110 kg, the maximum bolus dose is 44 mg.		
Titration Guidelines	Consult with prescriber. Titrate to the PTT goal of 1.5 – 3 times patient's baseline PTT.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 minute	No	Yes
Concentration	Standard: 0.2 mg/mL (50 mg/ 250 mL) Maximum: 0.4 mg/mL (100 mg/ 250 mL)		
Stability	48 hours		
Monitoring	Vital signs, signs and symptoms of bleeding Monitor therapy using the aPTT. It should be 1.5 to 3 times the baseline aPTT, not exceeding 100 seconds. Check the aPTT 4 hours after initiation of therapy to confirm that the aPTT is within the desired therapeutic range then 4 – 6 hours after dose changes.		
Mechanism of Action	Lepiruidin is a direct thrombin inhibitor that decreases the generation of a fibrin clot.		
Adverse Reactions	Bleeding, hypotension, cardiac arrest, atrial fibrillation, ventricular tachycardia, dyspnea, pneumonia, abnormal renal function, multisystem and disseminated intravascular coagulation, abdominal pain, diarrhea, nausea, vomiting, coughing, urinary tract infection, fever, infection, pain, headache		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Leucovorin Calcium

Restricted Units	Yes, See Grid		
Special Information	Should not be administered concurrently with methotrexate. Not for intrathecal use.		
IV Line Information	Peripheral or Central		
Therapeutic Use	Antidote for folic acid antagonists, rescue following high-dose methotrexate, combination treatment with fluorouracil in the treatment of colon cancer, treatment of megaloblastic anemias when oral folate therapy is not possible.		
Dose	**High-dose methotrexate-rescue dose:** *Normal elimination:* 15mg started 24 hours after methotrexate infusion every 6 hours until methotrexate level < 0.05micromole/L *Delayed early methotrexate elimination*: 150mg every 3 hours until methotrexate level is < 1 micromole/L, then 15mg every 3 hours until methotrexate level is < 0.05 micromole/L **Methotrexate overdose:** 1mg per mg of methotrexate inadvertently administered; 100-1000 mg/m^2 every 3-6 hours; administer until methotrexate levels decrease to goal level **Colorectal cancer:** 200 mg/m^2 over at least 3 minutes in combination with fluorouracil 370mg/m^2 20 mg/m^2 in combination with fluorouracil 425 mg/m^2		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes- over 2-5 minutes, DO NOT administer at a rate >160mg/min	Yes- over 15 minutes-2 hours. DO NOT administer at a rate >160mg/min	No
Concentration	10 mg/mL (500 mg/50 mL)		
Stability	Solutions reconstituted with bacteriostatic water: use within 7 days Solutions reconstituted with sterile water for injection: use immediately Parenteral admixture is stable for 24 hours at room temperature and 4 days refrigerated, Protect from light.		
Monitoring	High dose methotrexate therapy: Methotrexate levels With fluorouracil therapy: CBC with diff and platelets, LFTs, electrolytes		
Mechanism of Action	A folic acid analog that competes for transport sites, displaces methotrexate from intracellular binding sites, and restores active folate stores necessary for DNA/RNA synthesis.		
Adverse Reactions	Anaphylaxis, urticaria, erythema, pruritus, rash, thrombocytosis, wheezing		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

levETIRacetam (Keppra®)

Restricted Units	None		
Special Information	IV formulation restricted to use in maintenance therapy for patients who cannot tolerate oral levETIRAcetam. levETIRAcetam dosing must be individualized to the patient's renal function.		
IV Line Information	Peripheral or Central		
Therapeutic Use	Indicated as adjunctive therapy in the treatment of partial onset seizures in adults with epilepsy. Also indicated as an alternative for patients when oral administration is temporarily not feasible.		
Dose	Treatment should be initiated with a daily dose of 1000 mg/day, given as twice-daily dosing (500 mg BID). Additional dosing increments my be given (1000 mg/day additional every 2 weeks) to a maximum recommended daily dose of 3000 mg. When switching from oral levETIRAcetam, the initial total daily intravenous dose of levETIRAcetam should be equivalent to the total daily dose and frequency of oral levETIRAcetam and should be administered as a 15-minute intravenous infusion following dilution in 100ml of compatible diluent.		
Titration Guidelines	The initial dose of 1000 mg/day can be titrated up every 2 weeks to a maximum dose of 3000 mg/day in two divided doses.		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 15 – 30 minutes	No
Concentration	IVPB: Dose/ 100 mL		
Stability	**Compatible with:** Normal Saline Lactated Ringer's Dextrose 5% LORazepam Diazepam Valproate sodium		
Monitoring	Vital signs, neuro status		
Mechanism of Action	The exact mechanism of action is unknown but does not involve inhibitory and excitatory neurotransmission.		
Adverse Reactions	Loss of appetite, vomiting, infectious disease, asthenia, dizziness, headache, somnolence, agitation, depression, hostile behavior, mood swings, nervousness, cough, pharyngitis, rhinitis		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

levOCARNitine (Carnitor®)

Restricted Units	None		
Special Information	May be added to TPN.		
IV Line Information	Central or Peripheral		
Therapeutic Use	For the acute and chronic treatment of patients with an inborn error of metabolism that results in secondary carnitine deficiency. Used for replacement in patients with valproic acid-induced carnitine deficiency		
Dose	**Metabolic Disorders, Carnitine Deficiency and Valproic Acid-Induced Carnitine Deficiency:** The recommended dose is 50 mg/kg given as a slow 2–3 minute bolus injection or by infusion. Often a loading dose is given in patients with severe metabolic crisis followed by an equivalent dose over the following 24 hours. It should be administered q3h or q4h, and never less than q6h either by infusion or by intravenous injection. All subsequent daily doses are recommended to be in the range of 50 mg/kg or as therapy may require. The highest reported dose administered has been 300 mg/kg.		
Titration Guidelines	Increase dosing frequency as needed guided by the serum ammonia levels		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 2 – 3 minutes	No	No
Concentration	200 mg/mL		
Stability	N/A		
Monitoring	Vital signs, plasma carnitine and ammonia concentrations		
Mechanism of Action	levOCARNitine is a carrier molecule for the transport of long-chain fatty acids across the inner mitochondrial membrane. levOCARNitine is required in mammalian energy metabolism.		
Adverse Reactions	Nausea and vomiting are the most common adverse drug reactions.		
Dispensing Category	Red		

Lidocaine (Xylocaine®) Infusion

Restricted Units	Yes, See Grid		
Special Information	Use with caution in bradycardia and liver failure. Endotrachial administration is 2-2.5 times the intravenous dose		
IV Line Information	Central or Peripheral		
Therapeutic Use	Antiarrythmic agent, Class I-B acute treatment of ventricular arrhythmias		
Dose	1 – 4 mg/min		
Titration Guidelines	Titrate in 0.5 mg/min increments		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 2 – 5 minutes	No	Yes
Concentration	4 mg/mL (2 grams/500 mL)		
Stability	48 hours		
Monitoring	Vital signs and cardiac monitoring Monitor and record number of PVCs/minute Therapeutic serum concentrations 1.5 - 5 mcg/mL Note: Serum concentrations may be falsely elevated in acute myocardial infarction		
Mechanism of Action	Lidocaine stabilizes the neuronal membrane by inhibiting the ionic fluxes required for the initiation and conduction of impulses, thereby effecting local anesthetic action.		
Adverse Reactions	Hypotension, positional headache, shivering, heart block, arrhythmias, cardiovascular collapse, dyspnea, respiratory depression or arrest		
Dispensing Category	Green		

LORazepam (Ativan®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	Infusion concentration: 0.16 mg/mL in glass bottles Use in-line 0.22 micron filter and change with each botttle Change IV tubing with each bottle or at least every 12 hours Severely fluid-restricted pts (end-stage renal failure): may use undiluted LORazepam via PCA pump (no filter, concentration of 4 mg/mL)		
IV Line Information	Central or Peripheral		
Therapeutic Use	Anxiolytic Prevention and treatment of alcohol/sedative withdrawal Sedation in ICU patients Anesthesia (induction and maintenance) Status epilepticus		
Dose	Dosage is variable. For sedation, begin with a 0.5 - 2 mg bolus IVP followed by continuous infusion of 0.5 - 2 mg/hr.		
Titration Guidelines	Increase infusion by 0.5 – 1 mg/hr until the desired sedative effect is achieved. Very high dosages are sometimes required in ICU patients, especially in chronic alcoholic patients. Elderly patients require lower doses.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Do not exceed 2 mg/min	No	Yes
Concentration	Standard: 0.16 mg/mL (40 mg/250 mL) Maximum: 4 mg/mL (120 mg/30 mL)		
Stability	24 hrs		
Monitoring	Vital signs, Level of consciousness For rates > 6 mg/hr, monitor serum osmolality and osmol gap		
Mechanism of Action	LORazepam is a benzodiazepine derivative. It is a relatively short-acting benzodiazepine, with an elimination half-life after single doses of 4-12 hours, and duration of sedative effects approximately 12 hours. Its primary action is the facilitation of GABA, an inhibitory neurotransmitter.		
Adverse Reactions	Respiratory depression, hypotension, metabolic acidosis/hyperosmolality (due to propylene glycol vehicle) especially with higer concentration or rate.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Magnesium Sulfate

Restricted Units	None IVP – Code only		
Special Information	Slower infusions are recommended for better absorption See Electrolyte Replacement Policy		
IV Line Information	Central is preferred, but can be given peripherally		
Therapeutic Use	Electrolyte Replacement Ventricular arrythmias (V-tach or torsades de pointes) Pre-eclampsia or eclampsia Tocolytic (inhibit uterine contractions)		
Dose	1-8 grams depending on patient's serum magnesium level		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Code Only	Yes – Infuse 1 gram per hour	Yes – OB Only
Concentration	1 gm/100mL 4 gm/100mL 6 gm/250mL Drip: 40 Gm/1000 mL (pre-eclampsia)		
Stability	Premade: 30 days Admixed: 48 hours		
Adverse Reactions	Hypotension, muscle and respiratory paralysis, heart block		
Monitoring	Vital signs, deep tendon reflexes, magnesium levels		
Mechanism of Action	Magnesium is a calcium channel blocker which results in arterial vasodilation. It also decreases acetylcholine in motor nerve terminals and acts on myocardium by slowing rate of S-A node impulse formation and prolonging conduction time. It is important for the maintenance of normal potassium and calcium plasma concentrations.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Mannitol (Osmitrol®)

Restricted Units	None		
Special Information	A 0.22 micron filter should be used to avoid inadvertant intravenous administration of mannitol crystals. Crystallization will occur below room temperatures Placing vial or bag into a warm bath or incubator will dissolve the crystals and then may be administered to patients.		
IV Line Information	Should be administered through a central or peripheral line with filter.		
Therapeutic Use	Elevated ICP's in patients with closed head injuries Reduction of intraocular pressure Oliguric renal failure		
Dose	Dose is variable. Usual dose is 12.5 – 50 grams, titrated to effect.		
Titration Guidelines	Dose is titrated to achieve desired intracranial and cerebral perfusion pressures, intraocular pressure or urine output.		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 30 to 60 minutes	No
Concentration	Vial: 25% (50 mL) IVPB: 20% (500 mL)		
Compatibility	Incompatible with blood products, cefepime, filgrastim, imipenem, meropenem , potassium chloride, sodium chloride		
Stability	N/A		
Monitoring	Intracranial pressure, central venous pressure, urine output, electrolytes Monitor for Serum Osmolality - Note the effect of Mannitol occurs over a 30 minute period. Should discontinue mannitol if serum osmolality greater than 320		
Mechanism of Action	Mannitol is an osmotic diuretic which induces a mild diuresis by elevation of the osmotic pressure of the glomerular filtrate to such an extent that the tubular reabsorption of water and solutes is hindered.		
Adverse Reactions	Headache, electrolyte abnormalities, pulmonary edema,congestive heart failure		
Dispensing Category	Green		

Meperidine (Demerol®)

HIGH ALERT DRUG

Restricted Units	None		
Special Information	Avoid use in patients with renal dysfunction or history of seizures. Signs and symptoms of CNS excitation may be initially masked by repeated doses. Use with caution in patients with elderly patients. **See UC Health Guidelines**		
IV Line Information	Central or Peripheral		
Therapeutic Use	Chills and rigors Sedation for Procedures		
Dose	Normal dosing is 12.5-50 mg IV q2h prn for analgesia 25-50 mg IV prior to procedure IM dose is 25 – 50 mg		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 5 minutes	No	No
Concentration	25 mg/mL, 50 mg/mL, 75 mg/mL, 100 mg/mL		
Stability	N/A		
Adverse Reactions	Respiratory depression, CNS excitation, decreased BP, HR, tremors, agitation, seizures, due to accumulation of a metabolite.		
Monitoring	Vital signs, level of consciousness, pain scores, signs/symptoms of CNS excitation, electrolytes		
Mechanism of Action	Meperidine is a short acting mu opioid receptor agonist in the CNS thus mimicking the actions of endogenous substances (enkephalins, beta- endorphins). It may also alter the release of acetylcholine, norepinephrine, dopamine, and substance P.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Methadone (Dolophine®)

Restricted Units	None		
Special Information	Risk of torsades greater with hypokalemia, hypomagnesemia, or concurrent drugs causing QT_c prolongation		
IV Line Information	Central or Peripheral		
Therapeutic Use	Analgesia Sedation in ICU Patients Detoxification and maintenance of opioid dependence		
Dose	Normal dosing is 2.5-20 mg IV q6-12 hrs for analgesia		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 2 minutes	No	No
Concentration	10 mg/mL		
Stability	N/A		
Adverse Reactions	Respiratory depression, nausea, vomiting, constipation, torsades de pointes (long-term high dose)		
Monitoring	Vital signs, level of consciousness, ECG		
Mechanism of Action	Methadone is a long acting mu opioid receptor agonist in the CNS thus mimicking the actions of endogenous substances (enkephalins, beta-endorphins). It may also alter the release of acetylcholine, norepinephrine, dopamine, and substance P. Additionally it may suppress neuronal hyperexcitability by blocking NMDA receptors which may be an advantage in neuropathic pain.		
Dispensing Category	Green		

Methocarbamol (Robaxin®)

Restricted Units	None		
Special Information	Do not refrigerate Caution with impaired renal function due to propylene glycol vehicle		
Therapeutic Use	Muscle relaxant for painful musculoskeletal disorders Tetanus		
Dose	Given in 1 gram doses up to every 8 hrs. Greater than 3 grams/day for greater than 3 days not recommended except when treating tetanus. Doses as high as 4 grams every 6 hrs may be needed for tetanus.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Rate not to exceed 300 mg/min	Yes – Over 60 minutes	No
Concentration	1 gram/100 mL		
IV Line Information	Central or Peripheral		
Stability	48 hours		
Monitoring	Vital signs, level of consciousness, IV site (extravasation)		
Mechanism of Action	Centrally acting muscle relaxant through blockade of spinal polysynaptic reflexes. Also nonspecific CNS depressant causing sedation.		
Adverse Reactions	Hypotension, bradycardia, dizziness, lightheadedness, syncope, thrombophlebitis and tissue sloughing with extravasation, urine discoloration		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Methohexital (Brevital®)

Restricted Units	Yes, See Grid		
Special Information	Contraindicated in acute intermittent or variegate porphyrias		
IV Line Information	Central or Peripheral		
Therapeutic Use	Induction of general anesthesia Anesthetic adjunct		
Dose	Induction: 1-1.5 mg/kg at a rate of 10 mg every 5 seconds Adjunct: 20-40 mg every 4-7 minutes or continuous drip starting at 6 mg/min		
Titration Guidelines	Titrate to desired level of sedation.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 15 seconds	No	No
Concentration	10 mg/mL		
Stability	N/A		
Monitoring	Vital signs, level of consciousness		
Mechanism of Action	Methohexital is an ultra-short acting barbiturate. Barbiturates are general CNS depressants.		
Adverse Reactions	Respiratory depression, hypotension, pain at injection site, thrombophlebitis		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Methoxamine (Vasoxyl®)

