APPENDIX 1 - GUIDELINES FOR THE ADMINISTRATION OF PARENTERAL MEDICATIONS - ADULT

†in Code Blue/RRT
‡Initiate in ED/ACCU

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Drug Name	ACCU ED PACU	L&D	POST-PARTUM	2500 UNIT	MED/ SURG	COMMENTS	IVPB/Drip STANDARD CONCENTRATIONS / RATE OF ADMINISTRATION	IV Push/IM STANDARD CONCENTRATIONS / RATE OF ADMINISTRATION
	Drip							
Lacosamide	IVPB	IVPB	IVPB	IVPB	IVPB		Mix in 100 mL NS, D5W or LR; Infuse over 30 - 60 min	-------
Leucovorin Calcium	IVPB	---	---	IVPB	IVPB	Administration schedules differ by indication; refer to individual protocols	Mix in 100 mL NS over 30 min	-------
Leuprolide Acetate	IM Only	IM Only	IM Only	IM Only	IM Only	Restricted to Women's Health Clinic and Infusion Center	-------	3.75 mg to 30 mg prefilled
levETIRAcetam	IVPB	IVPB	IVPB	IVPB	IVPB		500, 750, or 1000 mg/100 mL NS over 30 min	-------
Levocarnitine	Push	Push	Push	Push	Push		Mix with 50 mL NS over 15 min	Over 2-3 min
	IVPB	IVPB	IVPB	IVPB	IVPB			
Levofloxacin	IVPB	IVPB	IVPB	IVPB	IVPB		250 mg/50 mL D5W over 60 min, 500 mg/100 mL D5W over 60 min, 750 mg/150 mL D5W over 90 min	-------
Levothyroxine	Push	Push	Push	Push	Push	Reconstitute w/ 5mL NS only; use immediately	-------	100 mcg/mL; Rate: 2 min
Lidocaine	Drip	---	---	---	---	Do not add to potassium containing solutions	2 gm/500 mL	-------
Lidocaine/ Epinephrine	Infiltration/Procedure					Not recommended for direct IV administration	-------	-------
Linezolid	IVPB	IVPB	IVPB	IVPB	IVPB	Restricted to Attending	600 mg/300 mL D5W over 30 min	-------
LORazepam	Push	Push	Push	Push	Push	Drip: mechanical vent required except for DNR/End of Life/Comfort/Palliative Care	120 mg/60 mL	IV: Rate: ≤ 2mg/min; dilute IVP dose prior to use with an equal volume of NS
See Appendix 2 for titration protocol	IM	IM	IM	IM	IM			IM: Should be administered (undiluted)
	Drip	---	---	---	---			
Magnesium Chloride	IVPB	IVPB	IVPB	IVPB	IVPB	Should NOT be used in compounding TPN	1 gm/50 mL D5W; 2 gm/100 mL D5W; 4 gm/200 mL D5W; Rate: 1 gm/hr	-------
Magnesium Sulfate	Push†	Push†	Push†	Push†	Push†	IV push only during Code Blue; rate is indication dependent	2 gm/50 mL PREMIX; 4 gm/100 mL PREMIX; 20 gm/500 mL PREMIX; 1 gm/50 mL D5W; 2 gm/100 mL D5W; 4 gm/100 mL D5W; General Rate: 1 gm/hr; If severely symptomatic preeclampsia/eclampsia more aggressive therapy (loading 4 g over 5 minutes) may be required	General Rate: < 150 mg/min; May IV push 1-2 gm over 1-2 minutes in persistent pulseless VT /VF with hypomagnesemia; For torsades de pointes give 1-2 gm over 15 minutes (IVPB PREMIX preferred); Max concentration 20% (2gm/10 mL) for IV push
	IVPB	IVPB	IVPB	IVPB	IVPB			

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	Drip	Drip	Drip	Drip	---			
Mannitol	Push IVPB	Push IVPB	Push IVPB	Push IVPB	Push IVPB	Use 5 micron filter and 18g needle.	Undiluted – Rate variable on diagnosis	Rate variable on diagnosis
meperidine	Push IM/SubQ	Push IM/SubQ	Push IM/SubQ	Push IM/SubQ	Push IM/SubQ	Restricted to the patients with rigor	------	Slow IV Push with dilution of 10 mg/mL (patient should be lying down) IM preferred
Mepivacaine HCl	Infiltration/Procedure					Not recommended for direct IV	------	------
Meropenem	IVPB	IVPB	IVPB	IVPB	IVPB	Use within 1 hour of reconstitution	500 mg/50 mL NS; 1gm/50 mL NS; infuse over 15 - 30 min	------
Mesna	IVPB	---	---	IVPB	IVPB		Dilute in 50 - 100 mL NS or D5W over 15 - 30 min	------
Methocarbamol	IVPB	IVPB	IVPB	IVPB	IVPB		250 mg – 1000 mg/100 mL NS over 15 min	------
Methohexital Sodium	Push	---	---	---	---	Procedural sedation/anesthesia	------	Dilute to a 1% (10 mg/mL) max concentration Rate 1 mL/5 seconds or ~2 mg/second
Methotrexate	IM Drip	---	---	IM Drip	IM Drip		Mix in 1000 mL NS to run over 24 hrs (high dose MTX)	IM injection for ectopic pregnancy and rheumatoid arthritis
Methylene Blue	Push IVPB	Push IVPB	Push IVPB	Push IVPB	Push IVPB	Vesicant; ensure proper needle / catheter placement prior to and during infusion; If a prolonged or continuous infusion is employed, administration via central line is recommended	Mix in 50 mL D5W infuse over 5 - 30 min	Undiluted over 5-10 min
Methylergonovine Maleate	Push IM	Push IM	Push IM	--- ---	--- ---	Prevention of hemorrhage; IM preferred route; IV administration should only be considered during life-threatening situations; monitor blood pressure	------	Dilute to 5 mL with NS Rate: over 1 min
Methylnaltrexone	Subcut	---	---	Subcut	Subcut		N/A	Administer by subcutaneous injection into the upper arm, abdomen, or thigh. Rotate injection sites at each dose.

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methylPREDNISolone (Depo-Medrol®) Acetate	IM	IM	IM	IM	IM	Avoid injection into the deltoid muscle due to a high incidence of subcutaneous atrophy. Avoid injection or leakage into the dermis. Do not inject into areas that have evidence of acute local infection.		
methylPREDNISolone sodium succinate (Solu-MEDROL®)	Push	Push	Push	Push	Push	Doses < 250 mg given IV Push	250 mg/50 mL D5W over 15 min 500 mg/50 mL D5W over 30 min 1 gm/50 mL D5W over 1 hr	Rate 40 mg/min
	IVPB	IVPB	IVPB	IVPB	IVPB			
Metoclopramide	Push	Push	Push	Push	Push	Doses ≤ 10 mg given IV Push	Dilute in 50 mL NS over 15 min	IV Push Undiluted over 1 - 2 minutes at 5 mg/min
	IVPB	IVPB	IVPB	IVPB	IVPB			
Metoprolol	Push	Push†	Push†	Push	Push†		Dilute in 50 mL NS over 30 min	IV Push Undiluted over 1-2 minutes at 2.5 mg/min
	IVPB	IVPB	IVPB	IVPB	IVPB			
metroNIDAZOLE	IVPB	IVPB	IVPB	IVPB	IVPB		500 mg/100 mL NS over 1 hr	-----
Micafungin	IVPB	IVPB	IVPB	IVPB	IVPB		50-150 mg/100 mL NS over 1 hr	-----
Midazolam *See Appendix 2 for titration protocol*	Push	Push†	Push†	Push†	Push†	Drip: mechanical vent required except for DNR/End of Life/Comfort/Palliative Care	100 mg/100 mL NS - titrate per order; See Pain/Sedation Protocol	IV Push 1 mg/mL concentration over at least 2 min
	Drip	---	---	---	---			
Milrinone *See Appendix 2 for titration protocol	Drip	---	---	---	---	-Caution in patients with renal dysfunction -May cause significant hypotension - Do not titrate; PHYSICIANS to order changes	20 mg/100 mL NS; 40 mg/200 mL NS	-----
mitoMYcin	Ophth	---	---	---	---	Mostly Clinic setting	Ophth: 0.4 mg/mL totlal volume 1 mL syringe	-----
	Bladder Irrigation	---	---	---	---		BI: 40 mg/40 mL NS for bladder irrigation	-----
Mitoxantrone HCl	IVPB	---	---	IVPB	IVPB		100 mL NS over 5 -15 minutes	-----
Morphine Sulfate *See Appendix 2 for titration protocol*	Push	Push	Push	Push	Push	Drip: mechanical vent required except for DNR/End of Life/Comfort/Palliative Care *NO Titration Drips on 2500 or MED/SURG units; set rate only.	100 mg/100 mL D5W - titrate per order; PCA 30 mg/30 mL	May give undiluted or dilute to a final concentration of 0.5 - 5 mg/mL IV Push over 4-5 min at a max rate of 1 mg/min
	PCA	PCA	PCA	PCA	PCA			
	Drip	Drip	Drip	Drip*	Drip*			

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Nafcillin	IVPB	IVPB	IVPB	IVPB	IVPB		1 gm/50 mL D5W over 30 min 2 gm/100 mL D5W over 30 min	------
Nalbuphine	Push	Push	Push	Push	Push			IV Push Undiluted over at least 2 - 3 min at 2.5 - 5 mg/min; Larger induction doses should be given over 10 - 15 min
Naloxone	Push	Push	Push	Push	Push		2 mg/500 mL NS	IV Push Undiluted over 30 seconds (may be diluted to a 0.04 mg/mL concentation for intermittent IV Push)
	Drip	---	---	---	---			
Neostigmine Methylsulfate	Push	Push	Push	Push	Push		----	Undiluted over 3 - 5 min at ~ 0.5 mg/min
Nesiritide	Push	---	---	---	---	Restricted to Cardiology	1.5 mg/250 mL D5W; refer to order for patient-specific rate	IV bolus from bag over 1 min followed by continuous infusion (bolus optional)
	Drip	---	---	---	---			
niCARdipine *See Appendix 2 for titration protocol*	Drip	---	---	---	---	Administer infusion via central line or through a large peripheral vein. Peripheral venous irritation may be minimized by changing the site of infusion every 12 hours.	25 mg/250 mL NS; 20 mg/200 mL NS PREMIX;	
Nitroglycerin *See Appendix 2 for titration protocol*	Drip	---	---	---	---	Adsorption occurs to soft plastic (eg, PVC); use administration sets intended for nitroglycerin. Avoid in-line IV filters that adsorb nitroglycerin.	50 mg/250 mL D5W in glass bottle	----
Nitroprusside Sodium *See Appendix 2 for titration protocol	Drip	---	---	---	---	Protect from light. Do not use discolored solutions (eg, blue, green, red) or solutions with visible particles. Monitor for cyanide/thiocyanate toxicity	50 mg/250 mL D5W	------

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Norepiphrine Bitrartrate **See Appendix 2 for titration protocol*	Drip	---	---	---	---	Monitor infusion site for phlebitis and symptoms of extravasation. Central line preferred. Peripheral line for short term use only with large bore needles (at least 20 gauge). Peripheral line should be placed in the upper arm or forearm contralateral to the blood pressure cuff. Hand/wrist lines should be avoided as well as any IV sites requiring more than 1 venipuncture.	8 mg/250 mL D5W or NS (peripheral); 16 mg/250 mL D5W or NS (central)	-----
Octreotide	Push/SubQ	Push/SubQ	Push/SubQ	Push/SubQ	Push/SubQ	May give SubQ, Depot formulation is given IM intragluteal ONLY (avoid deltoid)	Continuous IV Infusion (drip): 1250 mcg/ 250 mL NS – run at 50 mcg/hr 600 mcg/250 mL NS – run at 25 mcg/hr Intermittent IV Infusion: IVPB dilute in 50 mL NS over 15-30 min	IV Push Undiluted over 3 min at ~ 50 mcg/min; Rapid IV bolus given only during emergency situations (e.g. carcinoid crisis)
	IVPB	IVPB	IVPB	IVPB	IVPB			
	Drip	Drip	Drip	Drip	Drip			
Olanzapine	IM	IM	IM	IM	IM	Reconstitute 10 mg vial with 2.1 mL SWFI; Resulting solution is ~5 mg/mL: Use immediately (within 1 hour) following reconstitution	-----	-----
Ondansetron	Push	Push	Push	Push	Push		12 mg/50 mL D5W or NS; 16 mg/50 mL D5W or NS – over 15 - 30 min	IV Push Undiluted over 2 - 5 min at 2 - 4 mg/min
	IVPB	IVPB	IVPB	IVPB	IVPB			

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Oxaliplatin	IVPB	---	---	IVPB	IVPB	Flush infusion line with D5W prior to administration. Avoid ice chips, exposure to cold temperatures, or consumption of cold food/beverages during or within hours after oxaliplatin infusion (may exacerbate acute neurological symptoms). Do not use needles or administration sets containing aluminum. Avoid extravasation; monitor IV site for redness, swelling, or pain.	Mix in 500 mL D5W over 2 - 6 hrs	-----
Oxytocin *See Appendix 2 for titration protocol	Drip IVPB IM Push	Drip IVPB IM Push	Drip IVPB IM Push	---	---	May give IM for postpartum uterine bleeding Hazardous agent (NIOSH 2016 [group 3]) Monitor: BP, fluid status, labor/uterine activity, fetal monitoring	20 units/1000 mL NS Induction: See Appendix 2 titration protocol Post Partum: bolus over 30 min (max 40 unit) then 125 mL/hour (2.5 unit/hour)	IM: 10 unit/mL (when IV access unavailable) Caution with IVPush: cardiovascular risk (give over ≥ 5 minutes)
PACLitaxel	IVPB	---	---	IVPB	IVPB	Final conc 0.3 – 1.2 mg/mL	Mix in 250 mL NS over 1 – 2 hours for weekly dose; Mix in 500 mL NS over 3 hour for q3 wk dose	-----
Polidocanol	MISC	MISC	MISC	MISC	MISC	Restricted surgeons in OR and vascular clinic; administer by surgeons only	-----	-----
Paliperidone	IM	IM	IM	IM	IM	Restricted to INPT Psychiatry ONLY		Invega Sustenna: Do not mix with any other product or diluent; shake syringe for at least 10 seconds to ensure a homogenous suspension
Palonosetron	Push	Push	Push	Push	Push	Restricted to the following: oncology attending, moderate or highly emetogenic chemotherapy treatment, or failure to ondansetron regimen	-----	IV push over 30 seconds, beginning ~30 minutes prior to the start of chemotherapy
Pamidronate	IVPB	IVPB	IVPB	IVPB	IVPB	Infusion concentration/rate are indication-dependent	90 mg/250 mL NS; 90 mg/500 mL NS; 90 mg/1000 mL NS infuse over 2-24 hours	-----
Pancuronium Bromide	Push Drip	---	---	---	---		100 mg/100 mL NS	2 mg/mL (undiluted); Rate: over 60-90 sec

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Pantoprazole	Push Drip	Push Drip	Push Drip	Push Drip	Push Drip		80 mg/100 mL NS, run at 10 mL/hr	Rate: reconstituted with 10 mL NS and adminsitered over 2 min
Papaverine HCl	Push	---	---	---	---	Rapid IV administration may result in fatal arrhythmias and apnea		No faster than over 1-2 minutes
Pemetrexed	IVPB	---	---	IVPB	IVPB	Restricted to Infusion Center only.	Mix in 100 mL NS over 10 min	-----
Penicillin G Benzathine	IM	IM	IM	IM	IM		-----	-----
Penicillin G Potassium	IVPB	IVPB	IVPB	IVPB	IVPB		3 MU/50 mL D5W; 4 MU/100 mL D5W; 6 MU/100 mL D5W over 30 min; for OB 6 MU/100 mL D5W over 1 hr	-----
Penicillin G Procaine	IM	IM	IM	IM	IM		-----	-----
Pentamidine	IVPB	IVPB	IVPB	IVPB	IVPB		300 mg/100 mL D5W over 1 hr	-----
PENTobarbital	Push Drip	---	---	---	---		2500 mg/250 mL NS	Max rate 50 mg/min
Perflutren Lipid Microspheres	---	---	---	---	---	Radiologic Contrast Agent – see specific procedures	IV infusion 4 mL/min	Bolus over 30-60 sec
PHENobarbital	Push IVPB	Push IVPB	Push IVPB	Push IVPB	Push IVPB	Loading Dose (20 mg/kg) in ED/ACCU only, respiratory support may be needed with larger doses	Max rate 50 mg/min	Max rate 50 mg/min
phentolamine	MISC	MISC	MISC	MISC	MISC	Inject 5 - 10 mg (dilute in 10 mL NS) into extravasation area		
Phenylephrine **See Appendix 2 for titration protocol*	Push Drip	---	---	---	---	Monitor infusion site for phlebitis and symptoms of extravasation. Central line preferred. Peripheral line for short term use only with large bore needles (at least 20 gauge). Peripheral line should be placed in the upper arm or forearm contralateral to the blood pressure cuff. Hand/wrist lines should be avoided as well as any IV sites requiring more than 1 venipuncture.	40 mg/250 mL D5W or NS (peripheral) 80 mg/250 mL D5W or NS (central)	100 mcg/mL; Rate: 100 mcg/min
Phenytoin	IVPB	---	---	IVPB	---	Stock: 250 mg / 5 mL Stock: 100 mg / 2 mL	IV administration of 50 mg/mL in 100 mL NS. Only compatible in NS. Dilute from 100 mg / 2 mL or 250 mg /	NOT for IM administration.