Restricted Units	Yes, See Grids		
Special Information	May be administered IM or IV. Patients who are in shock require IV administration.		
IV Line Information	Peripheral or Central		
Therapeutic Use	Hypotension during anesthesia Supraventicular Paroxysmal Tachycardia Hypotensive Shock		
Dose	The recommended dose to restore blood pressure during anesthesia is 3 to 5 milligrams administered slowly. Intramuscular injection (10 to 15 milligrams) may be used to supplement intravenous administration to provide a more prolonged effect For supraventricular tachycardia, the usual intravenous dose is 10 milligrams injected slowly over 3 to 5 minutes. Continuous infusion may be utilized to treat hypotension; begin at 5 mg/minute and titrate to therapeutic effect on blood pressure. Recommended dilution: 40 milligrams in 250 milliliters dextrose 5% water		
Titration Guidelines	Should be administered in the lowest effective dosage for the shortest possible time. Small doses should be injected initially and subsequent doses determined by pressor response.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 3 – 5 minutes	No	Yes
Concentration	20 mg/mL for IV Push 40 mg in 250 mL of D5W (160 mcg/mL)		
Stability	24 hours		
Monitoring	Monitor bood pessure and heart rate.		
Mechanism of Action	Methoxamine acts through peripheral vasoconstriction by acting as a pure alpha-1 adrenergic receptor agonist, consequently increasing systemic blood pressure (both systolic and diastolic).		
Adverse Reactions	May cause restlessness, anxiety, nervousness, weakness, dizziness, precordial pain, tremor, respiratory distress, sweating, or pallor. A desire to void, a pilomotor response, and/or nausea and vomiting may also occur.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Methylene Blue (ProvayBlue®)

Restricted Units	None		
Special Information	Vesicant – avoid extravasation. Warning: Potential for serotonin syndrome with concomitant use of serotonergic drugs.		
IV Line Information	Peripheral or Central (central line recommended if given as a continuous infusion)		
Therapeutic Use	Methemoglobinemia (drug-induced or acquired), vasoplegia syndrome associated with CT surgery or severe septic shock		
Dose	Methemoglobinemia (acquired): 1 mg/kg, repeat 1 hour later if symptoms persist, and consider alternative therapy if no resolution after two doses Methemoglobinemia (drug-induced): 1-2 mg/kg or 25-50 mg/m2, may be repeated in 1 hour Vasoplegia: 1.5-2 mg/kg bolus x 1 over 20-60 minutes, plus or minus a continuous infusion of 0.5-1 mg/kg/hour (improvement has been noted within 1-2 hours after administration of bolus)		
Titration Guidelines	N/A. Dose changes for continuous infusion should be ordered by provider.		
Route	IVP	IVPB	Continuous Infusion
	Yes – methemoglobinemia, over 5-30 minutes	Yes – methemoglobinemia over 5-30 minutes or vasoplegia blous over 20-60 minutes	Yes
Concentration	Ampule: 5 mg/mL (50 mg/10 mL) Bolus dose diluted in 100 mL D5W prior to administration of IVP to avoid pain on injection. Continuous infusion: 100 mg in 250 mL D5W		
Stability	Diluted solution should be used immediately after preparation. Do not refrigerate or freeze. Do not dilute in NS or other chloride-containing solutions.		
Monitoring	ABG, CBC, methemoglobin levels, pulse oximeter, renal function, signs/symptoms of methemoglobinemia (pallor, cyanosis, nausea, muscle weakness, dizziness, confusion, agitation, dyspnea, tachycardia)		
Mechanism of Action	Water soluble thiazine dye that romotes non-enzymatic redox conversion of methemoglobin to hemoglobin. May improve vascular resistance in vasoplegia through direct inhibition of endothelial nitric acid synthase and inducible nitric acid synthase, by oxidation of enzyme-bound ferrous iron. Also blocks formation of cyclic guanosine monophosphate (cGMP) to reduce vasorelaxation.		
Adverse Reactions	Feeling hot, dizziness, hyperhidrosis, skin discoloration, dysgeusia, nausea, urine discoloration, limb pain, chest discomfort, syncope, headache, paresthesia, diarrhea, musculoskeletal pain, flu-like symptoms, dyspnea, methemoglobinemia, discomfort at injection site, sensation to cold, anxiety, chills, pruritus, diaphoresis, erythema		
Dispensing Category	Yellow		

Methylergonovine (Methergine®)

Restricted Units	Yes, See Grid		
Special Information	Use extreme caution when administering to patients with hypertension or asthma.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Prevention and treatment of postpartum and postabortion hemorrhage caused by intrauterine atony or subinvolution		
Dose	0.2 mg after delivery of anterior shoulder, after delivery of placenta, or during puerperium; may be repeated at intervals of 2-4 hours. Methylergonovine may be given undiluted or in 5 mL NS over no less than 1 minute. **IM route strongly preferred**		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 2 minutes	No	No
Concentration	Vial: 0.2 mg/mL		
Stability	When diluted, methylergonovine should be administered immediately.		
Monitoring	BP		
Mechanism of Action	Ergot alkaloid. Causes constriction of smooth muscle of the uterus.		
Adverse Reactions	Hypertension/cerebrovascular accident (IM route preferred for this reason), nausea, vomiting, dizziness, headache, ringing in ears, chest pain, shortness of breath.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

methylPREDNISolone (Solu-MEDROL®)

Restricted Units	None		
Special Information	None		
IV Line Information	Central or Peripheral		
Therapeutic Use	Corticosteroid that is used as an anti-inflammatory and immunosuppressant		
Dose	Dosage is variable. The maximum dose for most Therapeutic Uses is 125 mg IV three times daily; however, selected Therapeutic Uses may require doses up to 1000 mg/day. Spinal cord injury patients may receive a bolus of 30 mg/kg over 15 minutes followed 45 minutes later by a continuous infusion of 5.4 mg/kg/hour for 23 hours. May administer an additional 24 hours if needed. Therapy should begin within 8 hours of injury for maximal benefit.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes - At a rate not to exceed 50 mg/min	Yes – Over 15 – 30 minutes	Yes
Concentration	Variable. Vials may be reconstituted and diluted with compatible diluents to a variety of concentrations. IVPB: Dose/50 mL		
Stability	24 hours		
Monitoring	Vital signs, blood glucose, electrolytes		
Mechanism of Action	Corticosteroids decrease formation, release, and activity of the mediators of inflammation (eg, kinins, histamine, liposomal enzymes, prostaglandins, leukotrienes), inhibit margination and subsequent cell migration to the area of injury, and also reverse the dilation and increased vessel permeability in the area, resulting in decreased access of cells to the sites of injury. Their immunosuppressive properties decrease the response to delayed and immediate hypersensitivity reactions. Additionally, the access of sensitized T lymphocytes and macrophages to target cells may also be prevented by corticosteroids.		
Adverse Reactions	May increase serum glucose, especially in patients with underlying hyperglycemic conditions. May also cause mood swings, psychoses, sodium and water retention, nausea/vomiting/indigestion, and peptic ulcer.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Metoclopramide (Reglan®)

Restricted Units	None		
Special Information	Elderly patients and patients with renal or liver dysfunction are prone to CNS side effects and should receive a lower initial dose. Extrapyramidal symptoms are common with high doses and may be relieved by diphenhydrAMINE 25-50 mg or benztropine 1-2 mg.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Antiemetic; prokinetic agent		
Dose	Usual starting dose : 5-10 mg four times daily, given before meals and at bedtime if the patient is eating. Occasional patients may require higher doses (e.g., 20 mg) for relief. May be given IVP undiluted over 1-2 minutes. Doses up to 1-2 mg/kg every 4-6 hours have been used for chemotherapy-induced nausea and vomiting, although this is no longer used routinely. Large doses may be diluted in 50 mL of compatible diluent and infused over 15 minutes.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes. May be given undiluted at a rate not to exceed 10 mg/min	No	No
Concentration	Vial: 5 mg/mL		
Compatibility	Compatible with NS, D5W, LR, TPN, most drugs Incompatible with ampicillin, erythromycin, fluorouracil, furosemide, propofol		
Stability	2 days (protected from light) 24 hours (exposed to light)		
Monitoring	Vital signs, dystonic reactions (dose-dependent), agitation, confusion, electrolytes		
Mechanism of Action	Blocks dopamine receptors in chemoreceptor trigger zone of the CNS; enhances the response to acetylcholine of tissue in upper GI tract causing enhanced motility and accelerated gastric emptying without stimulating gastric, biliary, or pancreatic secretions.		
Adverse Reactions	Restlessness, drowsiness, disorientation, extrapyramidal symptoms, diarrhea		
Dispensing Category	Green		

Metoprolol (Lopressor®)

Restricted Units	Yes, See Grid		
Special Information	**IV and PO dosing are not equivalent.** Dosages must be lowered when switching a patient from oral to IV metoprolol. Cardiac monitoring required.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Hypertension, myocardial infarction, supraventricular tachyarrhythmias		
Dose	Myocardial infarction: 5 mg IV every 2 minutes for 3 doses, then continue with oral metoprolol beginning 15 minutes after the last IV dose. Hypertension and other Therapeutic Uses: 1.25-5 mg every 6-12 hours in patients unable to take oral medications. Doses up to 20 mg IV have been used.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes. May be given undiluted at a rate not to exceed 5 mg over 2 min	No	No
Concentration	Vial: 1 mg/mL		
Stability	N/A		
Monitoring	Vital signs, cardiac monitoring.		
Mechanism of Action	Beta-1 selective adrenergic receptor antagonist		
Adverse Reactions	Bronchospasm, bradycardia, hypotension, withdrawal effects, congestive heart failure, exacerbation of intermittent claudication		
Dispensing Category	Green		

Midazolam (Versed®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	If intermittent (q4-6h IVP) doses are used, other long-acting benzodiazepines (LORazepam, diazepam) are recommended due to lower cost and change in pharmacokinetics after repeated doses. Either the parent drug or metabolites accumulate in critically ill patients with continuous dosing and has caused prolonged sedation (up to 7 days in some patients after long-term therapy)		
IV Line Information	Central or Peripheral		
Therapeutic Use	Sedation Induction of anesthesia		
Dose	Conscious sedation: 0.5-2.5 mg slow IV push. Repeat every 2-3 minutes as needed to a usual total dose of 2.5-5 mg. Induction of anesthesia: 0.15-0.35 mg/kg slow IV push Continuous infusion: Usual starting dose 1 – 2 mg/hr, then titrated to effect		
Titration Guidelines	Titrate continuous infusions by increments of 5 mg/hr to achieve desired level of sedation. Certain patients (e.g., chronic alcoholics) may require very high doses.		
Route	IVP	IVPB	Continuous Infusion
	Yes. At a rate not to exceed 1 mg/min	No	Yes
Concentration	Vial: 1 mg/mL or 5 mg/mL Standard: 0.5 mg/mL (50 mg/100 mL) Maximum: 1 mg/mL (100 mg/100 mL)		
Stability	48 hours		
Monitoring	Vital signs, sedation scale		
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.		
Adverse Reactions	Respiratory depression, hypotension		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Milrinone (Primacor®)

Restricted Units	Yes, See Grid		
Special Information	Use with caution in patients with renal failure. Eliminated by kidneys, therefore may experience more side effects in patients with renal failure such as arrhythmias.		
IV Line Information	Peripheral or Central		
Therapeutic Use	Severe Heart failure/Cardiogenic shock		
Dose	Loading dose of 50 mcg/kg over 10 minutes. Followed by continuous infusion of 0.2 to 0.75 mcg/kg/min, titrating to response Dosage decrease necessary in renal failure		
Titration Guidelines	Titrate to desired cardiac output and/or hemodynamic profile		
Route	IVP	IVPB	Continuous Infusion
	No	Yes, loading dose over 10 minutes	Yes
Concentration	0.2 mg/mL (20 mg/100 mL)		
Stability	24 hours		
Monitoring	Vital signs, cardiac output if possible		
Mechanism of Action	Synthetic phosphodiesterase inhibitor, which acts as an inotrope by indirectly stimulating beta-$_1$ and beta-$_2$ receptors. Also causes peripheral vasodilation, decreasing SVR. No apparent advantage over the combination of DOBUTamine and nitroglycerin or nitroprusside. Hemodynamic Effects - reduces afterload (SVR) and preload (PCWP) as well as increases cardiac output. Mean arterial pressure may decrease (caution in hypotensive patients)		
Adverse Reactions	Thrombocytopenia, ventricular arrhythmias, headache, chest pain/angina, hypotension		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Morphine

HIGH ALERT DRUG

Restricted Units	None		
Special Information	Symptoms of overdose include respiratory depression, miosis, hypotension, bradycardia, apnea, pulmonary edema. Treatment of overdose includes support of the patient's airway and administration of naloxone.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Potent opioid analgesic used to treat acute, chronic, and severe pain. Extended release epidural morphine (DepoDur): Post-surgical pain associated with lower abdominal surgery, lower orthopedic surgery, and elective cesarean sections		
Dose	IM*, IV, SC doses: 0.5-50 mg/dose every 2-6 hours as needed IV continuous infusions: 0.1-15 mg/hour Epidural doses: 1-10 mg/24 hours Extended-release epidural morphine: 10-15 mg x 1 dose (may not be repeated) Dosage decrease necessary in renal failure. *IM use may result in variable absorption and lag time to peak effect, and is not recomeneded for routine use per the American Pain Society		
Titration Guidelines	Doses should be titrated to appropriate effect. Adjust dose according to severity of pain and patient response		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 - 2 minutes	No	Yes
Concentration	2 mg/mL, 4 mg/mL, 5 mg/mL, 8 mg/mL, 10 mg/mL, 15 mg/mL Standard: 1 mg/mL (50 mg/50 mL) Maximum: 4 mg/mL (400 mg/100 mL) PCA Standard: 1 mg/mL (30 mg/30 mL) PCA Maximum: 5 mg/mL (150 mg/30 mL)		
Stability	48 hours		
Monitoring	Vital signs, pain/sedation score Extended release epidural morphine: Patient must remain hospitalized for 48 hours following administration, regardless of whether the surgery was performed.		
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		
Adverse Reactions	Palpitations, hypotension, bradycardia, dizziness, sedation, confusion, nausea, vomiting, constipation, pain at injection site, respiratory depression, shortness of breath, histamine release		
Dispensing Category	Green		

Multivitamin Injection

Restricted Units	None		
Special Information	Most often used in Rally Pack (with folic acid and thiamine) and TPN Product may contain aluminum (use with caution in patients with impaired renal function)		
IV Line Information	Central or Peripheral		
Therapeutic Use	Daily multivitamin maintenance supplement for patients receiving parenteral nutrition.		
Dose	Depends upon patient need		
Titration Guidelines	No titration		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 1 hour	Yes – TPN
Concentration	IVPB: Dose/50 mL		
Stability	24 hours		
Monitoring	Vital signs		
Mechanism of Action	Intake of necessary vitamins contributes to maintaining the body's normal resistance and repair processes		
Adverse Reactions	Anaphylactoid reaction, rash, erythema, fever, headache, agitation, dizziness, anxiety, urticaria, shortness of breath, wheezing, and angioedema		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Muromonab (OKT3)

Restricted Units	None		
Special Information	Premedicate with methylPREDNISolone/acetaminophen/antihistamines Use 0.22 micron filter When using concomitant immunosuppressive drugs, dose of each should be reduced to lowest level compatible with effective therapeutic response		
IV Line Information	Central or Peripheral		
Therapeutic Use	Renal transplant rejection and steroid dependant cardiac and liver transplant rejection.		
Dose	Cardiac transplant rejection, Steroid-resistant: 5 mg IV bolus once daily for 10-14 days; begin after corticosteroid therapy has failed Liver transplant rejection, Steroid-resistant: 5 mg IV bolus once daily for 10-14 days; begin after corticosteroid therapy has failed Renal transplant rejection: 5 mg IV bolus once daily for 10-14 days; begin upon diagnosis Renal transplant rejection: Prophylaxis: 5 mg IV once daily for 5-14 days; begin perioperatively		
Titration Guidelines	No titration		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 minute	No	No
Concentration	1 mg/mL		
Stability	N/A		
Adverse Reactions	Shivering, diarrhea, nausea, vomiting, arthralgia, myalgia, headache, rigor, dyspnea, fever, malaise, hypovolemic pulmonary edema		
Monitoring	Vital signs, weight Neurologic symptoms during first 24 hr following each of first few doses Prior to and during therapy, monitor renal, hepatic, and hematopoietic function Monitor muromonab-CD3 plasma levels and CD3 positive T cells periodically		
Mechanism of Action	Binds to CD3 antigen on the surface of T lymphocytes which inactivates the adjacent T-cell receptor portion of the T lymphocyte cell membrane, thus preventing activation of the T lymphocyte.		
Dispensing Category	Black		