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						Telemetry trained nurses ONLY may give IV administration. Use double chemotherapy gloves and a protective gown during administration by the reproductive employee; at minimum, use single chemotherapy gloves during administration by the non-reproductive employee. Continuous monitoring of the electrocardiogram, blood pressure, and respiratory function is required during infusion and for 10 to 30 minutes after the end of infusion.	5 mL using patient specific dosing (may be further diluted in NS to a final concentration ≥5 mg/mL; infusion must be completed within 4 hours after preparation). Adult infusion rate: 20-50 mg/min (Max Rate: 50 mg/min). Load: 10-20 mg / kg, Usual: 100 mg every 6 to 8 hours. An in-line 0.22 to 0.55 micron filter is recommended for IVPB solutions due to the potential for precipitation of the solution. Infusion must be completed within 4 hours after preparation.	
Physostigmine	Push	Push	Push	---	---	Monitor HR; Significant bradicardia, respiratory distress, and seizures may occur from too rapid administration	-----	Infuse no faster than 1 mg/minute
Phytonadione	IVPB	IVPB	IVPB	IVPB	IVPB	Never IV Push, may give SubQ	10 mg/50 mL NS run over 30 min	-----
Piperacillin/ Tazobactam	IVPB	IVPB	IVPB	IVPB	IVPB	Refer to Autosubstitution Policy for Extended Infusion Criteria/Dosing	2.25 gm/50 mL D5W, 3.375 gm/50 mL D5W; 4.5 gm/100 mL D5W over 30 min for Conventional Infusion; IV infuse over 4 hrs for Extended Infusion	-----
Polymyxin B Sulfate	IVPB	IVPB	IVPB	IVPB	IVPB		500,000 units in 500 mL D5W Infuse over 60 - 120 minutes	-----
Potassium Acetate	IVPB	IVPB	IVPB	IVPB	IVPB		40 mEq/100 mL NS (central); 40 mEq/250 mL NS (peripheral) Drip varies as ordered, rate not to exceed 10 mEq/hr (in pt with central line on tele may be 20 mEq/hr)	-----
	Drip	Drip	Drip	Drip	Drip			
Potassium Chloride	IVPB	IVPB	IVPB	IVPB	IVPB		40 mEq/100 mL SW (central); 40 mEq/250 mL NS (peripheral) Drip varies as ordered, rate not to exceed 10 mEq/hr (in pt w/ central line on tele may be 20 mEq/hr)	-----
	Drip	Drip	Drip	Drip	Drip			

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Potassium Phosphate	IVPB	IVPB	IVPB	IVPB	IVPB		20 mmol/100 mL NS (central); 30 mmol/250 mL NS, 30 mmol/500 mL NS (central or peripheral); run at 5 mmol/hr (in pt w/ central line on tele may be 7 mmol/hr)	------
	Drip	Drip	Drip	Drip	Drip			
Pralidoxime	IM	---	---	---	---	Cardiac Monitor and BP monitor needed	infuse over 15 - 30 minutes	May administer IM (anterolateral aspect of thigh) if IV administration is not feasible
	IVPB	---	---	---	---			
Procainamide HCl	Push	---	---	---	---	Can cause significant hypotension and/or QRS widening	Drip: 2 gm/250 mL NS Maintenance: 1 to 6 mg/min by continuous infusion	500 mg/mL; Rate: <50 mg/min; max concentration 20 mg/mL (load)
	IVPB							
	Drip							
Prochlorperazine	Push/IM	Push/IM	Push/IM	Push/IM	Push/IM	AVOID skin contact with injection solution DO NOT administer SubQ	-----	Slow IV Push at a rate not exceeding 5 mg/min Deep IM into outer quadrant of buttocks
Promethazine	IM	IM	IM	IM	IM	IM is preferred. Do not administer SubQ or intra-arterially as necrotic lesions may occur. IV is not the preferred route, monitor for phlebitis. Administer through a large bore vein (not hand or wrist), preferably a central line. Administer via running I.V. line at port furthest from patient's vein. Instruct patients to report immediately signs of pain or burning	25 mg/50 mL NS to infused over 15 min. IV: Doses 6.25-12.5 mg must be diluted into 10 mL NS (normal saline) to administer over at least 5 minutes. Doses greater than 12.5 mg must be diluted into 50 mL NS IVPB by Pharmacy	DO NOT ADMINISTER VIA IV PUSH IM: Preferred route of administration
	IVPB	IVPB	IVPB	IVPB	IVPB			
Propofol **See Appendix 2 for titration protocol*	[a,†]Push	---	---	---	---	Must be on mech vent for drip and BP monitoring [a]In non intubated patients, for the purpose of rapid sequence intubation, the nurse can administer propofol IV push under the direct supervision of the physcian performing the intubation	Drip: 1000 mg/100 mL	10 mg/mL Max Rate for induction: 40 mg/10 seconds
	Drip							
Propranolol	Push	---	---	Push	---		Up to 10 mg in 50 mL NS over 30 min	Undiluted; Rate: 1 mg/min

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	IVPB	---	---	IVPB	---			
Protamine Sulfate	Push	Push	Push	Push	Push		-----	Over 10 min; max 50 mg; may be given undiluted or diluted with D5W or NS
Prothrombin Complex Concentrate/ 4-factor PCC (Kcentra)	Push	Push	Push	Push	---	Do NOT introduce other medications or blood products in the same IV line. ONLY indicated in reversal of urgent warfarin-associated acute major bleeding. Reduce infusion rate or interrupt infusion if patient's	Max rate: 8.4 mL/min (~ 210 units/minute)	Max rate: 8.4 mL/min (~ 210 units/minute)
	Drip	Drip	Drip	Drip	---			
Rasburicase	Drip	---	---	Drip	Drip	Inpatient: restricted to attending physicians	Mix in NS 50mL; Infuse over 30 minute	-----
Remifentanil	---	---	---	---	---	OR only	-----	-----
Rifampin	IVPB	IVPB	IVPB	IVPB	IVPB		300 mg/100 mL NS; 600 mg/100 mL NS over 1 hour	-----
Risperidone	IM Only	IM Only	IM Only	IM Only	IM Only		-----	-----
riTUXimab	IVPB	---	---	IVPB	IVPB		Final conc 1 mg/mL start at IV rate at 50 mg/hr increase rate by 50 mg/hr every 30 min until reach max	-----
Rocuronium *See Appendix 2 for	Push	---	---	---	---	Mech vent required; sedation required	500 mg/100 mL NS	Undiluted over 30 seconds
	Drip							
Romiplostim	SubQ	SubQ	SubQ	SubQ	SubQ	Restrict to hematology	-----	Reconstitute with only preservative free SWFI (add 0.72 mL to 250 mcg vial or 1.2 mL to 500 mcg vial
Ropivacaine	Epidural/Peripheral nerve block**					Rate is adjusted by Anesthesiologists	200 mg/100 mL (0.2% solution)** Peripheral nerve block: On-Q Pump Infusion @ 2 - 14 mL/hr	
Secretin	Push	Push	Push	Push	Push		------	Undiluted over 1 min
Selenium	TPN	TPN	TPN	TPN	TPN	Component in TPN	------	------
Sodium Bicarbonate	Push	Push	Push	Push	Push	Caution – addition in NS will result in hypertonic solution	150 mEq in 850 mL D5W	50 mEq/50 mL – Rapid Push

APPENDIX 1 - GUIDELINES FOR THE ADMINISTRATION OF PARENTERAL MEDICATIONS - ADULT

†in Code Blue/RRT
‡Initiate in ED/ACCU

HW830 Rev. Aug 2018
P&T Approved Sep 2018

Note: This reference serves as an abridged guideline for the administration of parenteral medications. Consult references for detailed information, including specific BOXED WARNING, dosing, compatibility, stability and other information

Drug Name	ACCU ED PACU	L&D	POST-PARTUM	2500 UNIT	MED/ SURG	COMMENTS	IVPB/Drip STANDARD CONCENTRATIONS / RATE OF ADMINISTRATION	IV Push/IM STANDARD CONCENTRATIONS / RATE OF ADMINISTRATION
	IVPB	IVPB	IVPB	IVPB	IVPB			
	Drip	Drip	Drip	Drip	Drip			
Sodium Chloride, Hypertonic saline (HTS) (Greater than 0.9% Sodium Chloride)	Push	---	---	---	---	Hypertonic Saline is defined as any concentration greater than 0.9% Sodium Chloride; HTS should be reserved for severe symptomatic hyponatremia or Refractory	Rate varies depending on indication and clinical status. Max peripheral infusion concentration 2.6% (900mOsm/L)	23.4% Sodium Chloride IVP 30 mL over 2-20 minutes via central line for refractory ICP elevation to be administered by physician only.
	IVPB			IVPB	IVPB			
Sodium Ferric Gluconate	IVPB	IVPB	IVPB	IVPB	IVPB		125 mg/100 mL NS over 1 hour	Slow IV Injection at a rate up to 12.5 mg/min
Sodium Phosphate	IVPB	IVPB	IVPB	IVPB	IVPB		Drip varies as ordered: 30 mmol/250 mL NS rate 5 mmol/hr	DO NOT Administer IV push
	Drip	Drip	Drip	Drip	Drip			
Sodium Tetradecyl Sulfate	MISC	MISC	MISC	MISC	MISC	Restricted to Surgery Department for Varicose Vein Treatment	-------	-------
Streptomycin Sulfate	IVPB	IVPB	IVPB	IVPB	IVPB	IM preferred (may be given IV in patients w/ insufficient muscle mass)	Max 1gm/dose – mix in 100 mL NS over 1 hr	-------
Streptozocin	Push	---	---	Push	Push		Mix in 100 mL NS over 30-60 min Mix in 250 mL NS over 6 hrs	
	IVPB			IVPB	IVPB			
Succinylcholine Chloride	Push	---	---	---	---	OK in intubation during Code/RRT	-------	Undiluted; Rate: 10-30 seconds
Sumitriptan Succinate	SubQ	SubQ	SubQ	SubQ	SubQ		-------	-------
Temsirolimus	IVPB	---	---	IVPB	IVPB	Restricted to Infusion Center Use polyethylene-lined non-DEHP administration sets	Mix in 250 mL NS over 30 – 60 minutes	-------
Tenecteplase	Push					Incompatible with D5W; Dextrose-containing lines must be flushed with NS before and after administration		Administer as a single IV bolus over 5 seconds
Terbutaline Sulfate	SubQ	SubQ	SubQ	SubQ	SubQ	See Extravasation Guidelines when used for management of vasoconstrictor extravasation	-------	IV push: 2.5-5 mcg/min; SubQ: Refer to Extravasation Guidelines for dilution instructions, SubQ undiluted for all other indications
	Push	Push	Push	Push	Push			

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Drug Name	ACCU ED PACU	L&D	POST-PARTUM	2500 UNIT	MED/ SURG	COMMENTS	IVPB/Drip STANDARD CONCENTRATIONS / RATE OF ADMINISTRATION	IV Push/IM STANDARD CONCENTRATIONS / RATE OF ADMINISTRATION
Testosterone Cypionate	IM	IM	IM	IM	IM		-------	-------
Tetracaine HCl	Procedural anesthesia/Spinal anesthesia					Not recommended for IV administration	-------	-------
Thiamine	IVPB	IVPB	IVPB	IVPB	IVPB	Local injection reactions can be minimized by slow administration. Thiamine should be given prior to IV dextrose containing	100 mg/50 mL NS over 30 min; Drip usually a component in other solutions	Max Rate: 100 mg slow IV push over 5 minutes
	Drip	Drip	Drip	Drip	Drip			
	Push	---	---	---	---			
Thiopental	Push	---	---	---	---		-------	Over 20-30 seconds
Thyrotropin	---	---	---	---	---	Radiologic Contrast Agent – IM only	-------	-------
Tobramycin	IVPB	IVPB	IVPB	IVPB	IVPB		100 mg/100 mL D5W; 80 mg/100 mL D5W; 5 mg/kg in 100 mL D5W - over 30 min	-------
Topotecan	IVPB	---	---	IVPB	IVPB		100 mL NS over 30 minutes	-------
Trace Metals	Drip	Drip	Drip	Drip	Drip		Usually infused with TPN	-------
Tranexamic Acid	IVPB	IVPB	IVPB	IVPB	IVPB	For trauma-associated hemorrhage: Loading dose 1000 mg IV infuse over 10 minutes,	Loading dose IV infuse over 10-30 minutes.	IV push max rate: 100 mg/min
	Push							
Trastuzumab	IVPB	---	---	IVPB	IVPB		Mix in 250 mL NS over 90 minutes for loading dose; 30 minutes for maintenance dose	------
Triamcinolone acetonide	IM	IM	IM	IM	IM		-------	-------
Trimethoprim/ Sulfamethoxazole	IVPB	IVPB	IVPB	IVPB	IVPB		100 mg-250 mg/250 mL D5W over 90 min; 251-500 mg/500 mL D5W over 2 hrs	------
Valproic Acid	IVPB	---	IVPB	IVPB	IVPB	Pregnancy category D	500 mg/100 mL NS over 1 hr; rate ≤ 20 mg/min	------
Vancomycin	IVPB	IVPB	IVPB	IVPB	IVPB		500-750 mg/150 mL D5W over 60 min; 1g/200 mL D5W over 60 min; 751-1000/200 mL D5W over 60 min; 1001-1500/300 mL D5W over 90 min; 1501 – 2000 mg/500 mLD5W over 2 hr.	------

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Drug Name	ACCU ED PACU	L&D	POST-PARTUM	2500 UNIT	MED/ SURG	COMMENTS	IVPB/Drip STANDARD CONCENTRATIONS / RATE OF ADMINISTRATION	IV Push/IM STANDARD CONCENTRATIONS / RATE OF ADMINISTRATION
Vasopressin *See Appendix 2 for titration protocol*	Drip	---	---	---	---	Maximum infusion rate recommended not to exceed: 0.04 units/min	20 units/100 mL NS	------
Vecuronium Bromide *See Appendix 2 for titration protocol*	Drip	---	---	---	---	Mech vent required for drip	100 mg/100 mL NS 0.8 mcg/kg/min to max of 1.7 mcg/kg/min	Rapid IV Injection with dilution of 1 mg/mL
	Push							
Verapamil	Push	Push	---	---	---	Requires tele	------	Rate: 5-10 mg over 2 min; give over 3 minutes for older patients.
vinBLAStine Sulfate	IVPB	---	---	IVPB	IVPB		Mix in 50 mL NS over 10 min	------
vinCRIStine Sulfate	IVPB	---	---	IVPB	IVPB		Mix in 50 mL NS over 10 min	------
Vinorelvine	IVPB	---	---	IVPB	IVPB		Mix in 50 mL NS over 10 min	------
Vitamin B-1 (see thiamine)								
Vitamin B-12 (cyanocobalamin)	IM Only	IM Only	IM Only	IM Only	IM Only		------	------
Vitamin B-6 (pyridoxine)	IM	IM	IM	IM	IM		Mix in 50 mL NS give over 15-30 min	------
	IVPB	IVPB	IVPB	IVPB	IVPB			
Vitamin C (ascorbic acid)	IVPB	IVPB	IVPB	IVPB	IVPB	Also in TPN	Mix in 50 mL NS give over 30 min	------
Vitamins, Multiple	IVPB	IVPB	IVPB	IVPB	IVPB	Also in TPN	Drip varies as ordered; mix in 50 mL NS, give over 15 min	------
	Drip	Drip	Drip	Drip	Drip			
voriconazole	IVPB	IVPB	IVPB	IVPB	IVPB	Restricted to ID	Mix in 100 mL or 250 mL infuse over 2 hours	------
Zidovudine	IVPB	IVPB	IVPB	IVPB	IVPB		200 mg/100 mL D5W over 1 hour	------
Ziprasidone	IM Only	IM Only	IM Only	IM Only	IM Only			------
Zoledronic Acid	---	---	---	---	---	Chemo Clinic only	Mix in 100 mL NS over 15 min	------