Appendix C - Guidelines for IV Medication Administration

Mycophenolate (Cellcept®)

Restricted Units	None		
Special Information	Mycophenolate mofetil is a prodrug which is rapidly converted to mycophenolic acid (MPA). Increased susceptibility to infection and the possible development of lymphoma may result from immunosuppression.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Renal, Cardiac and hepatic transplantation		
Dose	Cardiac transplant rejection; Prophylaxis: 1.5 g IV/ORAL twice daily Liver transplant rejection; Prophylaxis: 1 g IV twice daily or 1.5 g ORALLY twice daily Renal transplant rejection; Prophylaxis: 1 g IV/ORAL twice daily Reconstitute and dilute in D5W to a concentration of 6 mg/mL, do not mix with other drugs or solutions infuse slowly over AT LEAST 2 hours; do NOT administer as a bolus or rapid infusion.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 2 hours	No
Concentration	IVPB: Dose/250 ml		
Stability	7 days		
Monitoring	Vital signs; Monitor signs and symptoms of rejection, a CBC at least weekly during first month, twice monthly for second and third months, then monthly through the first year; renal function; periodically and signs and symptoms of infections.		
Mechanism of Action	Inhibits purine synthesis in lymphocytes. MPA inhibits the activity of IMPDH, a key enzyme in the de novo pathway of guanosine nucleotide synthesis in B and T lymphocytes that slows their proliferative response.		
Adverse Reactions	Nausea, vomiting, diarrhea, esophagitis, gastritis, leukopenia, anemia, thrombocytopenia		
Dispensing Category	Red		

Appendix C - Guidelines for IV Medication Administration

Nalbuphine (Nubain®)

Restricted Units	None		
Special Information	Nalbuphine possesses narcotic antagonist activity and may precipitate withdrawal symptoms in patients who have received narcotics chronically Dose should be adjusted in patients with hepatic or renal dysfunction		
IV Line Information	Central or Peripheral		
Therapeutic Use	General anesthesia, For balanced anesthesia; Adjunct Pain (Moderate to Severe), Including preoperative, postoperative, and obstetrical analgesia Shivering Itching		
Dose	General anesthesia, For balanced anesthesia; Adjunct: induction, 0.3-3 mg/kg IV over 10-15 min General anesthesia, For balanced anesthesia; Adjunct: maintenance, 0.25-0.5 mg/kg in single IV administrations as needed Pain (Moderate to Severe), Including preoperative, postoperative, and obstetrical analgesia: 10 mg IM/IV/SC every 3-6 hr as needed Shivering or itching: 5 – 10 mg IV max of 20 mg		
Titration Guidelines	No titration		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 2 minutes	No	No
Concentration	10 mg/mL		
Stability	N/A		
Monitoring	Vital signs, pain score, metal status changes		
Mechanism of Action	Opioid agonist-antagonist		
Adverse Reactions	Sweating, nausea, vomiting, dizziness, sedation, allergic reaction, respiratory depression		
Dispensing Category	Green		

Naloxone (Narcan®)

Restricted Units	None		
Special Information	In patients with known or suspected physical dependence on opioids, naloxone may precipitate withdrawal symptoms Reversal of buprenorphine-induced respiratory depression may be incomplete Use with caution in patients with pre-existing cardiac disease		
IV Line Information	Central or Peripheral		
Therapeutic Use	Diagnosis of opioid dependence Overdose of opiate Reversal of opiate activity Paralysis for ascending aortic aneurysm (AAA)		
Dose	Overdose of opiate: 0.4-2 mg IV/IM/SC, repeat every 2-3 min as needed; if no response after 10 mg, reconsider diagnosis of opioid toxicity Reversal of opiate activity: 0.1-0.2 mg IV, repeat every 2-3 min as needed to desired degree of reversal; repeat doses may be needed within 1-2 hr depending on amount and type of opioid and time interval since last opioid administration		
Titration Guidelines	No titration		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 15 seconds	No	Yes
Concentration	Vials: 0.4 mg/mL, 1 mg/mL Drip: 4 mcg/mL (2 mg/500 mL)		
Stability	24 hours		
Monitoring	Vital signs		
Mechanism of Action	Pure opioid antagonist		
Adverse Reactions	Cardiac dysrhythmia, hypertension, hypotension, ventricular fibrillation hepatotoxicity, pulmonary edema, opioid withdrawal		
Dispensing Category	Green		

Neostigmine (Prostigmine®)

Restricted Units	Yes, See Grid		
Special Information	If administered for reversal of neuromuscular blockade, administer 0.6-1.2 mg atropine sulfate IV several minutes prior to neostigmine For neuromuscular blockade, administer neostigmine during hyperventilation		
IV Line Information	Central or Peripheral		
Therapeutic Use	Abdominal distension Myasthenia gravis Reversal of neuromuscular blockade Urinary retention		
Dose	Abdominal distension: 0.5 mg IM/SC as needed Myasthenia gravis: 0.5 mg IM/SC; base subsequent doses on patient's response Reversal of neuromuscular blockade: 0.5-2 mg by slow IV and repeat as needed; rarely should the total dose exceed 5 mg Urinary retention: 0.5 mg IM/SC every 3 hr for at least 5 doses		
Titration Guidelines	No titration		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 3 – 5 minutes	No	No
Concentration	Vials: 1 mg/mL		
Stability	N/A		
Monitoring	Vital signs, neuromuscular response		
Mechanism of Action	Enhances cholinergic action by facilitating the transmission of neuromuscular impulses and inhibits the destruction of acetylcholine by acetylcholinesterase.		
Adverse Reactions	Excessive sweating, diarrhea, excessive salivation, flatulence, increased peristalsis, nausea, vomiting, muscle twitch, cardiac dysrhythmia, anaphylaxis, seizure, bronchospasm, respiratory arrest, respiratory depression		
Dispensing Category	Green		

Nesiritide (Natrecor®)

Restricted Units	Yes, See Grid		
Special Information	Restricted: See **UC Health Guidelines** Patients taking concomitant oral ACE inhibitors may cause an increase in symptomatic hypotension. IV bolus should be administered over approximately 60 seconds Do NOT initiate at a dose higher than the recommended dose If hypotension occurs, the dose should be reduced or the drug discontinued; restart at 70% of dose (without bolus) Avoid heparin-coated catheters Must be re-ordered at 48 hours to continue		
IV Line Information	Central line preferred, but may be given peripherally.		
Therapeutic Use	Indicated for the intravenous treatment of patients with acutely decompensated congestive heart failure who have dyspnea at rest or with minimal activity.		
Dose	2 mcg/kg IV bolus followed by 0.01mcg/kg/min continuous IV infusion		
Titration Guidelines	May increase by 0.005 mcg/kg/min (after a bolus of 1 mcg/kg IV) no more frequently than every 3 hr up to a MAX dose of 0.03 mcg/kg/min		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	0.015 mg/mL (1.5 mg/100 mL)		
Stability	24 hours		
Monitoring	Vital signs. Monitor blood pressure and heart rate closely during administration		
Mechanism of Action	Human BNP binds to the particulate guanylate cyclase receptor of vascular smooth muscle and endothelial cells, leading to increased intracellular concentrations of guanosine 3’5’-Cyclic monophosphate (cGMP) and smooth muscle relaxation. Nesiritide has been shown to relax isolated human arterial and venous tissue preparations that were precontracted with either endothelin-1 or alpha-adrenergic agonist, phenylephrine.		
Adverse Reactions	Hypotension, lightheadedness , pruritus, nausea, confusion, headache, paresthesia, somnolence, tremor, atrial/ventricular cardiac dysrhythmia		
Dispensing Category	Red		

niCARdipine (Cardene®)

Restricted Units	Yes, See Grid		
Special Information	May drop blood pressure rapidly, therefore must closely monitor blood pressure.		
IV Line Information	Central or Peripheral		
Therapeutic Use	niCARdipine is indicated for the short-term treatment of hypertension when oral therapy is not feasible or not desirable		
Dose	Initiate continuous infusion at 1 - 5 mg/hour, maximum rate of 15 mg/hr		
Titration Guidelines	If desired blood pressure reduction is not achieved at initial rate, increase the infusion rate by 1 - 2.5 mg/hour every 5-15 minutes to a maximum of 15 mg/hour.		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	0.2 mg/mL (50 mg/250 mL or Premade 40 mg/200 mL)		
Stability	24 Hours Protect from light		
Monitoring	Blood pressure should be monitored frequently or continuously during the infusion and immediately following discontinuation of infusion.		
Mechanism of Action	niCARdipine inhibits the transmembrane influx of calcium ions into cardiac muscle and smooth muscle without changing serum calcium concentrations.		
Adverse Reactions	The most common adverse reaction is headache, followed by hypotension, nausea/vomiting and tachycardia.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Nitroglycerin

Restricted Units	Yes, See Grid		
Special Information	40-80% of total nitroglycerin in diluted solution may be adsorbed by PVC tubing. Prime tubing thoroughly before administration. Take care with glass bottle Cardiac monitoring required		
IV Line Information	Central or Peripheral		
Therapeutic Use	Angina Congestive heart failure Myocardial infarction Pulmonary edema Peri-operative blood pressure control		
Dose	5-25 mcg/min initially continuous infusion Post CABG with internal mammary artery to prevent coronary artery vasospasm in a dosage of 50-75 mcg/min for approximately 24 hours.		
Titration Guidelines	Dosage must be titrated to the individual patient's response. Initially, increase dose in 5 mcg/min increments every 3-5 min until response noted. If no response occurs at 20 mcg/min, increments of 10 mcg/min can be used.		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	0.2 mg/mL (50 mg/250 mL)		
Stability	48 hours		
Monitoring	Vital signs, continuous cardiac monitoring		
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.		
Adverse Reactions	Headache, hypotension, reflex tachycardia, bradycardia, flushing, nausea, vomiting, palpitations, tolerance (increasing dose requirements)		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Nitroprusside (Nipride®)

Restricted Units	Yes, See Grid		
Special Information	Continuous cardiac and blood pressure monitoring All thiocyanate levels must be ordered STAT Signs and symptoms of cyanide or thiocyanate toxicity are unexpected development of metabolic acidemia, psychosis, lethargy, tinnitus, convulsions, and hyperreflexia.May occur in hepatic or renal insufficient patient. Increased sensitivity in elderly, renal failure, CHF and CVA patients.		
IV Line Information	Central preferred, but may be given peripherally.		
Therapeutic Use	Hypertensive crisis Congestive heart failure (CHF) Pulmonary edema Peri-operative blood pressure control		
Dose	Titrate up to a desired dose; avoid rapid reductions of blood pressure. Start at 0.25 mcg/kg/min and increase by 0.5 mcg/kg/min. Average rate is 3 mcg/kg/min with a range of 0.5-10 mcg/kg/min. Highly variable range of doses.		
Titration Guidelines	Onset within 1 min, blood pressure usually returns to pretreatment levels in 2-10 min. Increase in increments of 0.5 mcg/kg/min		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	500 mcg/mL (50 mg/100 mL)		
Stability	48 hours Protect from light, solution deteriorates in light. Wrap bottle with foil. Change solution every 24 hours.		
Monitoring	Vital signs, continuous cardiac and blood pressure monitoring Monitor for signs of cyanide toxicity. Acidosis may be earliest sign of cyanide toxicity.		
Mechanism of Action	A potent vasodilator, that has direct action on vascular smooth muscle by causing dilation of both venous and arterial vessels via nitric oxide release.		
Adverse Reactions	Hypotension, nausea, vomiting, diaphoresis, nasal stuffiness, muscular twitching, dizziness and weakness, increased shunt fraction Cyanide toxicity (usually occurs in large doses 4 mcg/kg/min or greater) Earliest sign is metabolic acidosis and high SvO2 Thiocyanate toxicity (in renal failure) Do not exceed thiocyanate levels > 100 mcg/mL (or 10 mg/dL)		
Dispensing Category	Yellow		

Norepinephrine (Levophed®)

Restricted Units	Yes, See Grid		
Special Information	Monitor IV site for infiltration which will cause tissue sloughing If infiltration occurs, immediate intra-dermal injections of phentolamine (or alternative) should be administerd, along with elevation and cold compressions.		
IV Line Information	Central line only		
Therapeutic Use	Hypotension/shock which persists after adequate fluid replacement		
Dose	Initial: 2 – 10 mcg/min		
Titration Guidelines	Titrate to effect, onset is rapid and duration is 1-2 min. after discontinuing infusion		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	64 mcg/mL (16 mg /250 mL)		
Stability	24 hours		
Monitoring	Vital signs, IV site for extravasation		
Mechanism of Action	A catecholamine which directly stimulates beta-$_1$ and alpha- adrenergic receptors.		
Adverse Reactions	Reflex bradycardia, ventricular irritability, arrhythmias, restlessness, headache, anxiety, peripheral vasoconstriction leading to gangrene of the extremities		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Ocrelizumab (Ocrevus®)

<table>
<tr><td>Restricted Units</td><td>Restricted to outpatient therapy with verification of payer source</td></tr>
<tr><td>Special Information</td><td>Increased risk of Hepatitis B virus (HBV) reactivation in patients with chronic hepatitis B infection or chronic HBV carriers (surface antigen positive)</td></tr>
<tr><td>IV Line Information</td><td>Administer though a dedicated peripheral or central IV line using a 0.2 or 0.22 micron in-line filter.</td></tr>
<tr><td>Therapeutic Use</td><td>Multiple Sclerosis, relapsing or progressive</td></tr>
<tr><td>Premedication</td><td>Premedicate with methylprednisolone (100 mg IV) 30 minutes prior to each infusion, and an antihistamine 30 to 60 minutes prior each infusion; may also consider premedication with acetaminophen.</td></tr>
<tr><td>Dose</td><td>300 mg IV infusion on day 1, followed by 300 mg IV infusion 2 weeks later; subsequent doses of 600 mg IV are administered once every 6 months (beginning 6 months after the first 300 mg IV dose)</td></tr>
<tr><td>Titration Guidelines</td><td>
<table>
<tr><th colspan="2">300 mg Dose Rate Titration Schedule</th></tr>
<tr><td>Time (minutes)</td><td>Infusion Rate</td></tr>
<tr><td>0</td><td>Start at 30 mL/hr x 30 minutes</td></tr>
<tr><td>30</td><td>Increase to 60 mL/hr x 30 minutes</td></tr>
<tr><td>60</td><td>Increase to 90 mL/hr x 30 minutes</td></tr>
<tr><td>90</td><td>Increase to 120 mL/hr x 30 minutes</td></tr>
<tr><td>120</td><td>Increase to 150 mL/hr x 30 minutes</td></tr>
<tr><td>150</td><td>Increase to 180 mL/hr for remainder of infusion
(Do not exceed 180 mL/hour rate for 300 mg dose.)</td></tr>
</table>
<table>
<tr><th colspan="2">600 mg Dose Rate Titration Schedule</th></tr>
<tr><td>Time (minutes)</td><td>Infusion Rate</td></tr>
<tr><td>0</td><td>Start at 40 mL/hr x 30 minutes</td></tr>
<tr><td>30</td><td>Increase to 80 mL/hr x 30 minutes</td></tr>
<tr><td>60</td><td>Increase to 120 mL/hr x 30 minutes</td></tr>
<tr><td>90</td><td>Increase to 160 mL/hr x 30 minutes</td></tr>
<tr><td>120</td><td>Increase to 200 mL/hr for remainder of infusion
(Do not exceed 200 mL/hour rate for 600 mg dose.)</td></tr>
</table>
</td></tr>
</table>