APPENDIX 2: TITRATION OF CRITICAL MEDICATIONS-ADULT

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Drug Name	Standard Concentration	Loading Dose	Initial Infusion Rate (suggested rate)	Adjust by (suggested rate)	Frequency (suggested time)	Maximum Rate	Titration Parameter	Comments
Vasopressors and Inotropes								
DOBUTamine (Dobutrex)	500 mg/250 mL (2 mg/mL)	---	2.5 mcg/kg/min	---	---	40 mcg/kg/min	Do not titrate. PHYSICIANS to order changes	
DOPamine (Inotropin)	400 mg/ 250 mL (*peripheral*) or 800 mg/ 250 mL (*central*)	---	1 - 5 mcg/kg/min	1 - 4 mcg/kg/min	3-5 min	20 mcg/kg/min	MAP	
EPINEPHrine	2 mg/ 250 mL (*peripheral*) or 4 mg / 250 mL (*central*)	---	0.5 - 1 mcg/min	1 - 5 mcg/min	3-5 min	10 mcg/min	MAP	
Norepinephrine (Levophed)	8 mg/ 250 mL (*peripheral*) or 16 mg/ 250 mL (*central*)	---	0.5 - 1 mcg/min	2 - 10 mcg/min	3-5 min	50 mcg/min	MAP	
Milrinone (Primacor)	20 mg/ 100 mL or 40 mg/ 200 mL	50 mcg/kg over 10 min	0.1 - 0.75 mcg/kg/min	---	---	1 mcg/kg/min	Do not titrate. PHYSICIANS to order changes	-Caution in patients with renal dysfunction -May cause significant hypotension
Phenylephrine (Neo-synephrine)	40 mg/ 250 mL (*peripheral*) or 80 mg / 250 mL (*central*)	---	100 - 180 mcg/min	20 - 40 mcg/min	3-5 min	300 mcg/min	MAP	
Vasopressin (Pitressin)	20 units/ 100 mL (0.2 units/mL)	---	0.01 unit/min	0.01 unit/min	3-5 min	0.04 unit/min	MAP	
Vasodilators								
Nitroglycerin (Tridil)	50 mg/ 250 mL (0.2 mg/mL)	---	5 - 10 mcg/min	5 mcg/min	3-5 min	200 mcg/min	Chest Pain score hold for SBP	
Nitroprusside (Nipride)	50 mg/ 250 mL (0.2 mg/mL)	---	0.3 - 0.5 mcg/kg/min	0.5 mcg/kg/min	3-5 min	10 mcg/kg/min	SBP	
Ni**CAR**dipine (Cardene)	20 mg/ 200 mL NS (Peripheral) or 40 mg/ 200 mL NS (central)	---	5 mg/hr	2.5 mg/hr	5-15 min	15 mg/hr	HR and/or SBP	
Antiarrhythmics								
Amiodarone (Cordarone)	450 mg/ 250 mL (1.8 mg/mL)	150 mg over 10 min	1 mg/min x 6 hr, then 0.5 mg/min	---	---	---	---	
Dil**TIAZ**em (Cardizem)	125 mg/ 125 mL (1 mg/mL)	0.25 mg/kg over 2 min	5 mg/hr	5 mg/hr	5-10 min	15 mg/hr	HR and/or SBP	
Esmolol (Brevibloc)	2500 mg/ 250 mL (10 mg/mL)	0.5 mg/kg over 1 min	50 mcg/kg/min	50 mcg/kg/min	5-10 min	300 mcg/kg/min	HR and/or SBP	
Labetalol (Normodyne)	300 mg/ 300 mL (1 mg/mL)	20 mg over 2 min	0.5 - 2 mg/min	0.5-2 mg/min	5-10 min	max 300 mg/day max 4 mg/min	HR and/or SBP	
Diuretics								

Bumetanide (Bumex)	10 mg/ 100 mL (0.1 mg/mL)	---	0.5 - 1 mg/hr	0.1 -0.5 mg/hr	0.5-1 hr	5 mg/hr	UOP	
Furosemide (Lasix)	100 mg/ 100 mL (1 mg/mL) 500 mg/50 mL (10 mg/mL)	---	3 - 5 mg/hr	5 mg/hr	0.5-1 hr	40 mg/hr	UOP	

Paralytics

Rocuronium (Zemuron)	200 mg/100 mL (2 mg/mL) 500 mg/ 100 mL (5 mg/mL)	0.5 mg/kg	6 - 10 mcg/kg/min	1 - 5 mcg/kg/min	3 - 5 min	16 mcg/kg/min	Maintain Train of Four (TOF) at 2/4	
Vecuronium (Norcuron)	100 mg/ 100 mL (1 mg/mL)	0.08 - 0.1 mg/kg	0.8 mcg/kg/min	0.2 - 0.3 mcg/kg/min	10 - 15 min	1.7 mcg/kg/min	Maintain Train of Four (TOF) at 2/4	Caution in patients with renal dysfunction
Cisatracurium (Nimbex)	100 mg/ 100 mL (1 mg/mL)	0.1 - 0.2 mg/kg	1 - 3 mcg/kg/min	0.2 - 0.5 mcg/kg/min	5 - 10 min	10 mcg/kg/min	Maintain Train of Four (TOF) at 2/4	

Analgesics

FentaNYL (Sublimaze)	1000 mcg/ 100 mL (10 mcg/mL)	50 - 100 mcg	25 - 75 mcg/hr	25 - 50 mcg/hr	2 - 15 min	450 mcg/hr	CPOT	
Morphine	100 mg/ 100 mL (1 mg/mL)	2 - 5 mg	1 - 3 mg/hr	0.5 - 1.5 mg/hr	5 - 15 min	12 mg/hr	CPOT	Caution in patients with renal dysfunction
Hydromorphone (Dilaudid)	50 mg/ 100mL (0.5 mg/mL)	1 - 3 mg	0.5 - 2 mg/hr	0.5 - 1 mg/hr	5 - 15 min	5 mg/hr	CPOT	

Sedatives

Dexmedetomidine (Precedex)	400 mcg/ 100 mL 200 mcg/ 50 mL (4 mcg/mL)	1 mcg/kg over 10 min	0.4 mcg/kg/hr	0.2 - 0.7 mcg/kg/hr	every 30 min	1.5 mcg/kg/hr	RASS scale	Monitor HR and BP
Ketamine (Ketalar)	100 mg/ 100 mL (1 mg/mL)	0.5 - 2 mg/kg	0.1 - 0.5 mg/min	0.1 - 0.5 mg/min	every 5 - 15 min	0.015 - 0.09 mg/kg/min	RASS scale	Monitor BP
Midazolam (Versed)	100 mg/ 100 mL (1 mg/mL)	2 - 5 mg	1 - 3 mg/hr	0.5 - 2 mg/hr	2 - 15 min	10 mg/hr	RASS scale	
Lorazepam (Ativan)	120 mg/ 60 mL (2 mg/mL)	2 - 4 mg	1 - 3 mg/hr	0.5 - 2 mg/hr	5 - 15 min	10 mg/hr	RASS scale	
Propofol (Diprivan)	1000 mg/ 100 mL (10mg/mL)	---	5 - 10 mcg/kg/min	5 - 10 mcg/kg/min	2 - 15 min	50 mcg/kg/min	RASS scale	Monitor BP

Anticoagulants

Argatroban	250 mg/ 250 ml (1 mg/mL)	---	0.5 - 2 mcg/kg/min based on physician order	0.25 - 0.5 mcg/kg/min based on protocol	every 4 hours until 2 consecutive aPTTs are in therapeutic range	---	aPTT	Caution in patients with hepatic dysfunction. Baseline CBC with platelets, PT/INR, aPTT, LFTs STAT PTT 2 hours after argatroban drip started. Repeat PTT 4 hours after each rate adjustment until PTT is in therapeutic range on 2 consecutive checks. Then monitor PTT QAM
Heparin	25,000 units/250 mL (100 units/mL)	60-80 units/kg ACS: 60 units/kg (**max** 5000 units) DVT/PE: 80 units/kg (**max** 8000 units) Rebolus as needed if ordered by physician	12-18 units/kg/hr based on physician order	100-300 units/hr based on protocol	every 6 hours until 2 consecutive aPTTs are in therapeutic range	ACS: initial **max rate** 1000 units/hr DVT/PE: initial **max rate** 1800 units/hr Then titrate to therapeutic range	aPTT	Baseline CBC with platelets, PT/INR, aPTT STAT PTT 6 hours after heparin drip started. Repeat PTT 6 hours after each rate adjustment until PTT is in therapeutic range on 2 consecutive checks. Then monitor PTT QAM

Labor & Delivery

Oxytoxin	20 units/1000 mL (20 mili-unit/mL)	none	1-2 milli-unit/min	1 - 2 milli-unit/min	every 30 min	20 milli-unit/min (without an order*)	**Adequate uterine activity:** a) 3-5 uterine contractions per 10 minute; Maximum of 5 contractions per 10 minute b) moderate - strong in palpation (or 50-70 mmHg via IUPC); 30-60 second duration. *See department guideline for further instructions	Hazardous agent (NIOSH 2016 [group 3]) Monitor: BP, fluid status, labor/uterine activity, fetal monitoring

Abreviations: min (minute); hr (hour); MAP (mean arterial pressure); SBP (systolic blood pressure); HR (heart rate); UOP (urine output); TOF (train of four); CPOT (critical-care pain observation tool); RASS (Richmond Agitation-Sedation Scale); BP (blood pressure); LFT (liver function test); aPTT (activated partial thromboplastin time); PT (prothrombin time); INR (international normalized ratio); max (maximum); DVT/PE (deep vein thrombosis/pulmonary embolism); QAM (every morning)

DEFINITIONS:
Push: Direct IV administration either manually or via Smart Pump, usually under 15 minutes
IVPB: Intermittent IV infusion utilizing a Smart Pump, usually 15 minutes or greater
Drip: Continuous IV infusion utilizing a Smart Pump, usually over 24 hours

NOTE:
This reference serves as an abridged guideline for the administration of parenteral medications for pediatric and neonatal patients. Consult references for detailed information, including specific BOXED WARNING, dosing, compatibility, stability and other information.

				IV BOLUS (Push)		INTERMITTENT INFUSION (IVPB)		CONTINUOUS INFUSION (Drip)		***Administer Using Guardrails***	
Drug	NICU	PICU	PEDS	concentration	RATE	concentration	RATE	concentration	RATE	Usual Dose [adult max]	Nursing Considerations
acetaminophen	IVPB	IVPB	IVPB	n/a	n/a	10 mg/mL	15 minutes	n/a	n/a	12.5-15 mg/kg/dose [< 50 kg 750 mg; ≥ 50 kg 1000 mg]	BOXED WARNING Formulary Restrictions
acetaZOLAMIDE	Push	Push	Push	100 mg/mL	1-2 minutes	100 mg/mL	15 minutes	n/a	n/a	1-5 mg/kg/dose [1000 mg]	Max 500 mg/min TPN: No
acetylcysteine		IVPB Drip	Drip	n/a	n/a	50 mg/mL	60 minutes	7 mg/mL	2nd dose: 4 hours 3rd dose: 16 hours	150 mg/kg over 60 min, then 50 mg/kg over 4 hours, then 100 mg/kg over 16 hours [300 mg/kg]	Standard acetaminophen overdose regimen
acyclovir	IVPB	IVPB	IVPB	n/a	n/a	5 mg/mL	60 minutes	n/a	n/a	5-20 mg/kg/dose (Obese: use IBW)	Central Line Preferred [7 mg/mL fluid restricted] TPN: No
adenosine	Push	Push	PALS	undiluted*	rapid 1-2 seconds	n/a	n/a	n/a	n/a	0.1 mg/kg/dose [6 mg] 0.2 mg/kg/dose [12 mg]	*PREPARATION: for doses less than 0.2 mL dilute 1 mL with 9 mL NS = 0.3 mg/mL (300 mcg/mL)
albumin	IVPB	IVPB	IVPB	n/a	n/a	50-250 mg/mL (5% - 25%)	30-60 minutes [5%: 4 mL/minute] [25%: 1 mL/minute]	n/a	n/a	0.25-1 g/kg/dose [25 g]	Suitable diluents D5W, D10W, NS TPN: Yes
alprostadil	Drip	Drip		n/a	n/a	n/a	n/a	5 mcg/mL 10 mcg/mL	DO NOT TITRATE	Usual: 0.01-0.1 mcg/kg/min Max: 0.4 mcg/kg/min	BOXED WARNING Central Line Preferred; TPN: No
alteplase	Drip Cath	Drip Cath	Cath	1 mg/mL	Locked off	n/a	n/a	1 mg/mL	maximum 0.06 mg/kg/hour	DVT: 0.03 mg/kg/hr	See protocol for occluded catheter
amikacin	IVPB	IVPB	IVPB	n/a	n/a	5 mg/mL	60 minutes	n/a	n/a	7.5-15 mg/kg/dose [25 mg/kg]	BOXED WARNING TPN: *2-in-1* Yes; verify with pharmacy
amiodarone	Push Drip	Push Drip		1.8 mg/mL	10-15 minutes	1.5 mg/mL 1.8 mg/mL	20-60 minutes	1,000 mcg/mL 1,800 mcg/mL 5,000 mcg/mL*	DO NOT TITRATE	Bolus: 5 mg/kg [300 mg] Usual: 5-15 mcg/kg/min Max: [2200 mg/day]	*CENTRAL line preferred 0.2 micron inline filter hypotension, bradycardis, phlebitis; TPN: No
amphotericin B liposomal	IVPB	IVPB	IVPB	n/a	n/a	1 mg/mL	120 minutes	n/a	n/a	3-5 mg/kg/dose [10 mg/kg/dose]	NOT compatible with NS, flush with D5W; do not use inline filter less than 1 micron
ampicillin	IVPB Push	IVPB Push	IVPB Push	100 mg/mL [dose ≤ 500 mg]	3-5 minutes	20 mg/mL	15-30 minutes	n/a	n/a	25-100 mg/kg/dose [12 g/day]	For immediate use, may reconstitute 500 mg vial with 5 mL SWFI; TPN: Yes
ampicillin/sulbactam (Unasyn)	IVPB	IVPB	IVPB	n/a	n/a	20 mg/mL	15-30 minutes	n/a	n/a	25-100 mg ampicillin/kg/dose ≥ 40 kg usual adult dose	< 40 kg: dose based on ampicillin; ≥40 kg: expressed as total grams of the ampicillin/sulbactam combination
atropine	Push	Push	PALS	undiluted	rapid 1-2 seconds	n/a	n/a	n/a	n/a	0.02 mg/kg/dose [0.5 mg child; 1 mg adolescent]	< 5 kg: no minimum dose
azithromycin	IVPB	IVPB	IVPB	n/a	n/a	2 mg/mL	60 minutes	n/a	n/a	5-10 mg/kg/dose [500mg]	TPN: 2-in-1 only

Please refer to NICU, PICU or PEDS, according to the patient type and monitoring provided, regardless of the physical location of the patient (emergency department, radiology etc.)

				IV BOLUS (Push)		INTERMITTENT INFUSION (IVPB)		CONTINUOUS INFUSION (Drip)		*Administer Using Guardrails*	
Drug	NICU	PICU	PEDS	concentration	RATE	concentration	RATE	concentration	RATE	Usual Dose [adult max]	Nursing Considerations
aztreonam	IVPB	IVPB	IVPB	n/a	n/a	50 mg/mL	30 minutes	n/a	n/a	30 mg/kg/dose [2000 mg]	phlebitis, discomfort at injections site TPN: YES
bumetanide	Push IVPB	Push IVPB	Push IVPB	0.25 mg/mL	1-2 minutes	D5W, LR, NS	5 minutes	n/a	n/a	0.01-0.1 mg/kg/dose [2 mg]	potent diuretic--monitor electrolytes: bumetanide 1 mg = furosemide 40 mg
caffeine citrate	IVPB	IVPB		n/a	n/a	20 mg/mL	10-15 minutes 30 minutes (load)	n/a	n/a	Load: 10-40 mg/kg/dose Usual: 5-8 mg/kg/dose	TPN: 2-in-1 only Not interchangable with caffeine benzoate
calcium chloride	IVPB	Push IVPB	PALS	100 mg/mL (PALS)	3-5 minutes	≤ 20 mg/mL	10-30 minutes	n/a	n/a	Hypocalcemia: Dose based on Calcium Chloride 10-20 mg/kg [1000 mg; 2000 mg PALS]	High Risk; bradycardia, hypotension, arrhythmias; hyaluronidase may be used for extravasation
calcium gluconate	Push IVPB TPN	Push IVPB TPN	IVPB TPN	100 mg/mL (PALS)	2-5 minutes	≤ 50 mg/mL	1-2 hours	[3 mg/mL peripheral] [20 mEq/day TPN]	Per TPN rate	50-100 mg/kg/dose [3000 mg]	High Risk; bradycardia, hypotension, arrhythmias; hyaluronidase may be used for extravasation--use large vein or central line TPN: C/I (consult Pharmacist)
ceFAZolin	Push IVPB	Push IVPB	Push IVPB	100 mg/mL	3-5 minutes	100 mg/mL	15-30 minutes	n/a	n/a	25-50 mg/kg/dose [2000 mg up 3000 mg sx prophylaxis]	caution with penicillin allergy (5-15% cross allergy)
cefepime	IVPB	IVPB	IVPB	n/a	n/a	100 mg/mL	30 minutes	n/a	n/a	50 mg/kg/dose [2000 mg]	caution with penicillin allergy (5-15% cross allergy)
cefotaxime	IVPB	Push IVPB	Push IVPB	100 mg/mL	3-5 minutes	100 mg/mL	15-30 minutes	n/a	n/a	50 mg/kg/dose [2000 mg]	TPN: YES
cefOXitin	IVPB	Push IVPB	Push IVPB	100 mg/mL	3-5 minutes	100 mg/mL	15-30 minutes	n/a	n/a	30-40 mg/kg/dose [3000 mg]	caution with penicillin allergy (5-15% cross allergy)
ceftazidime	IVPB	Push IVPB	Push IVPB	100 mg/mL	3-5 minutes	100 mg/mL	15-30 minutes	n/a	n/a	50 mg/kg/dose [2000 mg]	TPN: YES
ceftriaxone	IVPB	IVPB	IVPB	n/a	n/a	40 mg/mL	30 minutes	n/a	n/a	25-100 mg/kg/dose [2000 mg]	Also available in 1% Lidocaine for IM use TPN: No Avoid use with calcium containing solutions
cefuroxime	IVPB	IVPB	IVPB	100 mg/mL	3-5 minutes	100 mg/mL	15-30 minutes	n/a	n/a	50 mg/kg/dose [1500 mg]	
chorothiazide	Push IVPB	Push IVPB		25 mg/mL	3-5 minutes	25 mg/mL	30 minutes	n/a	n/a	1-4 mg/kg/dose	Extravasation Risk; calcium sparing; monitor blood pressure; monitor electrolytes TPN: No
ciprofloxacin	IVPB	IVPB	IVPB	n/a	n/a	2 mg/mL	60 minutes	n/a	n/a	10-15 mg/kg/dose Q8-12Hr [400 mg]	BOXED WARNING May cause venous irritation TPN: YES
clindamycin	IVPB	IVPB	IVPB	n/a	n/a	12 mg/mL	60 minutes	n/a	n/a	5-10 mg/kg/dose [600mg]	BOXED WARNING TPN: YES
dantrolene		Push	Push	250 mg vial	1st dose: rapid Subsequent doses: 1 minute	prophylaxis	60 minutes	n/a	n/a	2.5 mg/kg/dose	Reconstitute by adding 5 mL SWFI to vial (do NOT use bacteriostatic water) Vesicant/extravasation risk
dexamethasone	Push	Push IVPB	Push IVPB	4 mg/mL	1-4 minutes	2 mg/mL	15-30 minutes	n/a	n/a	0.2-0.6 mg/kg/dose [10mg]	variable dosing, check reference

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				IV BOLUS (Push)		INTERMITTENT INFUSION (IVPB)		CONTINUOUS INFUSION (Drip)		***Administer Using Guardrails***	
Drug	NICU	PICU	PEDS	concentration	RATE	concentration	RATE	concentration	RATE	Usual Dose [adult max]	Nursing Considerations
dexmedetomidine		Push Drip		4 mcg/mL	10 minutes	n/a	n/a	4 mcg/mL 8 mcg/mL	DO NOT TITRATE	Bolus: 0.25-0.5 mcg/kg/dose Usual: 0.2-0.7 mcg/kg/hr Max: 1.4 mcg/kg/hr [1.5 mcg/kg/hr]	Monitor HR and BP; hypertension associated with higher doses
dextrose	Push IVPB	Push IVPB	Push IVPB	10% infant 25% children 50% adolescents	1 minute			variable	IVF/TPN	0.5-1 g/kg/dose [25 g] PALS	PALS; hypoglycemia protocol vesicant at conc. > 10% (12.5% maximum peripherally)
diazePAM		Push	Push	5 mg/mL	3-5 minutes (max 2 mg/min)	n/a	n/a	n/a	n/a	0.1-0.3 mg/kg/dose [10mg]	BOXED WARNING vesicant
diphenhydramine		Push	Push	undiluted	3-5 minutes (max 25 mg/min)	10 mg/mL in NS	10-15 minutes	n/a	n/a	1-2 mg/kg/dose [50 mg]	May also administer by deep IM
DOBUTamine	Drip	Drip		n/a	n/a	n/a	n/a	600 mcg/mL 800 mcg/mL 1,600 mcg/mL 8,000 mcg/mL	See Titration Protocol	Usual: 0-20 mcg/kg/min Max: 20 mcg/kg/min [40 mcg/kg/min]	Central Line Preferred; (specify range, MAP or SBP)* TPN: YES
DOPamine	Drip	Drip		n/a	n/a	n/a	n/a	600 mcg/mL 800 mcg/mL 1,600 mcg/mL 3,200 mcg/mL	See Titration Protocol	Usual: 3-5 mcg/kg/min Max: 20 mcg/kg/min [20 mcg/kg/min]	BOXED WARNING Antidote = phentolamine Central Line Preferred; (specify range, MAP or SBP)* TPN: YES
doxycycline		IVPB	IVPB	n/a	n/a	1 mg/mL	2-4 hour	n/a	n/a	2.2-4.4 mg/kg/dose [100 mg]	Avoid rapid infusion; avoid use < 8 yr age; TPN: *2 in 1* only
enalaprilat	Push IVPB	Push IVPB		undiluted	5 minutes	QS	5-60 minutes			5-10 mcg/kg/dose [1.25 mg]	BOXED WARNING May be further diluted in NS or D5W; TPN: YES
EPINEPHrine	Push Drip	Push Drip	PALS	0.1 mg/mL	rapid 1-2 seconds	n/a	n/a	10 mcg/mL 25 mcg/mL 50 mcg/mL 200 mcg/mL 400 mcg/mL	See Titration Protocol	Dose: 0.01 mg/kg [1 mg] Usual: 0.02-0.1 mcg/kg/min Max: 1 mcg/kg/min [10 mcg/min]	Central Line Preferred; (specify range, MAP or SBP)* Vesicant/Extravasation Risk TPN: *2 in 1* only
esmolol	Push Drip	Push Drip		10 mg/mL	1-2 minutes	n/a	n/a	10 mg/mL 20 mg/mL	See Titration Protocol	Load: 500 mcg/kg Usual: HTN: 25-250 mcg/kg/min SVT: 200 mcg/kg/min Max: [300 mcg/kg/min] HTN: 500 mcg/kg/min SVT: 1,000 mcg/kg/min	Central Line Preferred; (specify range HR, MAP or SBP)* TPN: YES
famotidine	Push IVPB	Push IVPB	Push IVPB	4 mg/mL	2-5 minutes max: 10 mg/min	2 mg/mL	15 minutes	n/a	n/a	0.25-1 mg/kg/dose [20 mg]	Max 10 mg/min TPN: YES
fat emulsion	IVPB TPN	TPN	TPN	20%	*ANTIDOTE Bolus	20%	over 24 hours	20%	over 24 hours	Antidote: 0.8-3 mL/kg bolus*	BOXED WARNING ANTIDOTE (http://www.lipidrescue.org)

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				IV BOLUS (Push)		INTERMITTENT INFUSION (IVPB)		CONTINUOUS INFUSION (Drip)		***Administer Using Guardrails***	
Drug	NICU	PICU	PEDS	concentration	RATE	concentration	RATE	concentration	RATE	Usual Dose [adult max]	Nursing Considerations
fentaNYL	Push IVPB Drip	Push IVPB Drip PCA	Push IVPB PCA	10-50 mcg/mL	3-5 minutes NICU: 10 minutes	10-50 mcg/mL	10-15 minutes	2 mcg/mL 5 mcg/mL 10 mcg/mL 25 mcg/mL 40 mcg/mL	DO NOT TITRATE	Dose: 1-5 mcg/kg [50 mcg] Bolus: 1-2 mcg/kg [50 mcg] Usual: 2-5 mcg/kg/hr Max: 7 mcg/kg/hr [450 mcg/hr]	BOXED WARNING MAY REQUIRE MECHANICAL VENTILATION Caution: chest wall rigidity; reverse with naloxone TPN: YES
fluconazole	IVPB	IVPB	IVPB			2 mg/mL	60-120 minutes Max: 200 mg/hr				TPN: YES
flumazenil	Push	Push	Push	undiluted	15-30 seconds					Usual: 0.01 mg/kg/dose [0.2 mg]	BOXED WARNING ANTIDOTE (benzodiazepines)
fosphenytoin	IVPB	IVPB	IVPB	n/a	n/a	20 mg PE/mL	30 minutes 2 mg PE/kg/min 150 mg PE/min use slowest rate	n/a	n/a	Dosing expressed as PE (phenytoin equivalents) Load: 15-20 mg PE/kg [1500 mg PE] Usual: 5 mg PE/kg/day Q12hr [300 mg PE/day]	BOXED WARNING Hazardous Precautions (NIOSH [group 2]) Continuous ECG with Q15min BP & RR until 20 minutes post infusion
furosemide	Push IVPB Drip	Push IVPB Drip	Push IVPB	10 mg/mL	1-2 minutes 0.5 mg/kg/min 4 mg/min (>120 mg)	1-2 mg/mL	10-15 minutes	0.5 mg/mL 1 mg/mL 2 mg/mL 5 mg/mL 10 mg/mL	See Titration Protocol	Dose: 1-2 mg/kg [40 mg] Usual: 0.05-0.4 mg/kg/hr Max: 160 mg/hr [40 mg/hr]	BOXED WARNING Rapid administration may cause transient or permanent ototoxicity TPN: Yes
ganciclovir	IVPB	IVPB	IVPB			10 mg/mL	60 minutes			3-7.5 mg/kg/dose Q12hr [15 mg/kg/day]	BOXED WARNING Hazardous Precautions (NIOSH [group 2]) TPN: No
gentamicin	IVPB	IVPB	IVPB			4 mg/mL 10 mg/mL	30-120 minutes			2.5-9.5 mg/kg/dose	BOXED WARNING TPN: YES
glucagon	Push Drip	Push Drip	Push	1 mg/mL	3-5 minutes			0.1 mg/mL	DO NOT TITRATE	NICU: 0.01-0.1 mg/kg/hour PICU: (β- or Ca- Channel blocker toxicity)* LD: 0.03-0.15 mg/kg [10 mg] CI: 0.07 mg/kg/hr [5 mg/hr]	*β-blocker or Ca-channel blocker toxicity, ensure adequate supply on hand
glycopyrrolate		Push	Push	undiluted	1-2 minutes	2 mcg/mL	for doses > 0.2 mg	n/a	n/a	4 mcg/kg/dose [100 mcg]	REVERSAL AGENT (neostigmine/pyridostigmine)
haloperidol		*Push	IM only	undiluted	slowly (max 5 mg/min)	D5W	30-45 minutes			0.05-0.15 mg/kg/dose [5 mg]	*IV Administration is OFF-Label use ECG monitoring for QT prolongation and arrhythmias
heparin	Flush IVF/TPN	Flush DRIP	Flush	1 unit/mL 10 unit/mL 100 unit/mL	line flush	n/a	n/a	100 unit/mL	See Titration Protocol	Usual: 20-35 unit/kg/hr Max: [1800 unit/hr]	standard concentration for UAC line 0.5 unit/mL in 0.45% NS 100 mL TPN: YES (< 100 unit/mL with lipids)
hydrALAZINE	Push	Push		undiluted	1-2 minutes					0.1-0.2 mg/kg/dose [20 mg]	Monitor HR and BP NOT compatible with dextrose

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				IV BOLUS (Push)		INTERMITTENT INFUSION (IVPB)		CONTINUOUS INFUSION (Drip)		***Administer Using Guardrails***	
Drug	NICU	PICU	PEDS	concentration	RATE	concentration	RATE	concentration	RATE	Usual Dose [adult max]	Nursing Considerations
hydrocortisone sodium succinate	Push IVPB	Push IVPB	Push IVPB	0.5 mg/mL 5 mg/mL [50 mg/mL]	≥ 30 seconds	0.1-1 mg/mL	10-30 minutes	n/a	n/a	1-2 mg/kg/dose [100 mg]	TPN: YES
HYDROmorphone		Push Drip PCA	Push PCA	undiluted	2-5 minutes	1:1 with NS	doses > 4 mg over 2-5 minuts	0.5 mg/mL 1 mg/mL	DO NOT TITRATE	Dose: 0.01 mg/kg consult reference for PCA and CI	Do Not Titrate
hydroxyzine		IM only	IM only	n/a	n/a	n/a	n/a	n/a	n/a	0.5-1 mg/kg/dose [50 mg]	vesicant
ibuprofen lysine	IVPB			n/a	n/a	5 mg/mL	15 minutes			10 mg/kg/dose followed by 5 mg/kg/dose x2 doses at 24 hr and 48 hr	Extravasation Risk Monitor urine output TPN: No
indomethacin	IVPB			n/a	n/a	0.5 mg/mL	30 minutes	n/a	n/a	0.1-0.25 mg/kg/dose	BOXED WARNING rapid administration (Push) decreases mesenteric artery and cerebral blood flow
imipenem/cilastatin	IVPB	IVPB	IVPB	n/a	n/a	5 mg/mL	30-60 minutes	n/a	n/a	DOSING BASED ON IMIPENEM 60-100 mg/kg/day divided Q6hr [4 g/day] 20-25 mg/kg/dose Q8-12hr (neonate)	TPN: YES
immune globulin (IVIG)	IVPB	IVPB	IVPB	n/a	n/a	5% 10%	2-24 hr*	n/a	n/a	See IVIG dosing recommendations	BOXED WARNING *Refer to individual product package insert
insulin, REGULAR	IVPB Drip	IVPB Drip		n/a	n/a	0.1 unit/kg with 400 mg/kg dextrose (hyperkalemia)	15-20 minutes	0.05 unit/mL 1 unit/mL	DO NOT TITRATE	Usual: 0.05-0.1 unit/kg/hr Max: caution > 5 unit/hr NICU: stop if BS ≤ 180 mg/dL	PRIME tubing 20 minutes before infusion TPN: YES
ketamine	Drip	*Push Drip		10-50 mg/mL	5-10 minutes 0.5 mg/kg/min or 2 mg/min *PHYSICIAN ONLY			2.5 mg/mL 10 mg/mL 20 mg/mL	DO NOT TITRATE	Dose: 1-2 mg/kg Usual: 0.5-2 mg/kg/hr Max: 3 mg/kg/hr (soft)	MAY REQUIRE MECHANICAL VENTILATION
ketorolac		Push	Push	undiluted	doses ≤ 30 mg 1-5 minutes					1 mg/kg/dose single dose or 0.5 mg/kg/dose Q6hr [30 mg]	BOXED WARNING Limit duration 48-72 hours (maximum 5 days) Monitor renal function and signs of bleeding
labetolol		Push Drip		undiluted	2-3 minutes 2 mg/min (max)			1 mg/mL 2 mg/mL 5 mg/mL	See Titration Protocol	Load: 0.2-1 mg/kg [20 mg] over 10 min Usual: 0.25-1 mg/kg/hour Max: 3 mg/kg/hr	
levetiracetam	IVPB	IVPB	IVPB	15 mg/mL	5-10 minutes emergently only	15 mg/mL	15 minutes			Load: 20-50 mg/kg [2,500 mg] Usual: 10 mg/kg [1000 mg]	IV to PO when able
levOCARNitine	TPN	Push IVPB Drip TPN	Push IVPB	undiluted	2-3 minutes	further diluted	10-20 minutes			Dose: 50 mg/kg NICU: 10-30 mg/kg/day (TPN)	TPN: YES
levoFLOXacin		IVPB	IVPB			5 mg/mL	60-90 minutes			8-10 mg/kg/dose Q12-24 hr	BOXED WARNING FR: Requires ID approval TPN: No