Appendix C - Guidelines for IV Medication Administration

Route	IVP	IVPB	Continuous Infusion
	No	Yes – Infuse over at least 2.5 hours for 300mg dose and at least 3.5 hours for a 600mg dose	No
Concentration	IVPB: 300 mg/250 mL or 600 mg/500 mL (for final concentration of 1.2 mg/mL)		
Stability	8 hours at room temperature, up to 24 hours refrigerated		
Monitoring	Monitor closely during and for at least 60 minutes after each IV infusion for signs of infusion reaction. Symptoms include pruritus, rash, urticaria, erythema, bronchospasm, throat irritation, oropharyngeal pain, dyspnea, pharyngeal or laryngeal edema, flushing, hypotension, pyrexia, fatigue, headache, dizziness, nausea, and tachycardia. Monitor for signs and symptoms of infection, malignancy, or PML.		
Mechanism of Action	Ocrelizumab is a recombinant humanized IgG monoclonal antibody directed against B-cells which express the cell surface antigen CD20; CD20 is present on pre-B and mature B lymphocytes. Ocrelizumab selectively targets and binds with high affinity to the cell surface to deplete CD20 expressing B-cells through antibody-dependent cell-mediated phagocytosis and cytotoxicity, as well as complement-mediated cytolysis		
Adverse Reactions	Skin and respiratory tract infections, decreased immunoglobulins, decreased neutrophils, limb and back pain, and infusion reaction.		
Dispensing Category	Black		

Appendix C - Guidelines for IV Medication Administration

Octreotide (Sandostatin®)

Restricted Units	None		
Special Information	Octreotide may increase the effect of insulin or sulfonylurea agents resulting in hypoglycemia.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Upper GI bleeding Gastrointestinal hypersecretory illness such as: severe diarrhea, hormone-secreting pituitary tumors, and gastrointestinal fistulas Acromegaly		
Dose	Subcutaneous (secretory disorders) - 100 mcg subcut q 8-12 h to start, titrate prn - Wide range of dosages: up to 1500 mcg/d IV infusion (Acute GI bleed) - bolus dose 50-100 mcg - Infusion of 25-50 mcg/hr		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 3 minutes	Yes – Over 15 to 30 minutes	Yes
Concentration	Amps: 50 mcg/mL, 100 mcg/mL, 500 mcg/mL IVPB: 500mcg / 250 mL		
Stability	48 hrs		
Monitoring	Vital signs		
Mechanism of Action	Octreotide is a synthetic analogue of somatostatin, a naturally occurring hormone, which causes vasoconstriction of the splanchnic vascular bed, reducing portal vein flow and pressure. Because of these properties, it is used as an IV infusion for the treatment of acute variceal bleeding. Octreotide potentially causes less vasoconstriction than vasopressin in this situation, and thus has been associated with fewer adverse effects.		
Adverse Reactions	Sinus bradycardia, hyperglycemia, nausea, bloating, constipation, paralytic ileus, injection site pain/burning		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Olanzapine (Zyprexa®)

Restricted Units	Restricted to behavioral health and emergency department.		
Special Information	**Black Box Warning**: Elderly patients with dementia-elated psychosis treated with atypical antipsychotic drugs are at tan increased risk of death compared to placebo. Ziprasidone mesylate is not approved fro the treatment of patients with dementia-related psychosis. **Dosing adjustments**: Debilitated patients: 2.5mg per IM injection, dose excalation should be performed with caution in these patients Geriatric: 5 mg IM injection		
IV Line Information	IM only		
Therapeutic Use	Agitation associated with bipolar disorder or schizophrenia		
Dose	Initial: 10 mg IM; lower doses of 5mg-7.5mg may be used if indicated (see dosing adjustments) Usual effective dose range: 2.5mg 10 mg IM		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	No	No
Concentration	IM use only; do not administer intravenously or subcutaneously Reconstitute with Sterile Water for Injection;		
Stability	Use within 1 hour after reconstitution and discard any unused portion		
Monitoring	Improvements in mental status, ECG changes, blood pressure, heart rate, blood glucose, S/S hyperglycemia, S/S of dehydration, S/S of neuroleptic malignant syndrome (hyperpyrexia, muscle rigidity, altered mental status), S/S of extrapyramidal effects and/or tardive dyskinesia, hepatic function tests.		
Mechanism of Action	Class: antipsychotic, thienobenzodiazepine Systemic: The exact mechanism by which olanzapine exerts its antipsychotic effect is unknown. However, this effect may be mediated through a combination of dopamine and serotonin 5-HT 2 antagonism. Olanzapine is a selective monoaminergic antagonist with a strong affinity for serotonin 5-HT 2A and 5-HT 2C receptors, and dopamine D 1, D 2, D 3, and D 4 receptors		
Adverse Reactions	Chest pain, orthostatic hypotension, peripheral edema, tachyarrhythmia, hyperglycemia, Extrapyramidal effects and/or tardive dyskinesia, hypercholesterolemia, increased appetite, GI upset,		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Ondansetron (Zofran®)

Restricted Units	None		
Special Information	More effective for prevention than rescue therapy		
IV Line Information	Central or Peripheral		
Therapeutic Use	Chemotherapy induced nausea and vomiting: treatment and prophylaxis. Postoperative nausea and vomiting: treatment and prophylaxis. Radiation induced nausea and vomiting: prophylaxis.		
Dose	Postoperative nausea and vomiting: 4 mg Chemotherapy or radiation induced nausea and vomiting : 4 – 8 mg, max of 32 mg		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – 16 mg over 1 min	Yes – Over 15 to 30 minutes	No
Concentration	Vial: 2 mg/mL IVPB: Dose / 50 mL		
Stability	48 hours		
Monitoring	Vital signs		
Mechanism of Action	An antiemetic, serotonin receptor antagonist (5-HT3).		
Adverse Reactions	Headache, constipation, diarrhea, dry mouth. Tachycardia, angina, chest pain, arrhythmias (rare).		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Oxytocin (Pitocin®)

Restricted Units	None		
Special Information	Intravenous infusion is the only acceptable method of parenteral administration of oxytocin for induction or stimulation of labor		
IV Line Information	Peripheral or Central		
Therapeutic Use	Induction of labor, postpartum hemorrhage		
Dose	Induction of labor: initial, 0.5 to 1 milliunit/min IV (3 to 6 mL/h of a 10 units/1000 mL dilute oxytocin solution Postpartum hemorrhage: 10 to 40 units of oxytocin added to running IV infusion		
Titration Guidelines	Induction of labor: gradually increase dose in increments of 1 to 2 milliunits/min every 30 to 60 min until desired contraction pattern has been established; once desired frequency of contractions has been reached and labor progressed to 5 to 6 cm dilation, the dose may be reduced by similar increments Postpartum hemorrhage: adjust infusion rate to sustain uterine contractions and control uterine atony		
Route	IVP	IVPB	Continuous Infusion
	Yes	No	Yes
Concentration	20 units/500 mL 40 units/1000 mL (***For use only when Lactated Ringer 500 mL in critically short supply***)		
Stability	24 hours		
Monitoring	Vital signs Labor induction: uterine activity, fetal status, cervical dilatation and effacement Postpartum bleeding: blood pressure, heart rate, uterine response, reduction in uterine bleeding		
Mechanism of Action	Oxytocin stimulates contraction of uterine smooth muscle by increasing intracellular calcium concentrations, thus mimicking contractions of normal, spontaneous labor and transiently impeding uterine blood flow.		
Adverse Reactions	Nausea, vomiting		
Dispensing Category	Green		

Pamidronate (Aredia®)

Restricted Units	None		
Special Information	None		
IV Line Information	Central or peripheral		
Therapeutic Use	Treatment of hypercalcemia of malignancy, Paget's disease, and osteolytic bone lesions		
Dose	60 to 90 mg IV		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 2 hours	No
Concentration	IVPB: Dose/250 mL		
Stability	24 hours		
Monitoring	Vital signs, serum electrolytes		
Mechanism of Action	A bisphosphonate which inhibits bone resorption via actions on osteoclasts or on osteoclast precursors.		
Adverse Reactions	Fever, fatigue, hypophosphatemia, hypokalemia, hypomagnesemia, hypocalcemia, nausea, tachycardia, syncope, hypertension		
Dispensing Category	Red		

Appendix C - Guidelines for IV Medication Administration

Pantoprazole (Protonix®)

Restricted Units	None		
Special Information	Severe hepatic impairment: limit maximum daily dose to 20 mg		
IV Line Information	Central or Peripheral		
Therapeutic Use	Erosive esophagitis - Gastroesophageal reflux disease, hypersecretory disorders, prevention of rebleeding of peptic ulcers, *Helicobacter pylori* eradication		
Dose	20 or 40 mg once daily or BID by IV injection (reconstituted with 10ml of NS and pushed over no less than 2 min) or IV infusion (reconstituted with 50ml of NS or D5W over 15 minutes, rate not to exceed 3 mg/min)		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 2 minutes	Yes	Yes
Concentration	Vial: 20 mg, 40 mg Infusion: 8 mg/ml (80 mg/100ml)		
Stability	Infusion: 24 hours at room temperature Injection: the reconstituted solution should be used within 24 hr and may be stored at room temperature		
Monitoring	Decreased abdominal and gastroesophageal discomfort, endoscopic improvement, and CBC		
Mechanism of Action	Class: Antiulcer, Proton Pump Inhibitor It inhibits the terminal stage in acid production by binding to H(+)/K(+)-ATPase in gastric parietal cells, thereby suppressing gastric acid secretions.		
Adverse Reactions	Injection site reactions, GI upset (abdominal pain, constipation, diarrhea, flatulence, indigestion, nausea), dizziness, headache,		
Dispensing Category	Green		

Papaverine Hydrochloride

Restricted Units	Yes, See Grid		
Special Information	May be given intra-arterially under intensive care supervision		
IV Line Information	Central or peripheral		
Therapeutic Use	Smooth muscle spasms, impotence		
Dose	35 – 60 mg IV or IM, may repeat every 3 hours		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 2 minutes	Yes	No
Concentration	Vial: 30 mg/mL IVPB:		
Stability	24 hours		
Monitoring	Vital signs, serum electrolytes		
Mechanism of Action	A vasodilating agent that produces generalized, nonspecific arteriolar dilatation and smooth muscle relaxation		
Adverse Reactions	Hypertension, tachycardia, flushing, pruritus, acidosis, hepatotoxicity, priapism		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Pancuronium (Pavulon®)

Restricted Units	Yes, See Grid		
Special Information	Must be intubated. Continuous cardiac monitor. The drug accumulates in renal failure -decrease dose. The drug is metabolized in the liver – the dose may need to be decreased in liver failure/ cholestasis. Use with extreme caution in patients with myasthenia gravis, Eaton Lambert Syndrome, Amyotrophic Lateral Sclerosis, hypokalemia. To reverse neuromuscular blockade use neostigmine 0.03 to 0.08 mg/kg.		
IV Line Information	Central or Peripheral		
Therapeutic Use	To cause skeletal muscle paralysis. To eliminate spontaneous breathing and promote prolonged mechanical ventilation. To decrease oxygen consumption in patients with severe cardiovascular or respiratory compromise.		
Dose	The dose is variable. Intermittent dosing : 0.1 to 0.2 mg/kg every 1-3 hours. Continuous infusion : Loading dose of 0.03 to 0.1 mg/kg then 0.05 to 0.1 mg/kg/hour.		
Titration Guidelines	Dosage is titrated to clinical endpoint or train-of-four.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 4 minutes	No	Yes
Concentration	Standard: 0.5 mg/mL (50 mg/100 mL)		
Stability	48 hours		
Monitoring	Vital signs , ventilation status, neurologic response		
Mechanism of Action	Non-depolarizing neuromuscular blocking agent that causes skeletal muscle relaxation by producing a decreased response to acetylcholine at the neuromuscular junction.		
Adverse Reactions	Tachycardia, hypertension, increased cardiac output, flushing, edema, pruritus, rash		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Pegloticase (Krystexxa®)

Restricted Units	Yes, Barrett Center		
Special Information	Other urate lowering therapies should be discontinued prior to use of pegloticase. Premedication with corticosteroids and antihistamines is required.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Treatment of chronic gout in adult patients refractory to conventional therapy. Not for treatment of asymptomatic hyperuricemia.		
Dose	8 mg IV infusion over at least 120 minutes every 2 weeks. Do not administer as IV push or bolus.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	Standard: 8 mg in 250 mL 0.9% sodium chloride or 0.45% sodium chloride		
Stability	4 hours refrigerated or at room temperature; must be used within 4 hours of dilution DO NOT SHAKE		
Monitoring	Serum uric acid levels before each infusion; consider discontinuing if uric acid level is >6 mg/dL, especially if there are two consecutive uric acid levels >6 mg/dL; Monitor for signs of anaphylaxis during infusion		
Mechanism of Action	Catalyzation of oxidation of uric acid to allantoin to lower serum uric acid levels		
Adverse Reactions	Anaphylactic reaction, infusion reaction, gout flares, congestive heart failure, nausea, vomiting, contusion, nasopharyngitis, chest pain, constipation		
Dispensing Category	Red		

PENTobarbital (Nembutal®)

Restricted Units	Yes, See Grid		
Special Information	Must be intubated Reduce dose in elderly patients and patients with hepatic dysfunction.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Termination of status epilepticus Drug-induced coma Elevated ICPs in traumatic brain injuries (intracranial hypertension)		
Dose	Status epilepticus and drug-induced coma Loading Dose: 2-15 mg/kg over 1 –2 hours Maintenance Infusion: 0.5 – 3 mg/kg/hr Elevated ICP: Loading Dose (over 4 hours) 1st hour: 2.5 mg/kg q15 min x 4 (Total = 10 mg/kg) Total 2nd to 4th hour: 10 mg/kg/hr as a continuous infusion Maintenance Infusion - After 4th hour 1-4 mg/kg/hr as a continuous infusion		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Maximum of 50 mg/min	No	Yes
Concentration	Vial: 50 mg/mL Drip: 4 mg/mL (2 gm/500 mL)		
Stability	12 hours		
Monitoring	Vital signs, ventilation status, cardiac function, PENTobarbital serum concentrations		
Mechanism of Action	PENTobarbital is a short-acting barbiturate (sedative/hypnotic) used for control of elevated intracranial pressures (ICP) in patients with closed head injuries. Barbiturates may potentially decrease ICP by: 1) decreasing cerebral metabolism and oxygen requirements, 2) decreasing cerebral blood flow due to vasoconstriction of cerebral vessels.		
Adverse Reactions	Respiratory depression, hypotension, coma, negative inotrope		
Dispensing Category	Red		

Appendix C - Guidelines for IV Medication Administration

PHENobarbital (Luminal®)

Restricted Units	Yes, See Grid		
Special Information			
IV Line Information	Central or peripheral		
Therapeutic Use	Treatment of seizures Sedative		
Dose	50 – 100 mg, 2 – 3 times per day		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Rate NTE 60 mg/min	No	No
Concentration	60 mg/mL 130 mg/mL		
Stability			
Monitoring	Vital signs, neuro status, PHENobarbital serum concentrations		
Mechanism of Action	Short-acting barbiturate with sedative, hypnotic, and anticonvulsant activity. Barbituates depress the sensory cortex, decrease motor activity, alter cerebellar function and produce drowsiness, sedation and hypnosis.		
Adverse Reactions	Drowsiness, lethargy, confusion, somnolence, agitation, headache, insomnia, dizziness, rash, dermatitis, Stevens-Johnson syndrome, respiratory depression		
Dispensing Category	Yellow		

Phentolamine (Regitine®)