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				IV BOLUS (Push)		INTERMITTENT INFUSION (IVPB)		CONTINUOUS INFUSION (Drip)		***Administer Using Guardrails***	
Drug	NICU	PICU	PEDS	concentration	RATE	concentration	RATE	concentration	RATE	Usual Dose [adult max]	Nursing Considerations
levothyroxine	Push	Push Drip	Push	20 mcg/mL	2-3 minutes	n/a	n/a	organ donor	mcg/kg/hour	50-80% of oral dose	BOXED WARNING Compatible: NS only
linezolid	IVPB	IVPB	IVPB			2 mg/mL	30-120 minutes			10 mg/kg/dose Q8-12 hr [600 mg/dose or 1200 mg/day > 12 yrs.]	TPN: *2-in-1* only
LORazepam	Push	Push Drip	Push	1:1 with NS	2-5 minutes 0.025 mg/kg/minute 2 mg/min (max)	n/a	n/a	1 mg/mL	DO NOT TITRATE	0.05-0.1 mg/kg/dose [4 mg] [10 mg/hr]	BOXED WARNING MAY REQUIRE MECHANICAL VENTILATION Central Line Preferred Dilute 1:1 with D5W, NS or SWFI 0.22 micron filter for continuous infusion extravasation risk
magnesium sulfate	IVPB	IVPB	IVPB	200 mg/mL (maximum)	PALS	20 mg/mL	1-4 hours 30 minutes (status asthmaticus)			25-75 mg/kg/dose [2 g]	TPN: YES
mannitol		IVPB				200 mg/mL	20-30 minutes (ICP) 2-6 hours (renal)			0.5-1 g/kg/dose [50 g]	Central Line Preferred; use in-line filter TPN:YES
meropenem	IVPB	IVPB	IVPB	50 mg/mL	3-5 minutes	20 mg/mL	15-30 minutes 4 hours			10-40 mg/kg/dose [2 g] Q8-12hr	TPN: YES
methylprednisolone SUCCINATE	Push	Push IVPB	Push IVPB	4 mg/mL 40 mg/mL 125 mg/mL	< 2 mg/kg 3-15 minutes		≥ 2 mg/kg 30 minutes	n/a	n/a	Low: < 2 mg/kg [125 mg] Mod: ≥ 2 mg/kg [250 mg] High: ≥ 15 mg/kg [500 mg]	TPN: YES
metoclopramide	Push	Push	Push	undiluted	1-2 minutes					0.1 mg/kg/dose [10 mg]	BOXED WARNING TPN: YES
metroNIDAZOLE	IVPB	IVPB	IVPB			5 mg/mL	60 minutes			7.5-15 mg/kg/dose [4 g/day]	BOXED WARNING TPN: YES
midazolam	Push Drip	Push Drip	Push	undiluted	2 minutes 1 mg/min (max)	n/a	n/a	0.05 mg/mL 0.1 mg/mL 0.2 mg/mL 1 mg/mL 5 mg/mL	DO NOT TITRATE	Dose: 0.05 mg/kg [5 mg] CI Usual: 0.03-0.4 mg/kg/hr Max: 3 mg/kg/hr [10 mg/hr]	BOXED WARNING MAY REQUIRE MECHANICAL VENTILATION TPN: I/C (consult pharmacist)
milrinone	IVPB Drip	IVPB Drip				≤ undiluted	15-60 minutes	0.05 mg/mL 0.1 mg/mL 0.2 mg/mL 0.5 mg/mL 1 mg/mL	See Titration Protocol	Load: 50-75 mcg/kg Usual: 0.25-0.75 mcg/kg/minute Max: 1.2 mcg/kg/minute	TPN: *2-in-1* only
morphine	Push Drip	Push Drip PCA	Push PCA	2 mg/mL 5 mg/mL	5-10 minutes	0.5-5 mg/mL	15-30 minutes	0.05 mg/mL 0.1 mg/mL 0.25 mg/mL 0.5 mg/mL 1 mg/mL 2 mg/mL 5 mg/mL	DO NOT TITRATE	0.05-0.1 mg/kg/dose [10 mg] PICU CI Usual: 0.01-0.06 mg/kg/hr Max: 0.2 mg/kg/hr [10 mg/hr] NICU CI Usual: 5-20 mcg/kg/hr Max: 30 mcg/kg/hr	BOXED WARNING MAY REQUIRE MECHANICAL VENTILATION Check Reference for PCA Dose TPN: YES

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				IV BOLUS (Push)		INTERMITTENT INFUSION (IVPB)		CONTINUOUS INFUSION (Drip)		***Administer Using Guardrails***	
Drug	NICU	PICU	PEDS	concentration	RATE	concentration	RATE	concentration	RATE	Usual Dose [adult max]	Nursing Considerations
nafcillin	IVPB	Push IVPB	Push IVPB	50 mg/mL	5-10 minutes	50 mg/mL	30 minutes	n/a	n/a	50-100 mg/kg/day [2 g]	Avoid aminoglycosides by 1 hour; TPN: YES
nalaxone	Push	Push Drip	Push	undiluted	30 seconds			4 mcg/mL 8 mcg/mL	DO NOT TITRATE	Full reversal 0.1 mg/kg [2 mg] Usual: 0.001-0.005 mg/kg Max: [2 mg]	May further dilute in NS
niCARdipine	Drip	Drip						0.1 mg/mL 0.25 mg/mL 0.5 mg/mL 1 mg/mL	See Titration Protocol	Usual: 0.5-3 mcg/kg/min Max: 5 mcg/kg/min [15 mg/hr]	High Risk
nitroglycerin		Drip						0.1 mg/mL 0.2 mg/mL 0.4 mg/mL 1 mg/mL	See Titration Protocol	Usual: 0.5-3 mcg/kg/min Max: 5 mcg/kg/min [200 mcg/min]	TPN: YES
nitroprusside		Drip						0.1 mg/mL 0.2 mg/mL 0.4 mg/mL 1 mg/mL	See Titration Protocol	Usual: 0.5-3 mcg/kg/min Max: 4 mcg/kg/min [10 mcg/kg/min x10 mins]	BOXED WARNING Monitor CYANIDE Levels TPN: YES
norepinephrine	Drip	Drip						32 mcg/mL 200 mcg/mL 600 mcg/mL	See Titration Protocol	Usual: 0.05-0.1 mcg/kg/min Max: 2 mcg/kg/min [50 mcg/min]	BOXED WARNING Antidote = phentolamine Extravasation: Central Line Prefered TPN: YES
ondansetron		Push	Push	undiluted	2-5 minutes					0.1-0.15 mg/kg/dose [4 mg]	TPN: *2-in-1* only
pantoprazole		Push IVPB	Push IVPB	4 mg/mL	2 minutes	0.4-0.8 mg/mL	15 minutes			0.5-1.8 mg/kg/dose [80 mg/dose]	Compatible: DSW, LR, NS TPN: No
penicillin G (parenteral)	IVPB	IVPB	IVPB			60,000 unit/mL	15-30 minutes			Usual 100,000-300,000 unit/kg/day	TPN: YES
PENTobarbital	Drip	IVPB DRIP				50 mg/mL	10-30 minutes	8 mg/mL 50 mg/mL	DO NOT TITRATE	Load: 10-20 mg/kg/dose over 10-30 min Usual: 1-2 mg/kg/hour	MAY REQUIRE MECHANICAL VENTILATION Monitor BP, HR and RR closely
PHENobarbital	Push IVPB	Push IVPB	Push IVPB	undiluted	3-5 minutes (max 1 mg/kg/min or 30 mg/min)	≤ 130 mg/mL	LD: 30-60 min			Load: 10-40 mg/kg over 30-60 min Usual: 5 mg/kg/day Q12-24 hr Max: 1000 mg/dose	Serum Level: 15-40 mcg/mL TPN: *2-in-1* only
phenytoin	IVPB	IVPB	IVPB	n/a		50 mg/mL or ≥ 5 mg/mL in NS	1-3 mg/kg/min 50 mg/min whichever slower	n/a		Load: 10-20 mg/kg/dose [1000 mg] Usual: 4-8 mg/kg/day Q8-12hr [100 mg]	BOXED WARNING Hazardous (NIOSH 2016 [group 2]) Large vein via infusion pump; continuous cardiac monitoring; If further diluted, must use 0.22-0.55 micron filter
phosphate	IVPB TPN	IVPB TPN	IVPB TPN			0.04 mM/mL (P) 0.27 mM/mL (C)	4-6 hours (mild) 8-12 hours (severe)			See Electrolyte Infusion Guideline	TPN: I/C call pharmacy Avoid Calcium containing solutions (LR)
phytonadione		IVPB					15-30 minutes			0.03 mg/kg [5 mg] fixed dosing: 2.5-5 mg	Oral route prefered
piperacillin/tazobactam	IVPB	IVPB	IVPB	n/a	n/a	60 mg/mL	30 minutes	n/a		80-100 mg piperacillin/kg/dose [4 g]	dosing based on piperacillin component; TPN: YES

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				IV BOLUS (Push)		INTERMITTENT INFUSION (IVPB)		CONTINUOUS INFUSION (Drip)		***Administer Using Guardrails***	
Drug	NICU	PICU	PEDS	concentration	RATE	concentration	RATE	concentration	RATE	Usual Dose [adult max]	Nursing Considerations
potassium	IVPB TPN	IVPB TPN	IVPB TPN	n/a	n/a	0.1 mEq/mL (P) 0.4 mEq/mL (C)	0.25 mEq/kg/hr 10 mEq/hr (P)	80 mEq/L (P)	continuous	See Electrolyte Infusion Guideline	Consider POTASSIUM from all sources TPN: YES
propofol		Push* Drip		10 mg/mL	20-30 seconds ***Qualified personnel only**	*n/a	n/a	10 mg/mL	See Titration Protocol	Mechanical Ventilation Required Initial: 5 mcg/kg/min Max: 50 mcg/kg/min	MAY REQUIRE MECHANICAL VENTILATION Caution: requires renewal Q24 hr (PRIS); ALERT: egg or soy allergy TPN: *2-in-1* only
RIFAMPin	IVPB	IVPB	IVPB			6 mg/mL	30-60 minutes			10-20 mg/kg/day Q12-24hr [600 mg/dose or 900 mg/day]	TPN: No
sodium bicarbonate	Push IVPB	Push IVPB Drip	PALS	0.5 mEq/mL 1 mEq/mL	5 min (max 0.3 mEq/kg/hr in infants)		4-8 hours			1-2 mEq/kg [50 mEq]	TPN: I/C (Avoid)
terbutaline		Push IVPB Drip		undiluted	5-10 minutes	0.5 mg/mL	15-30 minutes	0.1 mg/mL 0.25 mg/mL 0.5 mg/mL 1 mg/mL	DO NOT TITRATE	Load: 5-10 mcg/kg [20 mcg/kg] Usual: 0.1-5 mcg/kg/min Max: 10 mcg/kg/min	
valproic acid		Push IVPB	IVPB		5 minutes (IVPB Preferred)	10 mg/mL	60 minutes			Convert PO dose/day 1:1 divided Q6hr (strict NPO use only)	Risk for hepatotoxicity
vancomycin	IVPB	IVPB	IVPB	n/a	n/a	5 mg/mL	60-90 minutes	5 mg/mL	over 24 hours	10-20 mg/kg [4 g/day initial]	phlebitis/extravasation; monitor renal function; timing critical for levels TPN:YES
vasopressin	Drip	Drip	PALS	20 unit/mL	rapid 1-2 seconds			0.01 unit/mL 0.2 unit/mL 0.4 unit/mL 1 unit/mL	See Titration Protocol	Check reference for specific dosing Units vary by indication and age (milliunit/kg/hr, unit/hr, millimunits/kg/min; unit/min)	Extravasation: Central Line Prefered TPN: NO
vecuronium	Push Drip	Push Drip		1 mg/mL	rapid 1-2 seconds			0.5 mg/mL 1 mg/mL	DO NOT TITRATE	Bolus: 0.1 mg/kg Usual: 0.01-0.1 mg/kg/hr Max: 0.2 mg/kg/hour [1.7 mcg/kg/min]	High Risk-PARALYZING AGENT PRECAUTION! DDI: aminoglycosides may prolong effect TPN: *2-in-1* only
zidovudine	IVPB	IVPB	IVPB			2 mg/mL	30 minutes			1.5-3 mg/kg/dose [600 mg/day]	HAZARDOUS PRECAUTIONS (NIOSH 2014 [GROUP 2])

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Abbreviations:		
	DDI: Drug-Drug Interaction	NIOSH: National Institute for Occupational Safety and Health
	I/C: Incompatible/compatible (variable results favors incompatible)	TPN 2-in-1: Total Parenteral Nutrition containing dextrose and protein *without* fat
	Max: Maximum	TPN 3-in-1: Total Parenteral Nutrition containing dextrose, protein and fat

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Pediatric ICU STANDARD DRIPS and Titration Protocol

MEDICATION	CONCENTRATION	AMOUNT	FLUID	RATE	SUGGESTED DOSING [Adult Maximum]	Titration and Weaning*
amiodarone	1,800 mcg/mL	90 mg/50 mL	D5W	ⓘ	Load: 5 mg/kg (300 mg) over 5-60 min Usual: 5-10 mcgkg/min Maximum: 15 mcg/kg/min	DO NOT TITRATE
		360 mg/200 mL	PREMIX			
dexmedetomidine	4 mcg/mL	200 mcg/50 mL	NS	ⓘ	Load: 0.5-1 mcg/kg/dose Usual: 0.2-0.7 mcg/kg/hour Maximum: 1 mcg/kg/hour	DO NOT TITRATE
	8 mcg/mL	400 mcg/50 mL		ⓘ		
DOBUTamine	0.5 mg/mL	25 mg/50 mL	D5W or NS	ⓘ	Initial: 5 mcg/kg/min Usual: 5-20 mcg/kg/min Max: 20 mcg/kg/min [30]	Titrate: 2 mcg/kg/min Q5 min (specify range MAP or SBP)* Wean: 2 mcg/kg/min Q30 min
	1 mg/mL	50 mg/50 mL		ⓘ		
	2 mg/mL	100 mg/50 mL		ⓘ		
	8 mg/mL	400 mg/50 mL		ⓘ		
DOPamine	0.8 mg/mL	40 mg/50 mL	D5W or NS	ⓘ	Low: 1-5 mcg/kg/min (renal) Moderate: 5-15 mcg/kg/min High: > 15 mcg/kg/min (alpha) Maximum: 20 mcg/kg/min	Titrate: 2 mcg/kg/min Q5 min (specify range MAP or SBP)* Wean: 2 mcg/kg/min Q30 min
	1.6 mg/mL	80 mg/50 mL		ⓘ		
	3.2 mg/mL	160 mg/50 mL		ⓘ		
	6.4 mg/mL	320 mg/50 mL		ⓘ		
EPINEPHrine	10 mcg/mL	0.5 mg/50 mL	D5W or NS	ⓘ	Usual dose: 0.02-1 mcg/kg/min Maximum: 1 mcg/kg/min [10 mcg/min]	Titrate: 0.05 mcg/kg/min Q5 min (specify range MAP or SBP)* Wean: 0.05 mcg/kg/min Q30 min
	25 mcg/mL	1.25 mg/50 mL		ⓘ		
	50 mcg/mL	2.5 mg/50 mL		ⓘ		
	200 mcg/mL	10 mg/50 mL		ⓘ		
	400 mcg/mL	20 mg/50 mL		ⓘ		
esmolol	10 mg/mL	500 mg/50 mL	PREMIX	ⓘ	Initial: HTN: 25 mcg/kg/min SVT: 200 mcg/kg/min usual: 50-250 mcg/kg/min Max: 500 mcg/kg/min	Titrate: 25 mcg/kg/min Q5 min (specify range HR or SBP)* Notify Prescriber ≥ 250 mcg/kg/min Wean: 50 mcg/kg/min Q30 min
	10 mg/mL	200 mL	PREMIX			
	20 mg/mL	1000 mg/50 mL	NS	ⓘ		
fentaNYL	5 mcg/mL	250 mcg/50 mL	D5W or NS	ⓘ	Usual: 2-7 mcg/kg/hour Maximum: 7 mcg/kg/hour	DO NOT TITRATE
	10 mcg/mL	500 mcg/50 mL		ⓘ		
		1000 mcg/100 mL	PREMIX			
	25 mcg/mL	1250 mcg/50 mL	D5W or NS	ⓘ		
	40 mcg/mL	2000 mcg/50 mL		ⓘ		
furosemide	0.5 mg/mL	25 mg/50 mL	NS or D5W	ⓘ	Usual: 0.05-0.4 mg/kg/hour Max: 1 mg/kg/hour [40 mg/hr]	DO NOT TITRATE
	1 mg/mL	50 mg/50 mL		ⓘ		
	2 mg/mL	100 mg/50 mL		ⓘ		
	5 mg/mL	250 mg/50 mL		ⓘ		
	10 mg/mL	500 mg/50 mL	Straight	ⓘ		
Heparin	100 unit/mL	5000 unit/50 mL	D5W	ⓘ	Usual: 10-25 unit/kg/hour Maximum: [initial 1800 unit/hour]	TITRATE PER PROTOCOL
	100 unit/mL	25000 unit/250 mL	PREMIX			
HYDROmorphone	0.5 mg/mL	25 mg/50 mL	D5W	ⓘ	Usual: 5-25 mcg/kg/hour Max: 25 mcg/kg/hour	CAUTION OPIATE NAÏVE DO NOT TITRATE
	1 mg/mL	50 mg/50 mL	D5W or NS	ⓘ		
insulin	1 unit/mL	50 unit/50 mL	NS	ⓘ	Usual: 0.05-0.1 unit/kg/hr Caution: rate > 5 unit/hr or BG < 150	DO NOT TITRATE (for Pediatric DKA)
	1 unit/mL	100 unit/100 mL				
Ketamine	2.5 mg/mL	125 mg/50 mL	NS or D5W	ⓘ	Load: 1-2 mg/kg/dose over 5 mins Usual: 1-2 mg/kg/hour Max: 3 mg/kg/hour (soft)	DO NOT TITRATE
	10 mg/mL	500 mg/50 mL		ⓘ		
	20 mg/mL	1000 mg/50 mL		ⓘ		
labetolol	1 mg/mL	50 mg/50 mL	D5W	ⓘ	Load: 0.2-1 mg/kg [20 mg] 10 min Usual: 0.25-1 mg/kg/hour Max: 3 mg/kg/hour [4 mg/min]	Titrate: 0.25 mg/kg/hr Q15 min (specify range MAP or SBP)* Wean: 0.25 mg/kg/hr Q30 min
	2 mg/mL	100 mg/50 mL		ⓘ		
	5 mg/mL	250 mg/50 mL		ⓘ		
midazolam	0.1 mg/mL	5 mg/50 mL	NS or D5W	ⓘ	Usual: 0.05-0.1 mg/kg/hour Max: 0.4 mg/kg/hour [10 mg/hr]	DO NOT TITRATE
	0.2 mg/mL	10 mg/50 mL		ⓘ		
	1 mg/mL	50 mg/50 mL		ⓘ		
		100 mg/100 mL	PREMIX NS			
	2 mg/mL	100 mg/50 mL	NS or D5W	ⓘ		
	5 mg/mL	250 mg/50 mL		ⓘ		
milrinone	0.1 mg/mL	10 mg/50 mL	NS	ⓘ	Load: 50 mcg/kg over 15 min Usual: 0.25-0.75 mcg/kg/min Max: 1.2 mcg/kg/min [0.78 mcg/kg/min]	DO NOT TITRATE
	0.2 mg/mL	10 mg/50 mL		ⓘ		
	0.5 mg/mL	25 mg/50 mL		ⓘ		
	1 mg/mL	50 mg/50 mL	Straight	ⓘ		
morphine	0.5 mg/mL	25 mg/50 mL	NS or D5W	ⓘ	Usual: 0.05-0.1 mg/kg/hour Max: 0.4 mg/kg/hour [10 mg/hr]	DO NOT TITRATE
	1 mg/mL	50 mg/50 mL		ⓘ		
		100 mg/100 mL	PREMIX D5W			
	2 mg/mL	100 mg/50 mL	NS or D5W	ⓘ		
	5 mg/mL	250 mg/50 mL		ⓘ		