Restricted Units	None		
Special Information	Contraindicated in patients with history of myocardial infarction, coronary artery disease, and angina pectoris		
IV Line Information	Periperheral or Central		
Therapeutic Use	Pre- or intra-operative hypertensive episode, treatment or prophylaxis Diagnosis of pheochromocytoma Treatment for extravasation		
Dose	5 mg IVP or IM		
Titration Guidelines	None; may repeat dose as needed		
Route	IVP	IVPB	Continuous Infusion
	Yes	No	No
Concentration	Reconstitute with Sterile Water for Injection to a concentration of 5 mg/mL		
Stability	Reconstituted solution should be used upon preparation; do not store		
Monitoring	Vital signs		
Mechanism of Action	Direct positive inotropic and chronotropic effects on heart muscle and vasodilator effects on vascular smooth muscle. It possesses a short duration of alpha-adrenergic blocking activity .		
Adverse Reactions	Chest pain, hypotension, palpitations, tachyarrhythmia, diarrhea, nausea, vomiting, dizziness, headache, nasal congestion		
Dispensing Category	Green		

Phenylephrine (Neo-Synephrine®)

Restricted Units	Yes, See Grid		
Special Information	Effective immediately and lasts 15 minutes after infusion discontinued.		
IV Line Information	Central line only		
Therapeutic Use	Treatment of hypotension, vascular failure in shock		
Dose	Bolus doses: 0.1 to 0.5 mg, may repeat every 10 mins, up to 1mg Infusion: Initiate at 100-180 mcg/min. Doses are highly variable, titrate to effect		
Titration Guidelines	Titrate to maintain blood pressure		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	0.4 mg/mL (100 mg/250 mL)		
Stability	48 hrs		
Monitoring	Vital signs, extremities, blood gases, MAP		
Mechanism of Action	Acts predominantly by a direct stimulation of alpha-adrenergic receptors. At "normal" therapeutic doses, the drug has no substantial stimulant effect on beta-$_1$ receptors. However, substantial activation of beta-1 receptors occurs when large doses are used. Phenylephrine also has an indirect effect by releasing norepinephrine from storage sites. Hemodynamic Effects - The main effect of therapeutic doses of phenylephrine is arterial and venous vasoconstriction. SVR is increased, resulting in increased blood pressure. Cardiac output may be unchanged, but usually decreases due to increased SVR. Decreases renal blood flow.		
Adverse Reactions	Reflex bradycardia, gangrene of the extremities, ventricular arrhythmias, decreased urine output, decreased gut motility		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Phenytoin (Dilantin®)

Restricted Units	None		
Special Information	Use of a 0.22 micropore filter is suggested to avoid administration of phenytoin crystals. Flush line with NS after administration of dose. Serum concentrations: Monitor trough concentrations prior to dose. Therapeutic total concentration: 10-20 mcg/ml Free or unbound concentration: 1-2 mcg/mL. Patients with hypoalbuminemia, renal failure or other highly protein bound drugs (e.g valproate) get free phenytoin levels.		
IV Line Information	Central or Peripheral May use syringe pump. Infuse at less than 50 mg/min. If diluted use a 0.22 micropore filter.		
Therapeutic Use	Seizure disorders (generalized tonic-clonic and partial seizures)		
Dose	Loading Dose: 18-20 mg/kg Maintenance Dose: 5-6 mg/kg/day Dosage is titrated by serum concentration monitoring		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Maximum of 50 mg/min	Yes – Over 15 minutes	No
Stability	Short - prepare directly before administration Microcrystalization occurs within 30-60 minutes after preparation.		
Monitoring	Vital signs, IV site, phenytoin serum concentrations		
Mechanism of Action	Phenytoin is a hydantoin anticonvulsant whose mechanism of action is limitation of seizure propagation by reduction of post-tetanic potentiation of synaptic transmission.		
Adverse Reactions	Hypotension, atrial/ventricular arrhythmias, cardiovascular collapse, ataxia, nystagmus, slurred speech, toxic epidermal necrolysis, infusion site reactions		
Dispensing Category	Green		

Phosphorus

Restricted Units	None		
Special Information	Every 3 mMol of Potassium phosphate contains 4.4 mEq of Potassium Every 3 mMol of Sodium phosphate contains 4 mEq of Sodium For serum Potassium greater than 4 meq/mL, use Sodium phospahate For serum Potassium less than 4 meq/mL, use Potassium phosphate		
IV Line Information	**Peripheral Line:** Maximum rate of IV infusion: 5 mMol/hour **Central Line:** Maximum rate of IV infusion: 7.5 mMol/hour		
Therapeutic Use	Replacement of phosphorus in patients with evidence of hypophosphatemia		
Dose	Dosing is variable based on patients phosphorus level and renal function. Serum Phosphorus 1.6 to 2.5 mg/dL – Give 0.32 mMol/kg IVPB X 1 Serum Phosphorus <1.6 mg/dL – Give 0.64 mMol/kg X 1		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	Yes
Concentration	Potassium/Sodium phosphate 1-5 mMol/50mL Potassium/Sodium phosphate 6-10 mMol/100mL Potassium/Sodium phosphate 11-30 mMol/150mL (ICU or cardiac monitored) Potassium/Sodium phosphate 11-30 mMol/250mL Potassium/Sodium phosphate greater than 30 mMol/250mL (ICU or cardiac monitored) Potassium/Sodium phosphate greater than 30 mMol/500mL		
Stability	48 hours		
Monitoring	Monitor phosphorus and calcium levels daily during replacement periods. Consider potassium phosphate in appropriate patients with low phosphorus and potassium; use sodium phosphate if potassium is high or not needed.		
Mechanism of Action	Phosphorus is a major intracellular anion that serves as the major source of intracellular energy (e.g., ATP), in particular respiratory and myocardial cells tissues.		
Adverse Reactions	Rapid peripheral infusion may cause hypotension, venous irritation, or extravasation. Hyperphosphatemia (especially in patients with renal insufficiency) Hypocalcemia		
Dispensing Category	Green		

Physostigmine

Restricted Units	Yes, See Grid		
Special Information	Continuous cardiac monitoring Atropine should be readily available to reverse toxic effects of physostigmine. Use with caution in patients receiving tricyclic antidepressants for risk of bradycardia is increased.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Acute reversal of anticholinergic drugs and toxic effects from poisonings.		
Dose	2 mg IV given no faster than 1 mg/min; dose may be repeated if no reversal has occurred or if anticholinergic symptoms return		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Maximum of 1 mg/min	N/A	N/A
Concentration	Vial: 1 mg/mL		
Stability			
Monitoring	Vital signs during and after administration along with continuous telemetry. Signs of cholinergic toxicity include slowing of heart rate; narrowing of the QRS complex; decreased blood pressure; moistening of mucous membranes; increased bowel sounds; increased bladder tone; reversal of delirium, hallucinations, or coma		
Mechanism of Action	Physostigmine is an acetylcholinesterase inhibitor. This increases the accumulation of acetylcholine at the neuroreceptor sites thereby overcoming the antagonism of acetylcholine from anticholinergic drugs.		
Adverse Reactions	Bradycardia (rapid administration); tachycardia; PVCs; diarrhea; nausea; vomiting; salivation; incontinence; seizures		
Dispensing Category	Green		

Phytonadione (Vitamin K)

Restricted Units	None		
Special Information	Anaphylaxis or hypotension with rapid IV administration. Must be infused slowly over at least 20 minutes. Oral route are preferred over IV if able Subcutaneous route **not** preferred over IV infusion per CHEST guidelines due to eradic absorption and delayed correction of INR documented in primary literature		
IV Line Information	Central or Peripheral		
Therapeutic Use	Replacement of Vitamin K deficiency and correction of associated coagulopathy as evidenced by elevations of PT/INR Delayed reversal of warfarin-induced anticoagulation		
Dose	Dosage is usually patient specific based on the degree of coagulopathy. Phytonadione can be given IVPB, subcutaneously, or orally. Usual dosages are 0.5 to 10 mg IVPB/subcut or 2 to 10 mg PO.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 20 to 60 minutes	No
Concentration	IVPB: Dose/50 mL		
Stability	24 hours MUST protect from light.		
Monitoring	Vital signs, PT/INR		
Mechanism of Action	Vitamin K is an essential vitamin for hepatic synthesis of coagulation Factors II (prothrombin), VII, IX and X. It also is a required cofactor for the post-translational oxidative carboxylation of certain proteins.		
Adverse Reactions	Anaphylaxis or hypotension with rapid IV administration; subtherapeutic anticoagulation, cyanosis, diaphoresis, dizziness		
Dispensing Category	Green		

Pralidoxime (Protopam®)

Restricted Units	Yes, See Grid		
Special Information	Continuous cardiac monitor Slow IV infusion prevents tachycardia, laryngospasm, muscle rigidity Elimination may be decreased in renal insufficiency		
IV Line Information	Central is preferred, but may be given peripherally		
Therapeutic Use	Pralidoxime (in addition to atropine) is indicated for severe organophosphate insecticide poisonings, which have anticholinesterase activity, particularly those characterized by profound weakness, respiratory depression, and muscle twitching. Pralidoxime may also be useful in the control of overdosage by anticholinesterase drugs.		
Dose	Initial: 1 to 2 grams , may repeat in 1 hour then q 8-12 hours if cholinergic signs and symptoms recur.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 15 to 30 minutes not to exceed 200 mg/min	No
Concentration	IVPB: Dose/100 mL		
Stability	4 hours		
Monitoring	Vital signs; cardiac monitoring; serum or whole blood cholinesterase levels		
Mechanism of Action	Pralidoxime restores cholinesterase activity towards normal when used in the treatment of anticholinesterase poisoning		
Adverse Reactions	Tachycardia; laryngospasm; muscle rigidity; nausea; vomiting; diarrhea; diplopia; hyperventilation		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Procainamide (Pronestyl®)

Restricted Units	Yes, See Grid		
Special Information	Continuous cardiac monitoring Reduce dose in elderly patients, CHF and renal insufficiency		
IV Line Information	Central or Peripheral		
Therapeutic Use	Atrial and ventricular arrhythmias and PVCs		
Dose	Loading dose 15 mg/kg (Maximum dose 1 gram) Maintenance: 1-6 mg/min		
Titration Guidelines	0.5 mg/min increments		
Route	IVP	IVPB	Continuous Infusion
	Yes – Code only	Yes – Maximum of 50 mg/min	Yes
Concentration	Standard: 8 mg/mL (2 grams/250 mL)		
Stability	24 hours		
Monitoring	Vital signs, cardiac monitoring, CBC, platelet count Monitor Procainamide and NAPA blood leves (normal Procainamide 3-10 mcg/mL)		
Mechanism of Action	Increases the effective refractory period of the atria. Reduces impulse conduction velocity in the atria, His-Purkinje fibers and ventricular muscle. Considered a myocardial depressant because it decreases myocardial excitability and conduction velocity and may depress myocardial contractility.		
Adverse Reactions	Widened QRS, prolonged QT and PR, lowering of R and T waves Paradoxical ventricular tachycardia Increased AV Block Nausea, vomiting and diarrhea Hypotension - especially with loading dose		
Dispensing Category	Green		

Prochlorperazine (Compazine®)

Restricted Units	None		
Special Information	Avoid subcutaneous injection.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Nausea and vomiting (medical or post-operative)		
Dose	2.5 to 10 mg slow IV or IM injection; recommendations not to exceed 40 mg per day. Can be given as needed or scheduled.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 5 to 10 minutes	No	No
Concentration	Vial: 5 mg/mL May be given undiluted		
Stability	Protect from light.		
Monitoring	Mental status; routine vital signs; ECG in patients requiring around-the-clock doses; anticholinergic and extrapyramidal side effects.		
Mechanism of Action	Prochlorperazine acts centrally by inhibiting the dopamine receptors in the medullary chemoreceptor trigger zone (CTZ), and peripherally by blocking the vagus nerve in the gastrointestinal tract.		
Adverse Reactions	Arrhythmias; hypotension; hepatitis; mental status changes; delirium; somnolence; extrapyramidal symptoms; seizures; dyskinesias; urinary retention; constipation, injection site reactions		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Promethazine (Phenergan®)

Restricted Units	None		
Special Information	***Irritant*** Dilute with 10 – 20 mL of normal saline. Infuse into large vein, observe IV site for extravasation. Max of 25 mg/min. Avoid intra-arterial and subcutaneous injection. Use with caution in elderly patients and patients with asthma.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Nausea and vomiting (medical or post-operative) Allergic reaction Sleep (in conjunction with non-pharmacologic measures)		
Dose	6.25 to 25 mg IV/IM/PO/PR every 4 to 6 hours Usually given as needed, but can be scheduled for chronic nausea		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 3 to 5 minutes	No	No
Concentration	Vial: 25 mg/mL		
Stability	Protect from light.		
Monitoring	Vital signs; Mental status; ECG in patients requiring around-the-clock doses; Anticholinergic and extrapyramidal side effects; IV site		
Mechanism of Action	Promethazine is phenothiazine derivative structurally unlike the antipsychotic phenothiazines that has antihistamine, sedative, and antiemetic effects primarily through Histamine-1 receptor antagonism.		
Adverse Reactions	Sedation; delirium; mental status changes; bradycardia; hypotension; QRS and QTc interval prolongation; extrapyramidal symptoms; seizures; constipation; urinary retention; injection site reactions		
Dispensing Category	Green		

Propofol (Diprivan®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid.		
Special Information	Has no analgesic activity Formulated in a 1% lipid emulsion containing 1.1 kilocalorie/mL. Infusion rates greater than 20mL/hour provide greater than 500 kcals/day. Discontinuation of propofol requires a gradual reduction in dose (50% every 2 hours). Abrupt discontinuation may result in rapid awakening (anxiety, agitation).		
IV Line Information	Peripheral or Central IV tubing must be changed every 12 hours due to high lipid content.		
Therapeutic Use	Sedation of critically ill patients		
Dose	Initial: 5-10 mcg/kg/minute Continuous: 10-80 mcg/kg/minute		
Titration Guidelines	Titrate in 5 to 10 mcg/kg/min (0.3 to 0.6 mg/kg/h) increments to achieve desired level of sedation; allow minimum of 5 min between dose adjustments.		
Route	IVP	IVPB	Continuous Infusion
	Yes , but only by Physicians and CRNAs	No	Yes
Concentration	10 mg/mL		
Stability	24 hours		
Monitoring	Vital signs, Oxygen saturation		
Mechanism of Action	Propofol is a short-acting hypnotic. Its mechanism of action has not been well-defined.		
Adverse Reactions	Injection site pain, nausea, vomiting, involuntary movement, muscle, bradyarrhythmia, hypotension, anaphylaxis, priapism, apnea, respiratory acidosis		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Propranolol (Inderal®)

Restricted Units	Yes, See Grid		
Special Information	Requires continuous cardiac monitoring. IV doses are not equivalent to PO doses. Extreme caution and increased monitoring in patients with systolic dysfunction or bronchospastic disease (e.g., asthma).		
IV Line Information	Central or Peripheral		
Therapeutic Use	Hypertension; hyperthyroidism; angina; anxiety; tremor; migraine headaches; portal hypertension		
Dose	Intermittent dosing: 1 to 4 mg IV every 4 to 6 hours Rapid infusion: 1 mg/minute every 5 minutes up to 10 mg; may repeat every 4 to 6 hours		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Maximum of 1 mg/min	No	No
Concentration	Vial: 1 mg/mL		
Stability	N/A		
Monitoring	Vital signs, cardiac monitoring		
Mechanism of Action	Non-selective beta-1 and beta-2 receptor antagonist		
Adverse Reactions	Bradycardia; hypotension; CHF; rebound angina; hypertension; tachycardia with withdrawal; diarrhea; worsened asthma exacerbation		
Dispensing Category	Green		

Protamine Sulfate

Restricted Units	None		
Special Information	Use with caution especially in patients allergic to fish, vasectomized or infertile males and patients who have received protamine containing insulin or previous protamine therapy. Heparin rebound with anticoagulation and bleeding may occur several hours after heparin has been adequately reversed.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Treatment of heparin overdose.		
Dose (mg)	Dose is determined by the dosage of heparin; 1 mg of protamine neutralizes approximately 100 USP units of heparin. Adjust the protamine dosage depending upon the duration of time since heparin administration. If heparin was given by continuous infusion, give 1-1.5 mg protamine for every 100 units heparin given in the previous 4 hours. Administer via IV push over 1-3 minutes, maximum of 50 mg in any 10 minutes period. If calculated dose is > 50 mg, administer the remaining dose via continuous infusion over 8-16 hours.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 10 minutes	No	No
Concentration	Vial: 10 mg/mL		
Stability	N/A		
Monitoring	Vital signs, coagulation parameters 5- 15 minutes after protamine given. Hemodynamic parameters should be monitored during administration. Careful monitoring of chest tubes and drains is required to ensure not clotted off. Check PTT 9 hours after dose.		
Mechanism of Action	Combines with strongly acidic heparin to form a stable complex (salt) neutralizing the anticoagulant activity of both drugs.		
Adverse Reactions	Hypotension, bradycardia, dyspnea, hemorrhage, flushing, lassitude, nausea, vomiting, pulmonary hypertension, and hypersensitivity reaction		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Ranitidine (Zantac®)

Restricted Units	Nonformulary		
Special Information	Dose must be adjusted for renal impairment.		
IV Line Information	Peripheral or central line.		
Therapeutic Use	Ulcer, esophagitis, gastroesophageal reflux disease		
Dose	Pediatric : 0.5-10 mg/kg every 8-12 hours		
Titration Guidelines	No titration.		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	1 mg/mL and 25 mg/mL		
Stability	7 days (1 mg/mL)		
Monitoring	Vital signs, decreased abdominal and/or gastroesophageal discomfort, CBC		
Mechanism of Action	Ranitidine is a competitive H2-receptor antagonist.		
Adverse Reactions	Bradyarrhythmia, abdominal pain, constipation, diarrhea, nausea and vomiting, dizziness, headache, insomnia, somnolence, agitation, fatigue		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Reslizumab (Cinqair®)

Restricted Units	For outpatient use only with verification of reimbursement.		
Special Information	Restricted to treatment of severe eosinophilic asthma. Reslizumab should NOT be used for the treatment of acute asthma exacerbations.		
IV Line Information	Peripheral or central line. Infuse with an in-line 0.2 micron filter. Flush IV line with 0.9% sodium chloride at completion of infusion to ensure that all drug has been administered.		
Therapeutic Use	Add-on maintenance therapy for patients with severe eosiniphilic asthma.		
Dose	3 mg/kg every 4 weeks		
Titration Guidelines	Administer over 20-50 minutes		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	Prepare in 50 mL 0.9% sodium chloride		
Stability	16 hours at room temperature. Do not shake, do not tube.		
Monitoring	Monitor for anaphylaxis (may occur during or within 20 minutes after completion of infusion, and can occur with any dose – discontinue permanently is patient experiences anaphylaxis), malignancies, antibody development, increased creatine phosphokinase		
Mechanism of Action	Interleukin-5 antagonist. IL-5 is responsible for growth and differentiation, recruitment, activation, and survival of eosinophils. Eosinophils are associated with inflammation and are important component in pathogenesis of asthma.		
Adverse Reactions	Anaphylaxis, development of malignancies, myalgia, oropharyngeal pain		
Dispensing Category	Red		

Reteplase (Retavase, rPA)

Restricted Units	Yes, See Grid		
Special Information			
IV Line Information	Central line preferred. May be given peripherally. Vascular arterial line for catherter directed thrombolysis of peripheral occlusive disease.		
Therapeutic Use	Reteplase is indicated for use in the management of acute myocardial infarction (AMI) in adults, for the improvement of ventricular function following AMI and the reduction of mortality associated with AMI, for use in the management of acute ischemic stroke in adults for improving neurological recovery and reducing the incidence of disability, for the management of acute massive pulmonary embolism (PE) in adults for the lysis of the acute PE. Reteplase may also be used to lyse a clot that is obstructing an intravenous line or a chest tube.		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 2 minutes	No	Yes
Concentration	Vial: 10 units Catheter directed thrombolysis: 0.1 units/mL (10 units/100 mL)		
Stability	4 hours		
Monitoring	Vital signs, signs and symptoms of bleeding.		
Mechanism of Action	Reteplase is a thrombolytic agent known as tissue-type plasminogen activator. It initiates local fibrinolysis by binding to fibrin in a thrombus and converts entrapped plasminogen to plasmin.		
Adverse Reactions	Bleeding, hypotension, fever, nausea, vomiting, arrhythmias.		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Rh_o(D) Immune Globulin (Rhophylac®)

Restricted Units	No		
Special Information	When used for the prevention of rhesus (Rh) isoimmunization in an Rh-incompatible pregnancy, the dose is administered to the mother, not the neonate.		
IV Line Information	Infuse at 2 mL per 15 to 60 seconds		
Therapeutic Use	Prevention of rhesus (Rh) isoimmunization in an Rh-incompatible pregnancy. Immune thrombocytopenia (ITP).		
Dose	Antepartum prophylaxis: 300 mcg IM or IV at 28 to 30 weeks' gestation; Postpartum prophylaxis: 300 mcg IM or IV if volume of Rh-positive RBC exposure is ≤15 mL. If exposure to >15 mL of Rh-positive RBC is suspected, an appropriate dose should be calculated (see dosing for excessive fetomaternal hemorrhage). The dose should be administered within 72 hours of delivery. Excessive fetomaternal hemorrhage: When exposure to >15 mL Rh-positive RBC, administer 300 mcg IM or IV; in addition, administer 20 mcg per mL fetal RBC in excess of 15 mL if bleeding can be quantified or an additional 300 mcg if excess bleeding cannot be quantified. Total dose should be administered within 72 hours of complication.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes, slow IVP	No	No
Concentration	1500 units (300 mcg)/2 mL prefilled glass syringe (preservative-free)		
Storage/Stability	Store at 2°C to 8°C (refrigeration). Protect from light.		
Monitoring	Monitor for systemic reactions for 20 minutes after administration. Closely monitor patients treated for ITP in a healthcare setting for at least 8 hours after administration.		
Mechanism of Action	Prevents isoimmunization by suppressing the immune response and antibody formation by Rh_o(D)-negative individuals to Rh_o(D)-positive red blood cells.		
Efficacy	When administered within 72 hours of a full term delivery, the incidence of Rh isoimmunization decreases from 12% to 13% to 1% to 2%. The rate further decreases to <1% with administration at both 28 weeks' gestation and postpartum.		
Boxed Warning	Intravascular hemolysis leading to death has been reported in Rh_o (D)-positive patients treated for immune thrombocytopenic purpura (ITP) with Rh_o (D) immune globulin IV (human) products. (Note: This warning does not apply to Rh0 (D)-negative patients treated for the suppression of Rh isoimmunization.)		
Adverse Reactions	Chills, pyrexia, increased blood bilirubin, hypotension, decrease in haptoglobin and hemoglobin		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Rituximab (Rituxan®)

Restricted Units	None		
Special Information	Medications for the treatment of hypersensitivity reactions should be available for immediate use. Increased risk of Hepatitis B virus (HBV) reactivation in patients with chronic hepatitis B infection or chronic HBV carriers (surface antigen positive)		
IV Line Information	Peripheral or Central		
Therapeutic Use	FDA-labeled for Non-Hodgkin's lymphoma, chronic lymphocytic leukemia, rheumatoid arthritis, Wegener's granulomatosis and microscopic polyangiitis		
Premedication	Premedicate prior to each dose to minimize risk of infusion-related reactions.		
Dose	Varies by indication; common doses include: 375 mg/m^2, 500 mg/m^2, 250 mg/m^2		
Titration Guidelines	• First infusion: initiate at rate of 50 mg/hr, increase by 50 mg/hr increments every 30 minutes if no toxicity observed. Max infusion rate is 400 mg/hr. • Subsequent infusions: o Standard infusion: initiate rate of 100 mg/hr, increase by 100 mg/hr increments at 30-minute intervals to max of 400 mg/hr o Previously untreated follicular NHL or DLBCL patients: ▪ If patient did not have a grade 3 or 4 infusion reaction during cycle 1, a 90-minute infusion can be administered in cycle 2 with a glucocorticoid-containing chemo regimen (initiate at a rate of 20% of the total dose given in the first 30 minutes, and the remaining 80% of the total dose over the next 60 minutes). If tolerated in Cycle 2, the same rate can be used for the remainder of the treatment regimen. ▪ Patients with clinically significant CV disease or lymphocyte count of ≥5000 mm^3 before cycle 2 should not receive a 90-minute infusion. • Interrupt infusion or slow infusion rate for infusion reactions. Continue the infusion at one-half the previous rate upon improvement of symptoms.		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	IVPB: 1mg/mL to 4 mg/mL		
Stability	24 hours refrigerated in NS or D5W		
Monitoring	Monitor during and after each infusion for reactions. Measure vital signs immediately prior to infusion, during the infusion (every 30 minutes in patients without history of infusion reactions, every 15 minutes in those with history), and for 30 minutes after infusion. Monitor for signs and symptoms of infection. Cardiac monitoring in patients with pre-existing cardiovascular disease and RA during and after infusion. CBC with differential, electrolytes, renal function, fluid/hydration status balance.		
Mechanism of Action	Monoclonal antibody directed against the CD20 antigen on B-lymphocyte surface		
Adverse Reactions	Headache, fatigue, fever, nausea, infusion reactions, infections, hypersensitivity		
Dispensing Category	Black		

Rocuronium Bromide (Zemuron®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	**Patient must be intubated.** Does not possess any anxiolytic or analgesic activity, therefore, patient requires adequate sedation and/or pain control.		
IV Line Information	Central or Peripheral. Do not give IM.		
Therapeutic Use	Paralytic agents used to facilitation of endotracheal intubation and for use in patients with prolonged mechanical ventilation		
Dose (mg/kg/min)	Induction: 0.6 – 1.2 mg/kg IV Induction maintenance: Initiate at 4 – 12 mcg/kg/minute continuous IV infusion Intubation: 0.6 – 1.2 mg/kg IV Intubation maintenance: 0.1-0.2 mg/kg IV repeated as needed		
Titration Guidelines	Dosage is titrated to clinical endpoint or train of four.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over less than a minute	No	Yes
Concentration	Vials: 10 mg/mL Standard: 0.5 mg/mL (50 mg/100 mL) Maximum: 1 mg/mL (100 mg/100mL)		
Stability	24 hours		
Monitoring	Vital signs, may use peripheral nerve stimulator to monitor effect.		
Mechanism of Action	Non-depolarizing neuromuscular blocking agent that causes paralysis by producing a decreased response of the neurotransmitter acetylcholine at the myoneural junction.		
Adverse Reactions	Prolonged neuromuscular blockade, arrhythmia, tachycardia, hypotension, hypertension, nausea, vomiting, asthma, hiccup, rash, injection site edema, and pruritus		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Sodium Benzoate – Sodium Phenylacetate (Ammonul®)

<table>
<tr><td>Restricted Units</td><td>None</td></tr>
<tr><td>Special Information</td><td>Restricted: See <u>UC Health Guidelines</u></td></tr>
<tr><td>IV Line Information</td><td>Central line only.
Should be administered in a separate IV line whenever possible and not mixed with other medications.</td></tr>
<tr><td>Therapeutic Use</td><td>Treatment of hyperammonemia in patients with urea-cycle disorders, usually in combination with arginine. Treated in the Emergency Department as a potential life-threatening emergency.</td></tr>
<tr><td>Dose</td><td>Based on weight (kg) in patients <20 kg, BSA for patients who weigh >20 kg.
Administer loading dose followed by an equivalent maintenance dose over 24 hours.
<table>
<tr><th>Population</th><th colspan="3">Dosage</th></tr>
<tr><td rowspan="5">0-20 kg</td><td>Sodium phenylacetate</td><td>Sodium benzoate</td><td>Arginine</td></tr>
<tr><td colspan="3">CPS and OTC Deficiency</td></tr>
<tr><td>250 mg/kg</td><td>250 mg/kg</td><td>200 mg/kg</td></tr>
<tr><td colspan="3">ASS and ALS Deficiency</td></tr>
<tr><td>250 mg/kg</td><td>250 mg/kg</td><td>600 mg/kg</td></tr>
<tr><td rowspan="5">Greater than 20 kg</td><td colspan="3"></td></tr>
<tr><td colspan="3">CPS and OTC Deficiency</td></tr>
<tr><td>5.5g/m^2</td><td>5.5g/m^2</td><td>200 mg/kg</td></tr>
<tr><td colspan="3">ASS and ALS Deficiency</td></tr>
<tr><td>5.5g/m^2</td><td>5.5g/m^2</td><td>600 mg/kg</td></tr>
</table></td></tr>
<tr><td>Titration Guidelines</td><td>None</td></tr>
<tr><td rowspan="2">Route</td><td>IVP</td><td>IVPB</td><td>Continuous Infusion</td></tr>
<tr><td>No</td><td>Yes – Loading dose over 90-120 minutes</td><td>Yes – over 24 hours</td></tr>
<tr><td>Concentration</td><td>Vial: 100 mg/mL of each sodium phenylacetate and sodium benzoate
Infusion: Maximum concentration 10 mg/mL. Dispensed in 25-35 mL/kg 10% Dextrose, may be dispensed as multiple separate liter bags to make entire dose.</td></tr>
<tr><td>Stability</td><td>24 hours</td></tr>
<tr><td>Monitoring</td><td>Plasma ammonia, plasma glutamine, clinical response, neurologic status, serum elecrolytes, infusion site</td></tr>
<tr><td>Mechanism of Action</td><td>Provides alternative pathways for the removal of ammonia through the formation of their metabolites. One mole of sodium phenylacetate removes 2 moles of nitrogen, one mole of sodium benzoate removes 1 mole of nitrogen.</td></tr>
<tr><td>Adverse Reactions</td><td>Hypokalemia, hyperkalemia, hypocalcemia, hypernatremia, nausea, vomiting</td></tr>
<tr><td>Dispensing Category</td><td>Red</td></tr>
</table>

Sodium Bicarbonate

HIGH ALERT DRUG

Restricted Units	Yes, see grid		
Special Information	1 mEq = 84 mg		
IV Line Information	Peripheral or central		
Therapeutic Use	Alkalinizing agent; prevention of radiocontrast nephropathy; treatment of hyperkalemia		
Dose	Dose is variable, based on patient's condition and laboratory values. Typical doses are 50-100 mEq (bolus) or 5-25 mEq/hr (infusion).		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 – 3 minutes	Yes	Yes
Concentration	Available concentrations include: 5% (500 mL); 0.5 mEq/mL (4.2%, 5 mL, 10 mL); 1 mEq/mL (8.4%, 10 mL, 50 mL); 0.9 mEq/mL (7.5%, 50 mL); may be admixed with compatible diluents —typical concentrations are 50-150 mEq/L High Alert: Concentrated 1 mEq/mL 250 mL bottle		
Stability	72 hours when admixed		
Monitoring	Vital signs, urine output, electrolytes		
Mechanism of Action	Dissociates to provide bicarbonate anion which neutralizes hydrogen ion concentration and raises blood and urine pH		
Adverse Reactions	Observe for extravasation (irritant; may cause tissue necrosis), pulmonary edema/CHF, fluid and electrolyte abnormalities, metabolic alkalosis, angina/tachycardia		
Dispensing Category	Green		

2% Sodium Chloride

HIGH ALERT DRUG

Restricted Units	Yes, See grid		
Special Information	When life-threatening symptoms have ceased, hypertonic saline should be discontinued, and the remaining correction should be very gradual; When fluid overload is associated with hyponatremia, hypertonic saline should be accompanied by Furosemide IV		
IV Line Information	Central line preferred, can be given by peripheral line		
Therapeutic Use	Severe symptomatic hyponatremia, e.g. seizures, coma		
Dose	Individualize rate Acute symptomatic hyponatremia: 200-400ml/d		
Titration Guidelines	Based on physician order		
Route	IVP	IVPB	Continuous infusion
	No	No	Yes
Concentration	2%		
Stability	Compatible by Y-site administration with all common IV infusion solution		
Monitoring	Monitor serial sodium concentrations per Hypertonic Saline Protocol or at least every 8 hours for infusion adjustments. 24 hours fluid balance, urine/serum Na, osmolality, daily weight		
Mechanism of Action	Replacement of sodium. Functions in fluid and electrolyte imbalance and osmotic control.		
Adverse Reactions	Hypernatremia, hypokalemia, hyperchloremia, subsequent acidosis, fluid retention circulatory overload; Decreased conscious level, behavioral changes due to rapid correction, may occur within 1-4 days after administration.		
Dispensing Category	Yellow		