MEDICATION	CONCENTRATION	AMOUNT	FLUID	RATE	SUGGESTED DOSING [Adult Maximum]	Titration and Weaning*
niCARdipine	0.1 mg/mL	5 mg/50 mL	D5W or NS	ⓘ	Usual: 0.5-3 mcg/kg/min Max: 5 mcg/kg/min [15 mg/hr]	Titrate: 0.5 mcg/kg/min Q5 min (specify range MAP or SBP)* Wean off: 0.5 mcg/kg/min Q30 min
	0.25 mg/mL	12.5 mg/50 mL		ⓘ		
	0.5 mg/mL	25 mg/50 mL		ⓘ		
	1 mg/mL	50 mg/50 mL		ⓘ		
nitroglycerin	0.1 mg/mL	5 mg/50 mL	D5W or NS	ⓘ	Usual: 0.5-3 mcg/kg/min Max: 5 mcg/kg/min[200 mcg/min]	Titrate: 0.5 mcg/kg/min Q5 min (specify range MAP or SBP)* Wean off: 0.5 mcg/kg/min Q30 min
	0.2 mg/mL	10 mg/50 mL		ⓘ		
	0.4 mg/mL	20 mg/50 mL		ⓘ		
	1 mg/mL	50 mg/50 mL		ⓘ		
nitroprusside	0.1 mg/mL	5 mg/50 mL	D5W or NS	ⓘ	Usual: 0.5-3 mcg/kg/min Max: rarely need >4 mcg/kg/min [10 mcg/kg/min x10 min]	Monitor Cyanide Levels Titrate: 0.5 mcg/kg/min Q5 min (specify range MAP or SBP)* Wean off: 0.5 mcg/kg/min Q30 min
	0.2 mg/mL	10 mg/50 mL		ⓘ		
	0.4 mg/mL	20 mg/50 mL		ⓘ		
	1 mg/mL	50 mg/50 mL		ⓘ		
norepinephrine	32 mcg/mL	1.6 mg/50 mL	D5W or NS	ⓘ	Usual dose: 0.02-1 mcg/kg/min Max: 1 mcg/kg/min [50 mcg/min]	Titrate: 0.05 mcg/kg/min Q5 min (specify range MAP or SBP)* Wean: 0.05 mcg/kg/min Q30 min
	200 mcg/mL	10 mg/50 mL		ⓘ		
	600 mcg/mL	30 mg/50 mL		ⓘ		
PENTobarbital	2 mg/mL	100 mg/50 mL	NS	ⓘ	Usual: 0.5-2 mg/kg/hour Max: 5 mg/kg/hour	DO NOT TITRATE
	4 mg/mL	200 mg/50 mL				
	5 mg/mL	250 mg/50 mL				
	8 mg/mL	400 mg/50 mL				
phenylephrine	40 mcg/mL	2 mg/50 mL	D5W or NS	ⓘ	Usual: 0.02-0.1 mcg/kg/min Max: 1 mcg/kg/min	Titrate: 0.05 mcg/kg/min Q5 min (indicate parameter) Wean: 0.05 mcg/kg/min Q30 min
	160 mcg/mL	8 mg/50 mL		ⓘ		
	400 mcg/mL	20 mg/50 mL		ⓘ		
propofol	10 mg/mL	500 mg/50 mL	PREMIX	ⓘ	Usual: 0-50 mcg/kg/min Max: 50 mcg/kg/min; PRIS ≤ 48 hr	Titrate: 5 mcg/kg/min Q5 min to RASS
terbutaline	0.1 mg/mL	5 mg/50 mL	NS	ⓘ	Load: 5-10 mcg/kg Usual: 0.4-6 mcg/kg/min Max: 10 mcg/kg/min	DO NOT TITRATE
	0.25 mg/mL	12.5 mg/50 mL		ⓘ		
	0.5 mg/mL	25 mg/50 mL		ⓘ		
	1 mg/mL	50 mg/50 mL	Straight	ⓘ		
vasopressin DI diabetes insipidus < 40 kg	0.2 unit/mL	10 unit/50 mL	NS or D5W	ⓘ	Initial: 1 milliunit/kg/hr Usual: 0.5-1 milliunit/kg/hr Max: 10 milliunit/kg/hr	Double or half dose Q60 min to goal
	0.4 unit/mL	20 unit/50 mL		ⓘ		
	1 unit/mL	50 unit/50 mL		ⓘ		
vasopressin DI diabetes insipidus ≥ 40kg	1 unit/mL	50 unit/50 mL	NS or D5W	ⓘ	Usual: 2.5-4 unit/hour Max: convert usual daily requirement to hourly rate	Double or half dose Q60 min to goal
vasopressin shock < 25 kg	0.2 unit/mL	10 unit/50 mL	NS or D5W	ⓘ	Initial: 0.2 milliunit/kg/min Usual: 0.5-2 milliunit/kg/min Max: > 2 milliunit/kg/min (shows no	DO NOT TITRATE
	0.4 unit/mL	20 unit/50 mL		ⓘ		
	1 unit/mL	50 unit/50 mL		ⓘ		
vasopress shock ≥ 25 kg	0.2 unit/mL	10 unit/50 mL	NS or D5W	ⓘ	Usual: 0.01-0.04 unit/min Max: 0.04 unit/min	DO NOT TITRATE
	0.4 unit/mL	20 unit/50 mL		ⓘ		
	1 unit/mL	50 unit/50 mL		ⓘ		
vecuronium	0.5 mg/mL	25 mg/50 mL	D5W (SWFI)	ⓘ	Bolus: 0.1 mg/kg over seconds Usual: 0.05-0.1 mg/kg/hour Max: 0.2 mg/kg/hour	DO NOT TITRATE
	1 mg/mL	50 mg/50 mL		ⓘ		
	2 mg/mL	100 mg/50 mL		ⓘ		

Unless otherwise specified, all drips are prepared final volume 50 mL in 60 mL syringe

PEDIATRIC PROTOCOL FOR SYSTEMIC HEPARIN ADJUSTMENT

To be used after initial loading dose and maintenance I.V. infusion dose to maintain APTT of 60-80 seconds (assuming this reflects antifactor Xa level of 0.3-0.7)
Usual starting dose:

- < 1 year old: 28 unit/kg/hour
- ≥ 1 year old: 20 unit/kg/hour

Obtain blood for APTT 4 hours after heparin loading dose and 4 hours after every infusion rate change

Obtain daily CBC and APTT after APTT is therapeutic

APTT (seconds)	Dosage Adjustment	Time to repeat APTT
< 50	Give 50 unit/kg bolus and increase infusion rate by 10%	4 hours after rate change
50-59	Increase infusion rate by 10%	4 hours after rate change
60-80	Keep same rate	Next day
81-95	Decrease infusion rate by 10%	4 hours after rate change
96-120	Hold infusion for 30 minutes and decrease infusion rate by 10%	4 hours after rate change
> 120	Hold infusion for 60 minutes and decrease infusion rate by 15%	4 hours after rate change

Modified from Monagle P, Michelson AD, Bovill E, et al, "Antithrombotic Therapy in Children," Chest, 2001, 119:344S-70S

Neonatal ICU STANDARD DRIPS and Titration Protocol

MEDICATION	CONCENTRATION	AMOUNT	FLUID	RATE	SUGGESTED DOSING [Maximum]	Titration and Weaning*
Alprostadil	5 mcg/mL	125 mcg/25 mL	D5W	ⓘ	Usual: 0.05-0.1 mcg/kg/min	DO NOT TITRATE
	10 mcg/mL	250 mcg/25 mL		ⓘ	Max: 0.4 mcg/kg/min	
Amiodarone	1 mg/mL	25 mg/25 mL	NS or D5W	ⓘ	Usual: 5-10 mcg/kg/min	DO NOT TITRATE
	1.8 mg/mL	45 mg/25 mL		ⓘ	Max: 15 mcg/kg/min	
DOBUTamine	600 mcg/mL	15 mg/25 mL	D5W	ⓘ	Usual: 5 mcg/kg/min Max: 20 mcg/kg/min	Parameter: MAP -Range- Titrate: 2 mcgkg/min Q15 min Wean: 1 mcg/kg/min Q60 min
	800 mcg/mL	20 mg/25 mL		ⓘ		
	1600 mcg/mL	40 mg/25 mL		ⓘ		
DOPamine	600 mcg/mL	15 mg/25 mL	D5W	ⓘ	Usual: 3-5 mcg/kg/min Max: 20 mcg/kg/min	Paramater: MAP -Range- Titrate: 2 mcgkg/min Q15 min Wean: 1 mcg/kg/min Q60 min
	800 mcg/mL	20 mg/25 mL		ⓘ		
	1600 mcg/mL	40 mg/25 mL		ⓘ		
EPINEPHrine	10 mcg/mL	0.25 mcg/25 mL	D5W	ⓘ	Usual: 0.05-0.3 mcg/kg/min Max: 1 mcg/kg/min	Parameter: MAP -Range- Titrate: 0.1 mcg/kg/min Q15 min Wean: 0.05 mcg/kg/min Q60 min
	25 mcg/mL	0.625 mg/25 mL		ⓘ		
	50 mcg/mL	1.25 mg/25 mL		ⓘ		
esmolol	10 mg/mL	250 mg/25 mL	PREMIX NS	ⓘ	Usual: HTN: 50-250 mcg/kg/minute SVT: 200 mcg/kg/min Maximum: HTN: 500 mcg/kg/minute, SVT: 1,000 mcg/kg/min	Paramater: HR or MAP -Range- Titrate: 25-50 mcgkg/min Q15 min Wean: 50 mcg/kg/min Q60 min
	20 mg/mL	500 mg/25 mL	NS	ⓘ		
fentaNYL	2 mcg/mL	50 mcg/25 mL	D5W or NS	ⓘ	Usual: 2-5 mcg/kg/hr Max: 7 mcg/kg/hr (to effect)	DO NOT TITRATE
	5 mcg/mL	125 mcg/25 mL		ⓘ		
	10 mcg/mL	250 mcg/25 mL		ⓘ		
	25 mcg/mL	625 mcg/25 mL		ⓘ		
	40 mcg/mL	1000 mcg/25 mL		ⓘ		
Insulin Regular	0.05 unit/mL	1.25 unit/25 mL	D5W	ⓘ	Usual: 0.02-0.1 unit/kg/hr Max: 0.2 unit/kg/hr or BS ≤ 180 mg/dL	DO NOT TITRATE Nofify prescriber BS ≤ 250; stop if BS ≤ 180
midazolam	0.05 mg/mL	1.25 mg/25 mL	D5W or NS	ⓘ	Usual: 0.01-0.05 mg/kg/hr	DO NOT TITRATE
	0.1 mg/mL	2.5 mg/25 mL		ⓘ		
	0.2 mg/mL	5 mg/25 mL		ⓘ		
milrinone	50 mcg/mL	1.25 mg/25 mL	D5W or NS	ⓘ	Load: 50 mcg/kg over 15 min Usual: 0.25-0.75 mcg/kg/min Max: 1.2 mcg/kg/min	DO NOT TITRATE
	100 mcg/mL	2.5 mg/25 mL		ⓘ		
	200 mcg/mL	5 mg/25 mL		ⓘ		
	500 mcg/mL	12.5 mg/25 mL		ⓘ		
morphine	50 mcg/mL	1.25 mg/25 mL	D5W	ⓘ	Bolus: 50 mcg/kg/dose Usual: 5-20 mcg/kg/hour Max: 30 mcg/kg/hr [soft]	DO NOT TITRATE
	100 mcg/mL	2.5 mg/25 mL				
	250 mcg/mL	6.25 mg/25 mL				
vecuronium	0.5 mg/mL	12.5 mg/25 mL	D5W	ⓘ	Bolus: 0.01 mg/kg Usual: 0.01-0.07 mg/kg/hr Max: 0.18 mg/kg/hr	DO NOT TITRATE
	1 mg/mL	25 mg/25 mL		ⓘ		

All drips are prepared final volume 25 mL in 30 mL syringe

* Titration orders require complete dosing parameters: criteria/goal, initial dose, titration dose, titration frequency, and maximum dose

RIVERSIDE UNIVERSITY HEALTH SYSTEM MEDICAL CENTER
HOUSEWIDE

	Document No: 848	Page 1 of 8
Title: Automatic Substitutions for Adult Inpatients	**Effective Date:** 10/1/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By:  Jennifer Cruikshank CEO/ Hospital Director		☐ Policy ☒ Procedure ☐ Guideline

1. SCOPE

1.1 The scope of these procedures include the drugs for automatic substitution by pharmacists at the Riverside University Health System – Medical Center and the Riverside University Health System – Behavioral Health.

2. PROCEDURES

2.1 Procedures for automatic substitution.

a. The Pharmacy and Therapeutics Committee (P&T) will provide formulary guidelines for various classes of pharmaceuticals.

b. Prescribers may exclude orders from this policy if clinically indicated. For all orders to be excluded, prescriber must add "DO NOT SUBSTITUTE" to order.

c. This auto-substitution policy is only applicable in the ADULT inpatient population.

d. Auto-substitution provides standardized, safe and appropriate, clinically effective, and cost effective use of pharmaceuticals.[1]

e. The dosage conversion tables or listed therapeutic substitution lists have comparable doses based on therapeutic interchange studies, comparative clinical studies, and manufacturers' recommended dosing.

f. According to the dosage conversion tables or listed therapeutic substitution lists in this policy, pharmacists will automatically substitute P&T Committee approved medications.

g. The new order will be entered into the Pharmacy System. The "Administration Instructions" section will read: "P and T Approved Autosub for:_____".

   i. Example: Physician orders Simvastatin 40mg PO at bedtime. Pharmacist will enter the medication as Atorvastatin 20mg PO at bedtime, with Administration Instructions: P and T Approved Autosub for Simvastatin 40 mg at bedtime.

h. The medication label will contain the administration instructions, as defined above. This information will also be evident if a nurse pulls the medication from Pyxis®.

APPENDIX 1. INSULIN AUTOMATIC SUBSTITUTION

Drug Ordered	**Drug for Substitution**
Insulin, aspart (NovoLOG®)	Insulin, Lispro (HumaLOG®)
Insulin, glulisine (Apidra®)	

APPENDIX 2. H2-RECEPTOR ANTAGONIST AUTOMATIC SUBSTITUTION

2. Table 1. ORAL H2-RECEPTOR ANTAGONIST DOSAGE CONVERSIONS[2]

Drug Ordered			**Famotidine Dose for Substitution**
Cimetidine	Nizatidine	RaNITIdine	
100 mg PO BID	75 mg PO BID	75 mg PO BID	10 mg PO BID
300 mg PO QHS	150 mg PO QHS	150 mg PO QHS	20 mg PO QHS
400 mg PO QHS	---	---	
300 mg PO BID – 4x/DAY	150 mg PO BID	150 mg PO BID	20 mg PO BID
400 mg PO BID – 4x/DAY	---	---	
800 mg PO QHS	300 mg PO QHS	300 mg PO QHS	40 mg PO QHS

2. Table 2. INTRAVENOUS H2-RECEPTOR ANTAGONIST DOSAGE CONVERSIONS[3]

Drug Ordered		**Famotidine Dose for Substitution**
Cimetidine	RaNITIdine	
300 mg IVPB Q24H	50 mg IVPB Q24H	20 mg IV push Q24H
300 mg IVPB Q12H or Q6H	50 mg IVPB Q12H or Q8H	20 mg IV push Q12H
900 mg/24 hour infusion	150 mg/24 hour infusion	40 mg/24 hour infusion

APPENDIX 3. PROTON PUMP INHIBITOR AUTOMATIC SUBSTITUTION

3. Table 1. ORAL PROTON PUMP INHIBITORS DOSAGE CONVERSIONS[4,5]

Drug Ordered					**Pantoprazole Dose for Substitution**
Dexlansoprazole (Dexilant®)	Esomeprazole	Lansoprazole	Omeprazole	RABEprazole	
30 mg	20 mg	15 mg	10 – 20 mg	---	20 mg
60 mg	40 mg	30 mg	40 mg	20 mg	40 mg

3. Table 2. INTRAVENOUS PROTON PUMP INHIBITORS DOSAGE CONVERSIONS[6,7]

Drug Ordered	**Pantoprazole Dose for Substitution**
Esomeprazole 40 mg	Pantoprazole 40 mg
Esomeprazole 8 mg/hour	Pantoprazole 8 mg/hour

APPENDIX 4. INHALED CORTICOSTEROID (ICS) AUTOMATIC SUBSTITUTION[8]

Drug ordered			Drug for Substitution
Budesonide (Pulmicort®)	Mometasone (Asmanex®)	Beclomethasone (QVAR®)/ Beclomethasone HFA (QVAR® Redihaler™)	**Fluticasone HFA (Flovent®)**
-----	110 mcg daily	40 mcg BID	**44 mcg BID**
180 mcg BID	220 mcg daily	80 mcg BID	**88 mcg BID**
-----	-----	120 mcg BID	**132 mcg BID**
360 mcg BID	-----	160 mcg BID	**176 mcg BID**
540 mcg BID	440 mcg daily	240 mcg BID	**220 mcg BID**
720 mcg BID	-----	320 mcg BID	**440 mcg BID**

APPENDIX 5. COMBINATION ICS/LABA AUTOMATIC SUBSTITUTION[8,9,10]

Drug Ordered			Drug for Substitution
Budesonide/Formoterol (Symbicort®)	Fluticasone/Salmeterol (Advair® Diskus™)	Mometasone/Formoterol (Dulera®)	**Fluticasone/Salmeterol (Advair® HFA™)**
80/4.5 mcg 2 puffs BID	100/50 mcg 1 puff BID	-----	**45/21 mcg 2 puff BID**
160/4.5 mcg 2 puffs BID	250/50 mcg 1 puff BID	100/5 mcg 2 puffs BID	**115/21 mcg 2 puff BID**
-----	500/50 mcg 1 puff BID	200/5 mcg 2 puffs BID	**230/21 mcg 2 puff BID**

NOTE: Fluticasone/Vilanterol (BreoEllipta) also on formulary.

APPENDIX 6. MACROBID AUTOMATIC SUBSTITUTION[11,12]

Drug Ordered	Drug for Substitution
Macrodantin® 100 mg PO Four Times Daily	Macrobid® 100 mg PO BID

APPENDIX 7. HMG-CoA REDUCTASE INHIBITOR ("STATIN") AUTOMATIC SUBSTITUTION[13,14]

Comparable dose based on expected LDL-C reduction

Drug Ordered							Drug for Substitution
Pitavastatin (Livalo®)	Fluvastatin (Lescol®)	Lovastatin (Mevacor®)	Pravastatin (Pravachol®)	Simvastatin (Zocor®)	Rosuvastatin (Crestor®)	Simvastatin/ Ezetimibe (Vytorin®)	
1 mg	40 mg	20 mg	20 mg	10 mg	--	--	**Pravastatin 20 mg QHS**
2 mg	80 mg	40 mg	40 mg	20 mg	--	--	**Atorvastatin 10 mg DAILY**
4 mg	--	80 mg	80 mg	40 mg	5 mg	10/10 mg	**Atorvastatin 20 mg DAILY**
--	--	--	--	80 mg	10 mg	10/20 mg	**Atorvastatin 40 mg DAILY**
--	--	--	--	--	20 mg	10/40 mg	**Atorvastatin 80 mg DAILY**
--	--	--	--	--	40 mg	10/80 mg	**Contact physician to consider Atorvastatin 80 mg DAILY if appropriate, or to request by non-formulary process.**

APPENDIX 8. ANGIOTENSIN CONVERTING ENZYME (ACE) INHIBITOR AUTOMATIC SUBSTITUTION[15]

Drug Ordered								Drug for Substitution
Trandolapril (Mavik®)	Ramipril (Altace®)	Quinapril (Accupril®)	Perindopril (Aceon®)	Moexipril (Univasc®)	Lisinopril (Prinivil®, Zestril®)	Fosinopril (Monopril®)	Enalapril (Vasotec®)	**Benazepril (Lotensin®)**
0.5 mg DAILY	1.25 mg DAILY	5 mg DAILY	2 mg DAILY	3.75 mg DAILY	5 mg DAILY	--	5 mg DAILY	**5 mg DAILY**
1 mg DAILY	2.5 mg DAILY or divided BID	10 mg DAILY	4 mg DAILY or divided BID	7.5 mg DAILY or divided BID	10 mg DAILY or divided BID	10 mg DAILY or divided BID	10 mg DAILY or divided BID	**10 mg DAILY**
2 mg DAILY	5 mg DAILY or divided BID	20 mg DAILY or divided BID	8 mg DAILY or divided BID	15 mg DAILY or divided BID	20 mg DAILY or divided BID	20 mg DAILY or divided BID	20 mg DAILY or divided BID	**20 mg DAILY or divided BID***
4 mg DAILY	10 mg DAILY or divided BID	40 mg DAILY or divided BID	16 mg DAILY or divided BID	30 mg DAILY or divided BID	40 mg DAILY or divided BID	40 mg DAILY or divided BID	40 mg DAILY or divided BID	**40 mg DAILY or divided BID***
4 mg BID	20 mg DAILY or divided BID	80 mg DAILY or divided BID	---	60 mg DAILY or divided BID	80 mg DAILY or divided BID	80 mg DAILY or divided BID	---	**80 mg DAILY or divided BID***

*New order will be given the same frequency as the original order.

APPENDIX 9. ANGIOTENSIN RECEPTOR BLOCKER (ARB) AUTOMATIC SUBSTITUTION[16]

Drug Ordered						**Drug for Substitution**
Valsartan (Diovan®)	Telmisartan (Micardis®)	Olmesartan (Benicar®)	Irbesartan (Avapro®)	Eprosartan (Teveten®)	Candesartan (Atacand®)	**Losartan (Cozaar®)**
40 mg DAILY or divided BID	20 mg DAILY	10mg DAILY	75 mg DAILY	400 mg DAILY	4 mg DAILY	**25 mg DAILY**
80 mg Daily or divided BID	40 mg DAILY	20 mg DAILY	150 mg DAILY	600 mg DAILY	8 mg DAILY or divided BID	**50 mg DAILY or divided BID***
160 mg DAILY	80 mg DAILY	40 mg DAILY	300 mg DAILY	800 mg DAILY or divided BID	16 mg DAILY or divided BID	**100 mg DAILY or divided BID***

*New order will be given the same frequency as the original order.

APPENDIX 10: DEPAKOTE AUTOMATIC SUBSTITUTION[17]

Drug Ordered	Drug for Substitution
Depakote® DR (divalproex sodium delayed-release) **Total Daily Dose (mg)**	**Depakote® ER (mg)** (divalproex sodium extended-release) **Total Daily Dose (mg)**
500-625	750
750-875	1000
1000-1125	1250
1250-1375	1500
1500-1625	1750
1750	2000
1875-2000	2250
2125-2250	2500
2375	2750
2500-2750	3000
2875	3250
3000-3125	3500

All adult patients on Depakote® will be converted to once daily at bedtime Depakote ER® unless indicated by the prescribing physician. For total daily doses below 500mg or above 3125mg of Depakote®, the prescriber will be contacted regarding the conversion.

Depakote Sprinkles and Valproic acid are available for patients who are unable to take Depakote ER® (i.e. patients with NG tubes).

APPENDIX 11: PHENOBARBITAL AUTOMATIC SUBSTITUTION

Drug Ordered	Drug for Substitution
Phenobarbital 15 mg	**Phenobarbital 16.2 mg**
Phenobarbital 30 mg	**Phenobarbital 32.4 mg**
Phenobarbital 60 mg	**Phenobarbital 64.8 mg**
Phenobarbital 100 mg	**Phenobarbital 97.2 mg**

APPENDIX 12: LOOP DIURETICS – used interchangeably, depending on availability

Diuretic	Furosemide	Ethacrynic Acid	Bumetanide	Torsemide
Route	IV	IV	IV	IV
Duration (h)	2	2	0.5-1	6-8
Dosage (mg)	20	25	0.5	5
	40	50	1	10
	80	100	2	20
Frequency/Day	No change	No change	No change	No change
Relative Potency	1	0.6-0.8	40	2-4

APPENDIX 13: EXTENDED INFUSION ZOSYN® (piperacillin/tazobactam)*[18]

Dosage conversion between intermittent and extended infusion regimens		
Creatinine Clearance	**Intermittent Dosing**	**Extended Infusion Dosing for substitution**
≥ 20 mL/min or CRRT (continuous renal replacement therapy)	4.5g IV q6h or 3.375g IV q6h or 2.25g IV q6h	3.375g IV over **4hrs** q8h
< 20 mL/min	2.25g IV q6 (severe infections, nosocomial infections) 2.25g IV q8h	3.375g IV over **4hrs** q12h
Hemodialysis or Peritoneal Dialysis	2.25g IV q8 (severe infections, nosocomial infections) 2.25g IV q12h	Extended infusion not applicable 2.25g IV over **30min** q8 2.25g IV over 30min q12h

*Exception: children under 18 years old, patients in ER, OR, PACU, L&D/OB services, one time doses, solid organ or bone marrow transplant, dialysis (hemodialysis or peritoneal dialysis).
NOTE: For infections due to organisms with MICs >16 mg/L, consider an alternative antimicrobial agent.

Medication scheduling and/or drug compatibility conflicts: Unit-based clinical pharmacists will be available to assist nursing to help resolve medication scheduling and compatibility issues. If shifting medication administration times does not alleviate the problem, nursing may request standard 30-min infusions after consulting with the pharmacist and physician. Placing new lines to accommodate extended-infusion piperacillin/tazobactam is discouraged.

Note: Alaris® library will be revised accordingly.

APPENDIX 14:SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRI) AUTOMATIC SUBSTITUTION[19,20]

Drug Ordered	**Drug for Substitution**
Citalopram (Celexa®) 10 mg PO DAILY	**Escitalopram (Lexapro®) 5 mg PO DAILY**
Citalopram (Celexa®) 20 mg PO DAILY	**Escitalopram (Lexapro®) 10 mg PO DAILY**
Citalopram (Celexa®) 40 mg PO DAILY	**Escitalopram (Lexapro®) 20 mg PO DAILY**

APPENDIX 15:MANNITOL 25% TO MANNITOL 20% AUTOMATIC SUBSTITUTION

Drug Ordered	**Drug for Substitution**
Mannitol 25% (100 mL)	**Mannitol 20% (125 mL)**

APPENDIX 16: NEUPOGEN® TO ZARXIO® AUTOMATIC SUBSTITUTION

Drug Ordered	**Drug for Substitution**
Filgrastim (Neupogen®) 300 mcg/1 mL (1 mL) vial	**Filgrastim-sndz (Zarxio®) 300 mcg/0.5 mL (0.5 mL) prefilled syringe**
Filgrastim (Neupogen®) 450 mcg/1.6 mL (1.6 mL) vial	**Filgrastim-sndz (Zarxio®) 450 mcg/0.8 mL (0.8 mL) prefilled syringe**

*Exception: children under 18 years old. These dosages will be drawn from Neupogen® vials since pediatric patients will likely not be suitable for the standard dosages of 300 mcg and 480 mcg.

Document History:

Prior Release Dates: 12/15, 4/18		**Retire Date:**	
Document Owner: *Department of Pharmacy*		**Replaces Policy:** Pharmacy Policy 339, 340, 341, B231	
Date Reviewed	**Reviewed By:**	**Revisions Made?**	**Revision Description**
6/12/18	Pharmacy Review Committee	Yes	Modified Inhaled corticosteroid, combination ICS/LABA substitution, added Zarxio® substitution, updated tallman lettering
7/2/18	P&T Committee	No	
8/7/2018	PAC	Yes	Uncheck Behavioral Health
9/13/18	MEC	No	

4. References

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RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER
Housewide

	Document No: 832	Page 1 of 2
Title: Use of Multiple and Single-Dose Vials for Injectable Use	**Effective Date:** 7/9/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By:  Jennifer Cruikshank CEO/ Hospital Director		☐ Policy ☒ Procedure ☐ Guideline

1. SCOPE
This policy applies to handling of single-dose and multiple-dose vials at RUHS Medical Center, Behavioral Health and RUHS Care Clinics. This policy does not apply to the pharmacy's sterile compounding environment.

2. DEFINITION
2.1 Single-dose vial: vial of liquid medication intended for parenteral administration (injection or infusion) that is meant for use in a single patient for a single case/procedure/injection. Single-dose or single-use vials are labeled as such by the manufacturer and typically lack an antimicrobial preservative.

2.2 Multiple-dose vial: vial of liquid medication (injectable) that contains more than one dose of medication and is approved by the Food and Drug Administration (FDA) for use on multiple persons.

3. PROCEDURE.
Aseptic techniques and recognized procedures must be followed when using injectable single- and multiple-dose vials. As much as possible, the use of multiple-dose vials will be kept to a minimum in the hospital and the use of single-dose vials and ampules will be encouraged. The number of opened vials will be kept to a minimum. All vials for Inpatients are to be used only as patient specific including multi-dose vials.

3.1 All single-dose and multiple-dose vials will be visually inspected before withdrawal of a dose. The visual inspection should disclose possible physical contaminants, including color changes or precipitation. Discard any contaminated or expired vial.

3.2 Disinfect the single-dose and multiple-dose vials rubber septum before piercing by wiping with approved antiseptic swab. Allow the septum to dry before inserting a needle or other device into the vial.

3.3 Use a NEW needle and syringe for each entry.

3.4 Single-dose Vials

a. Vials that are labeled as single-dose or single-use must be used for a single patient and single case/procedure/injection. These single-dose vials should be disposed after initial use, unless otherwise specified by the manufacturer. If a second dose is required a new vial must be utilized.

b. Even if a single-dose or single-use vial appears to contain multiple doses or contains more medication than is needed for a single patient, that vial should not be used for more than one patient nor stored for future use on the same patient.

c. Do not combine (pool) leftover contents of single-dose or single-use vials or store single-dose or single-use vials for later use.

3.5 Multiple-dose vials

a. Multiple-dose vials, once opened, will be dated with the revised expiration date (also called beyond-use date).

b. The injectable multiple-dose vial may be used for up to 28 days or up to the manufacturer's expiration date, whichever is sooner.

c. This dating expectation does not apply to vaccines in the Centers for Disease Control and Prevention and state immunization programs, which have separate requirements for discarding multi-dose vaccines.