3% Sodium Chloride

HIGH ALERT DRUG

Restricted Units	Yes, See grid		
Special Information	When life-threatening symptoms have ceased, hypertonic saline should be discontinued, and the remaining correction should be very gradual; When fluid overload is associated with hyponatremia, hypertonic saline should be accompanied by Furosemide IV		
IV Line Information	Central line only		
Therapeutic Use	Severe symptomatic hyponatremia, e.g. seizures, coma		
Dose	Individualize rate Acute symptomatic hyponatremia: 200-400ml/d		
Titration Guidelines	Based on physician order		
Route	IVP	IVPB	Continuous infusion
	No	No	Yes
Concentration	3%		
Stability	Compatible by Y-site administration with all common IV infusion solution		
Monitoring	Monitor serial sodium concentrations per Hypertonic Saline Protocol or at least every 8 hours for infusion adjustments. 24 hours fluid balance, urine/serum Na, osmolality, daily weight		
Mechanism of Action	Replacement of sodium. Functions in fluid and electrolyte imbalance and osmotic control.		
Adverse Reactions	Hypernatremia, hypokalemia, hyperchloremia, subsequent acidosis, fluid retention circulatory overload; Decreased conscious level, behavioral changes due to rapid correction, may occur within 1-4 days after administration.		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Sodium Thiosulfate

Restricted Units	None		
Special Information	None		
IV Line Information	Central or Peripheral		
Therapeutic Use	Used in the treatment of cyanide poisoning following the administration of sodium nitrite; (off-label) for the treatment of calciphylaxis (calcific uremic arteriolopathy); (off-label) for extravasation management; (off-label) renal protection with high dose platinum therapy		
Dose (mg/kg)	Cyanide poisoning: 12.5 g once, may repeat at ½ the original dose if symptoms of cyanide toxicity return Calciphylaxis: (no standardized dose; 5-25 g) typically 25 g administered three times weekly or during or after dialysis Renal protection with high dose platinum therapy: (no standardized dose) typically 4 g/m^2 IV bolus followed by 12 g/m^2 IV infusion over 6 hours		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes: renal protection, 4 g/m^2	Yes – Cyanide poisoning: over 10-20 min; Calciphylaxis: over 30 minutes; Renal protection: 12 g/m^2 over 6 hours	No
Concentration	12.5 g/50 mL (vial) 25 g/100 mL (must add two vials to a sterile 100 mL empty bag)		
Stability	Store vials at room temperature and protect from light		
Monitoring	Blood pressure, heart rate, hemoglobin, hematocrit, serum lactate, methemoglobin and oxyhemoglobin		
Mechanism of Action	**Cyanide Toxicity:** Enzymatic transulfuration to thiocyanate (SCN-), which is relatively nontoxic and readily excreted in the urine. Sodium thiosulfate is thought to serve as a sulfur donor in the reaction catalyzed by the enzyme rhodanese, thus enhancing the endogenous detoxification of cyanide **Calciphylaxis:** As an antioxidant, it scavenges reactive oxygen species implicated in the pathogenesis of calciphylaxis, recouples endothelial nitric oxide synthase resulting in vasodilation that is thought to contribute to the rapid pain relief, and chelates intravascular and intraparenchymal calcium salts resulting in calcium thiosulfate which is significantly more soluble than other calcium salts and can be removed via dialysis, eliminating calcium deposits gradually over weeks to months **Renal Protection with high dose platinum therapy:** Forms a thiosulfate-platinum agent complex in the urine that is not toxic to either normal or cancer cells		
Adverse Reactions	Nausea, vomiting, headache, rhinorrhea, hypotension, anion gap metabolic acidosis (thiosulfuric acid), prolonged bleeding time		
Dispensing Category	Red		

Succinylcholine Chloride (Quelicin®)

Restricted Units	Yes, See Grid		
Special Information	May produce initial muscle fasciculation		
IV Line Information	Central or Peripheral		
Therapeutic Use	Intubation Induction of neuromuscular blockade in surgery		
Dose (mg/kg)	Intubation: 0.6 mg/kg IV over 10 -30 seconds (range 0.3 – 1.1 mg/kg IV) up to maximum of 150 mg		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 10 to 30 seconds	No	No
Concentration	Vial: 20 mg/mL, 100 mg/mL		
Stability	N/A		
Monitoring	Vital signs, electrolytes, cardiac monitoring		
Mechanism of Action	Depolarizing neuromuscular blocking agent which produces skeletal muscle paralysis by binding to acetylcholine receptor sites producing depolarization of the motor end-plate at the myoneural junction. Immediately after a single IV dose of a depolarizing agent, transient twitching or fasciculation of the skeletal muscles occurs and is followed by muscle paralysis.		
Adverse Reactions	Common adverse effects include prolonged muscle rigidity and prolonged myalgia. Serious adverse effects include bradycardia, hypotension, arrhythmia, hyperkalemia, apnea, and respiratory depression.		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Sugammadex (Bridion®)

Restricted Units	None		
Special Information	Restricted to the following clinical scenarios at UC Health: - Emergent reversal of neuromuscular blockade in the event of a lost or difficult airway - Reversal of neuromuscular blockade after convential reversal - Reversal of neuromuscular blockade for brief procedures where succinylcholine is otherwise contraindicated Wait times for readministration of rocuronium or vacuronium after given sugammadex varies greatly (5 minutes to 24 hours), and a nonsteroidal neuromuscular blocker may be required if repeated neuromuscular blockade is indicated. Advise women of childbearing age that sugmammadex can reduce effectiveness of hormonal contraceptives, and a backup method of contraception should be used for 7 days after sugammadex is given.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Reversal of neuromuscular blockade induced by rocuronium or vecuronium		
Dose (mg/kg)	Deep block (1-2 post-tetanic counts, prior to appearance of T4): 4 mg/kg single dose Moderate block (after appearance of T2): 2 mg/kg single dose Immediate reversal of rocuronium-induced blockade: 16 mg/kg after single dose of rocuronium 1.2 mg/kg		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 10 seconds	No	No
Concentration	Vial: 200 mg/2 mL, 500 mg/5 mL		
Stability	N/A		
Monitoring	Neuromuscular stimulation (post-tetanic counts and train-of-four), hemostatic and coagulation parameters, respiratory function during recovery		
Mechanism of Action	Selective relaxant binding agent that forms a complex with neuromuscular blockers rocuronium and vecuronium in the plasma, reducing the amount of paralytic available to bind to nicotinic receptors. This results in reversal of neuromuscular blockade.		
Adverse Reactions	Hypotension, headache, nausea/vomiting, pain at injection site, hypertension, prolonged QT interval, bradycardia, tachycardia, chills, incisional pain, dizziness, insomnia, anxiety, restlessness, pruitus, erythema, hypocalcemia, abdominal pain, flatulence, xerostomia, limb pain, cough, fever, procedural complication, hysterectomy, wound hemorrhage, decreased red blood cells		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Sulfamethoxazole/Trimethoprim (TMP) (Bactrim®)

Restricted Units	No		
Special Information	Contraindicated in patients with sulfa allergy Protect from light		
IV Line Information	Peripheral (must be well diluted) or Central		
Therapeutic Use	Treatment of severe of complicated infections when oral therapy is not feasible for Pneumocystis Carinii Pneumonia (PCP), empiric therapy for PCP in immune compromised patients, shigellosis, typhoid fever, *Nocardia asteroids* infection, *Cyclospora* infection or other infections caused by susceptible bacteria		
Dose	Pneumocystis Carinii Pneumonia: 15-20 mg TMP/kg/day in divided doses UTI: 8-10 mg TMP/kg/day in divided doses Meningitis: 10-20 mg TMP/kg/day in divided doses Shigellosis: 8-10 mg TMP/kg/day in divided doses Sepsis: 20 mg TMP/kg/day in divided doses *Cyclospora*: 160 mg TMP twice daily Nocardia, cutaneous: 5 mg TMP/kg/day in divided doses Nocardia, severe (pulmonary/cerebral): 10-15 mg TMP/kg/day in divided doses		
Titration Guidelines	Renal impairment: CrCl greater than 30 mL/min, give usual dose; CrCl 15-30 mL/min, give one-half the usual dose; CrCl less than 15 mL/min, not recommended		
Route	IVP	IVPB	Continuous Infusion
	No	Yes - over 60-90 minutes	No
Concentration	16 – 80 TMP/ 150 mL 81 – 160 TMP/250 mL 161 – 320 TMP/500 mL		
Stability	2 – 6 hours depending on concentration. Store at room temperature, do not refrigerate. Protect from light		
Monitoring	Vital signs, CBC with differential, Renal Function, Serum Potassium		
Mechanism of Action	Sulfamethoxazole is an antibacterial sulfonamide that prevents the formation of dihydrofolic acid, a bacterial compound necessary for survival. It exerts its effect by competing with para-aminobenzoic acid (PABA) thereby blocking bacterial synthesis of dihydrofolic acid. Trimethoprim is a synthetic antibiotic that interferes with the production of folic acid. It inhibits the production of tetrahydrofolic acid from dihydrofolic acid by binding to dihydrofolate reductase in the folic acid synthesis pathway.		
Adverse Reactions	Rash, Hives, Nausea/Vomiting, Immune Hypersensitivity Reaction RARE: Agranulocytosis, Aplastic Anemia, Hepatic Necrosis, Stevens Johnson Syndrome, and Toxic Epidermal Necrolysis		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Tacrolimus (Prograf®)

Restricted Units	• Not to be given in NICU or at Deaconess • May give via continuous infusion on all other units, but may NOT be titrated without physician order		
Special Information	• Level 2 Hazardous Drug - follow Hazardous Medications- Safe Handling and Use Policy (UCH-RX-MED MGMT-073-04) • Tacrolimus may adsorb to PVC-containing bags and tubing. o Prepare using glass bottle or VisIV bag with nitroglycerin tubing • **Prime tubing with tacrolimus solution** • Enteral route preferred. When transitioning from IV to oral, start the oral dose 8-12 hours after stopping the infusion. IV:PO conversion = 1:3-4		
IV Line Information	Peripheral or central line may be used. All tubing should be non-PVC containing. • For BMT patients, administer via the white lumen of a triple lumen catheter • Label the distal end of the tubing to indicate that the line contains Tacrolimus		
Therapeutic Use	Immunosuppressant used for prevention of graft versus host disease or rejection in bone marrow or solid organ transplant recipients.		
Dose	Usual starting dose: 0.02-0.05 mg/kg/day continuous IV infusion. • BMT dosing is based on adjusted body weight • Use actual body weight if actual body weight is less than ideal		
Titration Guidelines	Usual goal range: 5-20 ng/mL Consider empiric dose reductions when initiating voriconazole or posaconazole		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes
Concentration	UCMC standard: 2.5 mg/250mL UCMC standard diluent: D5W		
Stability	0.01 mg/mL solution stable in NS or D5W VisIV bag 48 hours at room temperature[1]		

Monitoring	• Requires drug level monitoring
	  o Draw level from new peripheral stick rather than existing central or peripheral IV catheter
	  o Draw levels at least three times weekly (MWF) until levels consistently therapeutic
	• Other monitoring parameters: renal function, hepatic function, serum electrolytes (calcium, magnesium, potassium), glucose, blood pressure (at least three times a week), signs/symptoms of anaphylaxis, and QTc		

Mechanism of Action	Calcineurin inhibitor (suppresses cellular immunity inhibiting T-lymphocyte activation)		

Appendix C - Guidelines for IV Medication Administration

Adverse Reactions	Tremor, headache, diarrhea, constipation, hypertension, nausea, renal dysfunction, anaphylaxis, hypomagnesemia, hypophosphatemia, hyperkalemia, hyperglycemia, hypercholesterolemia, pruritis, hepatotoxicity, and infection
Dispensing Category	Red

1. Am J Hosp Pharm. 1992 Jan;49(1):119-22.

Tenecteplase (TNKase, TNK)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information			
IV Line Information	Central line preferred. May be given peripherally. Vascular arterial line for catherter directed thrombolysis of peripheral occlusive disease.		
Therapeutic Use	Tenecteplease is indicated for use in mortality reduction associated with acute myocardial infarction (AMI). Treatment should be initiated as soon as possible after the onset of AMI symptoms.. Tenecteplase may also be used for catheter directed thrombolysis..		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 5 seconds	No	Yes
Concentration	Vial: 50 mg Catheter directed thrombolysis: 0.05 mg/mL (12.5 mg/250 mL)		
Stability	Drip: 24 hours		
Monitoring	Vital signs, signs and symptoms of bleeding.		
Mechanism of Action	Tenecteplase is a thrombolytic agent known as tissue-type plasminogen activator. It initiates local fibrinolysis by binding to fibrin in a thrombus and converts entrapped plasminogen to plasmin.		
Adverse Reactions	Bleeding, hypotension, fever, nausea, vomiting, arrhythmias.		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Thiamine

Restricted Units	None		
Special Information	May be included with MVI and thiamine for Rally Pack		
IV Line Information	Central or Peripheral		
Therapeutic Use	Treatment of thiamine deficiency syndromes including beriberi, Wernicke's encephalopathy, and peripheral neuritis in pregnancy.		
Dose (mg)	Beriberi: 10 – 20 mg IM or slow IV infusion 3 times/day for up to 2 weeks Wernicke's encephalopathy: 100 mg IV or IM for 3 days (up to 1000 mg may be necessary in the first 12 hours) Peripheral neuritis in pregnancy: 5-10 mg IM daily		
Titration Guidelines	N/A		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – Over 60 minutes	No
Concentration	100 mg/50 mL		
Stability	Protect from air and light		
Adverse Reactions	Injection site reaction		
Monitoring	Vital signs		
Mechanism of Action	The organ systems principally affected by thiamine deficiency are the peripheral nervous system, cardiovascular system, and GI tract. Administration of thiamine completely reverses the cardiovascular and GI symptoms of thiamine deficiency; however, the degree of improvement in neurologic symptoms depends on the duration and severity of the lesions.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Torsemide (Demadex®)

Restricted Units	None		
Special Information	Oral and IV doses are therapeutically equivalent.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Management of edema associated with congestive heart failure and hepatic or renal disease when rapid onset is desired.		
Dose	10 or 20 mg once daily.		
Titration Guidelines	None.		
Route	IVP	IVPB	Continuous Infusion
	Yes- over 2 minutes	No	No
Concentration	Vial: 10 mg/ml		
Stability	24 hours		
Monitoring	Vital signs, urine output, serum potassium and other electrolytes.		
Mechanism of Action	Torsemide inhibits reabsorption of sodium and chloride in the ascending loop of henle and distal renal tubule; interferes with the chloride-binding co transport system, thus causing increased excretion of water, sodium, chloride, magnesium and calcium.		
Adverse Reactions	Edema, abnormal ECG, chest pain, headache, dizziness, insomnia, weakness, arthralgia, myalgia, cough, angioedema, GI hemorrhage, rash.		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Tranexamic Acid (Cyklokapron®)

Restricted Units	None		
Special Information	**UC Health Trauma Injury Protocol**		
IV Line Information	Central or Peripheral		
Therapeutic Use	Management of primary fibrinolysis in trauma patients to control trauma-associated hemorrhage; tooth extraction in patients with hemophilia		
Dose	Trauma-associated hemorrhage: 1000 mg over 10 minutes, see **UC Health Trauma Injury Protocol** for dosing guide in trauma patients Tooth extraction: 10 mg/kg immediately before surgery, then 10 mg/kg/day TID-QID for 2-8 days		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes – maximum rate 100 mg/min	No
Concentration	Vial: 100 mg/ml IVPB: 1000 mg in 100 mL 0.9% sodium chloride, final concentration 10 mg/mL		
Stability	24 hours refrigerated		
Monitoring	For patients receiving a course of therapy longer than 3 days: ophthalmic examination at baseline and and regular intervals during course of therapy, may cause blurred vision		
Mechanism of Action	Displaces plasminogen from fibrin to inhibit fibrinolysis		
Adverse Reactions	Hypotension with rapid IV injection, blurred vision, allergic dermatitis		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Treprostinil (Remodulin®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	See **UC Health Guidelines** Treprostinil dosing weight stays the same as weight upon initiation of therapy. Abrupt cessation of infusion should be avoided secondary to life-threatening refractory pulmonary hypertension. Concentration may change during titration of therapy When transitioning from subcutaneous to IV therapy, the dosages are equivalent.		
IV Line Information	Central line preferred due to more reliable access; peripheral line may be used for initiation prior to placement of central line, or for brief periods when central access is lost Use a 0.22 micron filter for intravenous route of infusion (not required for subcutaneous route)		
Therapeutic Use	Treatment of pulmonary hypertension with NYHA class II-IV symptoms		
Dose	1.25 ng/kg/min initially (0.625 ng/kg/min for hepatic insufficiency or if not tolerated)		
Titration Guidelines	Dose increase based on clinical response and patient tolerance (increments of 1.25 ng/kg/min per week for the first 4 weeks of treatment, later 2.5 ng/kg/min per week). Limited experience with dosages > 40 ng/kg/min. Inpatient titration may be more rapid depending on acuity and severity of pulmonary arterial hypertension and right heart failure.		
Route	IVP	IVPB	Continuous Infusion
	No	No	Yes (IV or subcutaneous)
Concentration	1mg/ml, 2.5mg/ml, 5mg/ml, 10mg/ml in 3ml specialty syringe for subcutaneous infusion Varies for intravenous infusion		
Stability	IV infusion stable for 48 hours. Subcutaneous infusion syringe stable for 72 hours.		
Monitoring	If patient experiences nausea, headache, jaw pain, diarrhea, vomiting, chest pain, increased oxygen requirement, or a decrease in SBP by greater than 10 mmHg upon initiating therapy or dose increases, the physician should be contacted and a dose decrease should be considered. Also monitor for signs and symptoms of bleeding. Patients receiving subcutaneous treprostinil should be monitored for site pain and issues.		
Mechanism of Action	Direct vasodilation of pulmonary and systemic arterial vessels, inhibition of platelet activation		
Adverse Reactions	Subcutaneous site pain, headache, jaw pain, flushing, hypotension, tachycardia, diarrhea, nausea and vomiting, flu-like symptoms, anxiety, bleeding.		
Dispensing Category	Black		

Appendix C - Guidelines for IV Medication Administration

Ustekinumab (Stelara®)

<table>
<tr><td>Restricted Units</td><td>Outpatient Use Only</td></tr>
<tr><td>Special Information</td><td>Induction dosing is administered via IV infusion. Maintenance dosing is administered by subcutaneous injection.
Medications for the treatment of hypersensitivity reactions should be available for immediate use.
Administer over at least 1 hour.
Once diluted, must be used within 4 hours.</td></tr>
<tr><td>IV Line Information</td><td>Use IV set with in-line, low-protein binding filter (0.2 micrometer) required. Do not infuse concomitantly in the same IV line with other agents</td></tr>
<tr><td>Therapeutic Use</td><td>Psoriasis, psoriatic arthritis, and Crohn’s disease</td></tr>
<tr><td>Premedication</td><td>N/A</td></tr>
<tr><td>Dose</td><td><table>
<tr><th>Weight Range (kg)</th><th>Recommended Dosing</th></tr>
<tr><td>≤ 55</td><td>260 mg (2 vials)</td></tr>
<tr><td>> 55 to 85</td><td>390 mg (3 vials)</td></tr>
<tr><td>> 85</td><td>520 mg (4 vials)</td></tr>
</table></td></tr>
<tr><td>Titration Guidelines</td><td>N/A</td></tr>
<tr><td>Route</td><td><table>
<tr><td>IV Infusion</td><td>IVPB</td></tr>
<tr><td>Yes</td><td>No</td></tr>
</table></td></tr>
<tr><td>Concentration</td><td>Single-dose vial: 130 mg/26 mL</td></tr>
<tr><td>Stability</td><td>4 hours</td></tr>
<tr><td>Monitoring</td><td>• Tuberculosis screening (prior to initiating and periodically through therapy)
• CBC
• Ustekinumab-antibody formation
• Signs and symptoms of infection
• Reversible posterior leukoencephalopathy syndrome
• Squamous skin cell carcinoma</td></tr>
<tr><td>Mechanism of Action</td><td>Interleukin-12/23 inhibitor leading to decreased cellular immunity and inflammation</td></tr>
<tr><td>Adverse Reactions</td><td>Vomiting, nasopharyngitis, injection site erythema, vulvovaginal candidiasis/mycotic infection, bronchitis, pruritus, urinary tract infection, sinusitis</td></tr>
<tr><td>Dispensing Category</td><td>Red</td></tr>
</table>

Valproate Sodium (Depacon®)

Restricted Units	None		
Special Information	Use of valproate sodium for more than 14 days has not been studied. Patients should be switched to oral as soon as it is clinically feasible.		
IV Line Information	Peripheral or Central		
Therapeutic Use	Used as monotherapy and adjunctive therapy in the treatment of patients with complex partial seizures, simple and complex absence seizures and multiple seizures. Also used for treatment of acute or mixed manic episodes in bipolar.		
Dose	10-15 mg/kg/day then weekly increases of 5-10 mg/kg/day. Optimal clinical response is achieved at 60 mg/kg/day.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	IVPB: Dose/50 mL		
Stability	24 hrs		
Monitoring	Vital signs, neural status, liver function tests, serum amylase levels, platelet counts and coagulation tests.		
Mechanism of Action	Mechanism has not been established, it has been suggested that its activity in epilepsy is related to its action in gamma-aminobutyric acid (GABA).		
Adverse Reactions	Chest pain, headache, abdominal pain, diarrhea, nausea, vomiting, dizziness, nervousness.		
Dispensing Category	Green		

Vasopressin

Restricted Units	Yes, See Grid		
IV Line Information	Central line preferred, but may be given peripherally		
Special Information	For patients at high risk for angina, nitroglycerin may be used concommitantly. May be given via ETT in code situations.		
Therapeutic Use	Central Diabetes Insipidus Septic Shock (catecholamine-refractory) Upper GI Bleed		
Dose	Diabetes Insipidus – Continuous infusion of 0.01-0.03 units/min and titrated to desired urine output. May give 5-10 units IM or SQ bid – tid Maximum = 2 units/min UGI Bleed – Initial: 0.2 to 0.4 units/min IV infusion and increased each hour by 0.2 unit/minute until the hemorrhage is controlled; may increase up to 0.9 units/minute Septic Shock (catecholamine-refractory) – Continuous, nontitratable infusion of 0.03 units/min to facilitate stabilization of catecholamine requirements.		
Titration Guidelines	See dosing section above		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over 1 minute	No	Yes
Concentration	1 unit/mL (40 units/100 mL)		
Stability	24 hours		
Monitoring	Vital signs, urine output. Patient should be monitored for chest pain secondary to coronary vasoconstriction.		
Mechanism of Action	Exogenous anti-diuretic hormone, potent vasoconstrictor		
Adverse Reactions	Tremor, dizziness, vasoconstriction, hypertension, bradycardia and cardiac dysrhythmias, pulmonary edema, angina, water intoxication, nausea, vomiting, abdominal cramps, diarrhea		
Dispensing Category	Green		

Vecuronium (Norcuron®)

HIGH ALERT DRUG

Restricted Units	Yes, See Grid		
Special Information	**Patient must be intubated.** Does not possess any anxiolytic or analgesic activity, therefore, patient requires adequate sedation and/or pain control. Use with caution in patients with liver dysfunction (best to use cisatracurium). Possible accumulation of metabolites in renal failure patients with prolonged paralysis after continuous use.		
IV Line Information	Central or Peripheral		
Therapeutic Use	Paralysis during surgery Paralysis during prolonged mechanical ventilation		
Dose	Dosage is highly variable. After an initial IVP dose of 0.08-0.1 mg/kg, a continuous infusion of 0.8-1.7 mcg/kg/min may be started. Dosage is then titrated upward to response.		
Titration Guidelines	Dosage is then titrated upward to response.		
Route	IVP	IVPB	Continuous Infusion
	Yes – Over less than a minute	No	Yes
Concentration	1 mg/mL (100 mg/100 mL)		
Stability	24 hours		
Monitoring	Vital signs, may use peripheral nerve stimulator to monitor effect.		
Mechanism of Action	Non-depolarizing neuromuscular blocking agent that causes paralysis by producing a decreased response of the neurotransmitter acetylcholine at the myoneural junction.		
Adverse Reactions	Prolonged neuromuscular blockade, arrhythmia, tachycardia, hypotension, hypertension, nausea, vomiting, asthma, hiccup, rash, injection site edema, and pruritus		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Verapamil Hydrochloride

Restricted Units	Yes, See Grid		
Special Information	None		
IV Line Information	Central or Peripheral.		
Therapeutic Use	Verapamil is used for supraventricular tachyarrhythmias, atrial flutter or fibrillation.		
Dose	5-10mg (0.075-0.15mg/kg) as bolus dose over 2 minutes, then repeat 10mg (0.15mg/kg) 30minutes after the first dose if initial response is not adequate.		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	Yes- over 2 minutes	No	No
Concentration	2.5 mg/ml.		
Stability	24 hours.		
Monitoring	Vital signs, ECG		
Mechanism of Action	Verapamil is a calcium-ion influx inhibitor (slow-channel blocking agents). Although the mechanism is not completely understood, it is thought to inhibit calcium ion entry through select voltage-sensitive areas termed “slow channels” across cell membranes. By reducing intracellular calcium concentration in cardiac and vascular smooth muscle cells, it dilates coronary arteries and peripheral arteries and arterioles, and may reduce heart rate, decrease myocardial contractility (negative inotropic effect), and slow atrioventricular (AV) nodal conduction.		
Adverse Reactions	Hypotension, bradycardia, dizziness, headache, nausea and abdominal discomfort.		
Dispensing Category	Green		

Voriconazole (Vfend®)

Restricted Units	None		
Special Information	None		
IV Line Information	Central or peripheral.		
Therapeutic Use	Treatment of invasive aspergillosis, esophageal candidiasis, candidemia and treatment of candida deep tissue infections.		
Dose	Loading dose: 6 mg/kg every 12 hours for the first 24 hours Maintenance dose: 3-4 mg/kg every 12 hours.		
Titration Guidelines	If patients are not able to tolerate 4 mg/kg lower dose to 3 mg/kg.		
Route	IVP	IVPB	Continuous Infusion
	No	Yes -	No
Concentration	200 mg vial reconstituted to 10 mg/ml		
Stability	24 hours.		
Monitoring	Correct electrolyte disturbances prior to initiation of voriconazole, management of renal (particularly SCr) and hepatic functions at the start and during therapy. If treatment continues for over 28 days monitor visual function.		
Mechanism of Action	Voriconazole is a triazole antifungal agent. It inhibits the fungal cytochrome P-450-mediated 14 alpha-lanosterol demethylation, an essential step in the fungal ergosterol biosynthesis. The accumulation of 14 alpha-methyl sterols correlates with the subsequent loss of ergosterol in the fungal cell wall and may be responsible for the antifungal activity of voriconazole.		
Adverse Reactions	Abdominal pain, diarrhea, fever, headache, nausea, peripheral edema, rash, respiratory disorders, sepsis, visual disturbances, and vomiting.		
Dispensing Category	Yellow		

Appendix C - Guidelines for IV Medication Administration

Ziprasidone Mesaylate (Geodon®)

Restricted Units	Restricted to behavioral health and emergency department.		
Special Information	**Black Box Warning**: Elderly patients with dementia-elated psychosis treated with atypical antipsychotic drugs are at tan increased risk of death compared to placebo. Ziprasidone mesylate is not approved fro the treatment of patients with dementia-related psychosis. **Renal impairment**: IM ziprasidone mesylate should be administered with caution to patients with impaired renal function due to the cyclodextrin excipient in the IM formulation.		
IV Line Information	IM		
Therapeutic Use	Agitation, Acute - Schizophrenia		
Dose	10mg IM every 2 hrs (MAX dose 40mg/day) OR 20mg IM every 4 hrs (MAX dose of 40mg/day) Oral ziprasidone should replace IM as soon as possible; IM for more than 3 days has not been studied		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	No	No
Concentration	Reconstitute 20 mg vial with 1.2ml of sterile water for injection for final concentration of 20mg/ml		
Stability	Discard unused portion of reconstituted solution		
Monitoring	Mental status, ECG changes, blood pressure, heart rate, serum potassium and magnesium, S/S of Torsades de pointes (dizziness, palpitations, or syncope), blood glucose, S/S hyperglycemia, S/S of dehydration		
Mechanism of Action	Class: Antipsychotic and Benzisothiazoyl Ziprasidone mesylate is a psychotropic agent and its efficacy in schizophrenia is postulated to be from antagonism of both dopamine type 2 (D2) and serotonin type 2 (5HT2) receptors. It also exhibits high antagonistic binding affinity to alpha (1)-adrenergic receptors and other dopamine and serotonin receptors as well as moderate affinity for histamine H (1) receptor. Ziprasidone mesylate also inhibits synaptic reuptake of serotonin and norepinephrine.		
Adverse Reactions	Orthostatic hypotension (5%), QT prolongation, Syncope, Torsades de pointes (rare), Injection site pain (7-9%), GI upset (constipation, diarrhea, indigestion, nausea), Akathisia, Dizziness, Extrapyramidal disease, Somnolence and Agitation		
Dispensing Category	Green		

Appendix C - Guidelines for IV Medication Administration

Zoledronic Acid (Zometa®, Reclast®)

Restricted Units	Restricted to outpatient use with verification of reimbursement		
Special Information	Use of acetaminophen after administration of zoledronic acid may reduce adverse effects such as arthralgia, fever, flu-like symptoms and myalgia		
IV Line Information	Infuse in a line separate from other medications		
Therapeutic Use	Zoledronic acid may be used for multiple metastatic or multiple myeloma associated bone lesions from solid tumors, osteoporosis treatment and prevention, or Paget's disease.		
Premedication	Acetaminophen may be used as premedication		
Dose	Doses should be adjusted in renal impairment Malignancy with bone involvement: 4 mg IV every 3-4 weeks (Zometa® brand) Osteoporosis treatment or prevention: 5 mg IV once a year (Reclast® brand) Paget's disease: 5 mg IV as a single dose		
Titration Guidelines	None		
Route	IVP	IVPB	Continuous Infusion
	No	Yes	No
Concentration	5 mg/100mL premade bag OR 4mg/100mL compounded by pharmacy		
Stability	Premade: 30 days Compounded mixture: 24 hours in NS or D5W		
Monitoring	Infusion associated reactions such as arthralgia, fever, flu-like symptoms, myalgia. Also monitor renal function and calcium levels		
Mechanism of Action	Inhibits resorption of bone though inhibition of osteoclast activity and skeletal calcium release that is induced by tumors		
Adverse Reactions	Arthralgia, fever, flu-like symptoms, myalgia may all occur within the first 3 days following infusion. Usually resolves in 3-4 days after onset, but may take up to 2 weeks. May also cause atrial fibrillation, osteonecrosis of the bone of the jaw. Regular dental exams are recommended, with preventative care		
Dispensing Category	Red		

[i]. Raskin NH. Repetitive intravenous dihydroergotamine as therapy for intractable migraine. Neurology 1986;36:995-7
[ii]. Ford RG and Ford KT. Continuous intravenous dihydroergotamine in the treatment of intractable headache. Headache 1997;37:129-36.
[iii]. Institute For Clinical Sytems Improvement. Health care guideline: diagnosis and treatment of headache. Accessed on September 16, 2011: http://www.icsi.org/headache/headache__diagnosis_and_treatment_of_2609.html.
[iv]. Charles JA and Dohln P. Outpatient home-based continuous intravenous dihydroergotamine therapy for intractable migraine. Headache 2011;50:852-60.