4. REFERENCES

4.1 Centers for Disease Control and Prevention [CDC], 2011. FAQs regarding Safe Practices for Medical Injections.

4.2 The Joint Commission Sentinel Event Alert. 2014. Issue 52. Preventing infection from the misuse of vials.

4.3 Policy HW816 Single-Dose and Multiple-Dose Ophthalmic, Otic and other Topical Preparations

Document History:

Release Dates: 6/29/15	**Retire Date:**		
Sponsor: Pharmacy	**Replaces Policy:** Pharmacy F608,		
Date Reviewed	**Reviewed By:**	**Revisions Made?**	**Revision Description**
10/15/2014	Pharmacy Focus Group,	Yes	Added section for single dose vials products. Rename policy to reflect change.
11/3/2014	P&T Committee	No	
1/2015	MEC	No	
4/9/2015	PAC	Yes	Updated title to "Use of …"
4/13/15	PAC	Yes	Updated numbering and clarified MDV expiration wording in 2.4b.
6/2015	HEC	No	
2/6/2018	Pharmacy Review Committee	Yes	Moved one of the statements to a higher number in the policy. Added new line 2.4.c Updated format to latest template.
4/2/18	P&T	Yes	Add "for injectable use" to title. Add reference to policy HW816. Changed language to "must" vs should.
6/14/2018	PAC	No	
5/10/18	MEC Approved through minutes	No	
	HEC		

RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER
Housewide

	Document No: 849	Page 1 of 3
Title: Automatic Substitutions for Adult Outpatients	**Effective Date:** 10/12/2018	☐ **RUHS – Behavioral Health** ☐ **RUHS – Care Clinics** ☒ **RUHS – Medical Center** ☐ **RUHS – Public Health** ☐ **Departmental**
Approved By: Jennifer Cruikshank CEO/Hospital Director		☐ **Policy** ☒ **Procedure** ☐ **Guideline**

1. SCOPE

1.1 This auto-substitution policy is only applicable to the outpatient population.

1.2 This procedure is performed by the Riverside University Health System (RUHS) Retail Pharmacies with prescriptions written by any of the following:

a. All prescribers within the RUHS – Medical Center, including hospital based clinics.
b. Prescribers within RUHS Care Clinics who agree to enter into a collaborative practice with the RUHS Department of Pharmacy for therapeutic substitution, as documented by prescriber signature on the Collaborative Practice Agreement: General Outpatient Therapeutic Substitution.

1.3 Prescribers unaffiliated with RUHS are not bound by this policy.

2. PROCEDURES

2.1 The P&T will provide formulary guidelines for various classes of pharmaceuticals.

2.2 Auto-substitution provides standardized, safe and appropriate, clinically effective, and cost effective use of pharmaceuticals.

2.3 Prescribers may exclude prescriptions from this policy if clinically indicated. For all prescriptions to be excluded, prescriber must add "DO NOT SUBSTITUTE" to prescription.

2.4 This auto-substitution policy will be periodically reviewed at least every 3 years, and updated as new medications become available and recommended pharmacotherapy guidelines emerge.

2.5 Prescribers practicing at RUHS hospital based clinics or RUHS Care Clinics will receive written notification from RUHS P&T as updates or revisions are made to this policy.

2.6 Prescribers within the RUHS Care Clinics, who have agreed to enter into a collaborative practice:

a. Consent to changes made to this policy without further authorization.
b. Shall be re-authorized by a new signature every 3 years.

2.7 According to the attached Dosage Conversion Tables or listed Therapeutic Substitution Lists, pharmacists will automatically substitute P&T approved medications.

2.8 Combination medications that are not on formulary will be filled with the individual components.

a. This applies to any combination formulation: oral, topical, inhaled, etc.
b. Individual components will be the equivalent strength and frequency as written in the prescriber's order.
c. For example, the combination medication Lotrel® will be substituted with amlodipine and benazepril.
d. The prescriber will be contacted if substitution is not possible.

2.9 The substitution will be transcribed by the pharmacist onto the hardcopy of the order.

2.10 The order will be scanned into the pharmacy system to serve as a record of the substitution.

2.11 The patient shall be notified of the medication substitution(s) and the reasons for the substitution during consultation.

3. REFERENCES

3.1 California Pharmacy Law 2012. BPC § 4052.2: Permitted Pharmacist Procedures in Health Care Facility, Home Health Agency or Clinic with Physician Oversight. Accessed 26 July 2012.
3.2 California Pharmacy Law 2012. BPC § 4052.5: Pharmacist May Select Different Form of Medication with Same Active Chemical Ingredient; Exceptions. Accessed 26 July 2012.
3.3 California Pharmacy Law 2012. BPC § 4073: Substitution of Generic Drug - Requirements and Exceptions. Accessed 26 July 2012.
3.4 California Pharmacy Law 2012. CCR § 1716: Variation from Prescriptions. Accessed 26 July 2012.
3.5 Gray T, et al. ACCP Position Statement: Guidelines for Therapeutic Interchange – 2004. Pharmacotherapy 2005;25(11): 1666-1680.

4. ATTACHMENTS

4.1 Medication Chart

Release Dates: 3/15/17, 4/25/18	**Retire Date:** N/A
Sponsored by: Pharmacy	**Replaces Policy:** Pharmacy 465, D421

Date Reviewed	Reviewed By:	Revisions Made?	Revision Description
7/10/2018	Pharmacy Review Committee	Yes	Update tables (ACEI, ICS, Inhaled Anticholinergic Agents, Ophthalmic Medications).
8/6/18	P&T Committee	No	
9/4/18	PAC	No	
10/11/18	MEC	No	

I. ORAL MEDICATIONS

APPENDIX 1. ANGIOTENSIN CONVERTING ENZYME (ACE) INHIBITOR AUTOMATIC SUBSTITUTION[1]

Drug Ordered								Drug for Substitution
Trandolapril (Mavik)	Ramipril (Altace)	Quinapril (Accupril)	Perindopril (Aceon)	Moexipril (Univasc)	Lisinopril (Prinivil, Zestril)	Fosinopril (Monopril)	Enalapril (Vasotec)	**Benazepril (Lotensin)**
--	--	--	--	--	2.5 mg DAILY	--	2.5 mg DAILY	**2.5mg DAILY**
0.5 mg DAILY	1.25 mg DAILY	5 mg DAILY	2 mg DAILY	3.75 mg DAILY	5 mg DAILY	--	5 mg DAILY	**5 mg DAILY**
1 mg DAILY	2.5 mg DAILY or divided BID	10 mg DAILY	4 mg DAILY or divided BID	7.5 mg DAILY or divided BID	10 mg DAILY or divided BID	10 mg DAILY or divided BID	10 mg DAILY or divided BID	**10 mg DAILY**
2 mg DAILY	5 mg DAILY or divided BID	20 mg DAILY or divided BID	8 mg DAILY or divided BID	15 mg DAILY or divided BID	20 mg DAILY or divided BID	20 mg DAILY or divided BID	20 mg DAILY or divided BID	**20 mg DAILY or divided BID***
4 mg DAILY	10 mg DAILY or divided BID	40 mg DAILY or divided BID	16 mg DAILY or divided BID	30 mg DAILY or divided BID	40 mg DAILY or divided BID	40 mg DAILY or divided BID	40 mg DAILY or divided BID	**40 mg DAILY or divided BID***
4 mg BID	20 mg DAILY or divided BID	80 mg DAILY or divided BID	--	60 mg DAILY or divided BID	80 mg DAILY or divided BID	80 mg DAILY or divided BID	--	**80 mg DAILY or divided BID***

***New order will be given the same frequency as the original order.**

APPENDIX 2. ANGIOTENSIN RECEPTOR BLOCKER (ARB) AUTOMATIC SUBSTITUTION[2]

Drug Ordered						Drug for Substitution
Valsartan (Diovan)	Telmisartan (Micardis)	Olmesartan (Benicar)	Irbesartan (Avapro)	Eprosartan (Teveten)	Candesartan (Atacand)	**Losartan (Cozaar)**
40 mg DAILY or 20 mg BID	20 mg DAILY	10 mg DAILY	75 mg DAILY	400 mg DAILY	4 mg DAILY	**25 mg DAILY**
80 mg DAILY or 40 mg BID	40 mg DAILY	20 mg DAILY	150 mg DAILY	600 mg DAILY	8 mg DAILY or divided BID	**50 mg DAILY or divided BID***
160 mg DAILY	80 mg DAILY	40 mg DAILY	300 mg DAILY	800 mg DAILY or divided BID	16 mg DAILY or divided BID	**100 mg DAILY or divided BID***

***New order will be given the same frequency as the original order.**

APPENDIX 3. H2-RECEPTOR ANTAGONIST AUTOMATIC SUBSTITUTION[3]

Drug Ordered			Famotidine Dose for Substitution
Cimetidine	Nizatidine	Ranitidine	
100 mg PO BID	75 mg PO BID	75 mg PO BID	10 mg PO BID
300 mg PO QDAY	150 mg PO QHS	150 mg PO QHS	20 mg PO QHS
400 mg PO QHS	---	---	
300 mg PO BID – 4x/DAY	150 mg PO BID	150 mg PO BID	20 mg PO BID
400 mg PO BID – 4x/DAY	---	---	
800 mg PO QHS	300 mg PO QHS	300 mg PO QHS	40 mg PO QHS

APPENDIX 4. ORAL PROTON PUMP INHIBITOR (PPI) AUTOMATIC SUBSTITUTION[4]

Drug Ordered					Pantoprazole Dose for Substitution*
Dexlansoprazole (Dexilant)	Esomeprazole	Lansoprazole	Omeprazole	Rabeprazole	
30 mg	20 mg	15 mg	10 – 20 mg	---	20 mg
60 mg	40 mg	30 mg	40 mg	20 mg	40 mg

***If Pantoprazole is not covered by the patient's insurance/medication coverage**, the preferred formulary agent will be dispensed.

APPENDIX 5. HMG-CoA REDUCTASE INHIBITOR ("STATIN") AUTOMATIC SUBSTITUTION[5,6]

Comparable dose based on LDL-C reduction

Drug Ordered								Drug for Substitution*
Pitavastatin (Livalo)	Fluvastatin (Lescol)	Lovastatin (Mevacor)	Pravastatin (Pravachol)	Simvastatin (Zocor)	Atorvastatin (Lipitor)	Rosuvastatin (Crestor)	Simvastatin / Ezetimibe (Vytorin)	
1 mg	40 mg	20 mg	20 mg	10 mg				**Pravastatin 20 mg qhs**
2 mg	80 mg	40 mg	40 mg	20 mg	10 mg			**Atorvastatin 10 mg daily**
4 mg		80 mg	80 mg	40 mg	20 mg	5 mg	10/10 mg	**Atorvastatin 20 mg daily**
				80 mg	40 mg	10 mg	10/20 mg	**Atorvastatin 40 mg daily**
					80 mg	20 mg	10/40 mg	**Atorvastatin 80 mg daily**
						40 mg	10/80 mg	**Contact physician to consider Atorvastatin 80 mg daily if appropriate, or to request by non-formulary process.**

***If a prescribed statin is not covered by the patient's insurance/medication coverage**, the equipotent statin that is the preferred formulary agent will be dispensed.

APPENDIX 6: PHENOBARBITAL AUTOMATIC SUBSTITUTION

Drug Ordered	Drug for Substitution
Phenobarbital 15 mg	**Phenobarbital 16.2 mg**
Phenobarbital 30 mg	**Phenobarbital 32.4 mg**
Phenobarbital 60 mg	**Phenobarbital 64.8 mg**
Phenobarbital 100 mg	**Phenobarbital 97.2 mg**

APPENDIX 7. SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRI) AUTOMATIC SUBSTITUTION[7,8]

Drug Ordered	Drug for Substitution*
Citalopram (Celexa) 10 mg PO Daily	**Escitalopram (Lexapro) 5 mg PO Daily**
Citalopram (Celexa) 20 mg PO Daily	**Escitalopram (Lexapro) 10 mg PO Daily**
Citalopram (Celexa) 40 mg PO Daily	**Escitalopram (Lexapro) 20 mg PO Daily**

***If Escitalopram is not covered by the patient's insurance/medication coverage**, Citalopram will be dispensed according to the preferred formulary agent.

APPENDIX 8. MACROBID AUTOMATIC SUBSTITUTION

Drug ordered	Drug for substitution
Macrodantin 100 mg PO Four Times Daily	**Macrobid 100 mg PO BID**

APPENDIX 9. DEPAKOTE AUTOMATIC SUBSTITUTION[9]

Drug Ordered	**Drug for Substitution**
Depakote® (divalproex sodium delayed-release) **Total Daily Dose (mg)**	**Depakote ER® (mg)** (divalproex sodium extended-release) **Total Daily Dose (mg)**
500-625	**750**
750-875	**1000**
1000-1125	**1250**
1250-1375	**1500**
1500-1625	**1750**
1750	**2000**
1875-2000	**2250**
2125-2250	**2500**
2375	**2750**
2500-2750	**3000**
2875	**3250**
3000-3125	**3500**

All adult patients on Depakote® will be converted to once daily at bedtime Depakote ER® unless indicated by the prescribing physician. For total daily doses below 500mg or above 3125mg of Depakote®, the prescriber will be contacted regarding the conversion.

Depakote Sprinkles and Valproic acid are available for patients who are unable to take Depakote ER® (i.e. patients with NG tubes).

II. ORAL INHALATIONS

APPENDIX 10. SHORT- ACTING BETA AGONIST (SABA) AUTOMATIC SUBSTITUTION[10]

Drug Ordered		**Drug for Substitution**
Albuterol (ProAir HFA, Ventolin HFA)	Levalbuterol (Xopenex HFA)	**Albuterol (Proventil HFA)***
90 mcg 1 puff	45 mcg 1 puff	**90 mcg 1 puff**
90 mcg 2 puffs (180 mcg)	45 mcg 2 puffs (90 mcg)	**90 mcg 2 puffs (180 mcg)**

***If Proventil HFA is unavailable or not covered by the patient's insurance/medication coverage**, either Xopenex, ProAir, or Ventolin will be dispensed according to the preferred formulary agent.

APPENDIX 11: INHALED CORTICOSTEROID (ICS) AUTOMATIC SUBSTITUTION

Drug Ordered			**Drug for Substitution***
Budesonide (Pulmicort)	Mometasone (Asmanex)	Beclomethasone (QVAR/QVAR Redihaler™)	**Fluticasone (Flovent HFA)**
-----	110 mcg daily	40 mcg BID	**44mcg BID**
180 mcg BID	220 mcg daily	80 mcg BID	**88mcg BID**
-----	-----	120 mcg BID	**110mcg BID**
360 mcg BID	-----	160 mcg BID	**176mcg BID**
540 mcg BID	440 mcg daily	240 mcg BID	**220mcg BID**
720 mcg BID	-----	320 mcg BID	**440mcg BID**

* **If Substituted brand is unavailable or not covered by the patient's insurance/medication coverage**, the covered brand will be dispensed according to the preferred formulary agent

APPENDIX 12: COMBINATION ICS/LABA AUTOMATIC SUBSTITUTION [10]

Drug Ordered			Drug for Substitution*
Budesonide/Formoterol (Symbicort)	Fluticasone/Salmeterol (Advair HFA)	Mometasone/Formoterol (Dulera)	**Fluticasone/Salmeterol (Advair Diskus)**
80/4.5 mcg 2 puffs BID	45/21 mcg 2 puff BID	-----	**100/50 mcg 1 puff BID**
160/4.5 mcg 2 puffs BID	115/21 mcg 2 puff BID	100/5 mcg 2 puffs BID	**250/50 mcg 1 puff BID**
-----	230/21 mcg 2 puff BID	200/5 mcg 2 puffs BID	**500/50 mcg 1 puff BID**

***If Advair is unavailable or not covered by the patient's insurance/medication coverage:** Advair 100/50mcg can be substitute to Flovent HFA 110mcg and Serevent 50mcg 1 puff BID, Advair 250/50mcg to Flovent HFA 220mcg and Serevent 50mcg 1 puff BID, Advair 500/50mcg to Flovent 220mcg 2 puffs BID and Servent 50mcg 1 puff BID.
***If Flovent HFA is unavailable or not covered by the patient's insurance/medication coverage**, the following may be dispensed: QVAR HFA.

APPENDIX 13. INHALED ANTICHOLINERGIC AUTOMATIC SUBSTITUTION

Drug Ordered		Drug for Substitution*
Spiriva 18 mcg INH 1 Cap Daily	Incruse Ellipta 62.5mcg INH 1 puff daily	**Tudorza 400 mcg 1 puff BID**

*Only for COPD indication
***If Substituted brand is unavailable or not covered by the patient's insurance/medication coverage**, the covered brand will be dispensed according to the preferred formulary agent

III. DIABETIC SUPPLIES

APPENDIX 14. DIABETIC SUPPLIES AUTOMATIC SUBSTITUTION

Brand Ordered		Brand for Substitution*
Accu-Chek Glucometer	TRUEresult Glucometer	**TRUE METRIX Glucometer Kit**
Accu-Chek Test Strips	TRUEtest Strips	**TRUE METRIX Strips**
Accu-Chek Lancets	TRUEplus Lancets	**TRUEplus Lancets**

***Substitution not applicable to "Sweet Success" program patients.** RUHS pharmacies will continue to dispense the Accu-Chek glucometer and its supplies for pregnant diabetic patients participating in the "Sweet Success" program.
***If Substituted brand is unavailable or not covered by the patient's insurance/medication coverage**, the covered brand will be dispensed according to the preferred formulary agent.

IV. NASAL MEDICATIONS

APPENDIX 15. NASAL

CORTICOSTEROID SPRAYS AUTOMATIC SUBSTITUTION**Drug Ordered**	**Drug for Substitution***
Mometasone (Nasonex)	**Fluticasone Propionate (Flonase)**

***If Fluticasone Propionate is not covered by the patient's insurance/medication coverage**, Mometasone will be dispensed according to the preferred formulary agent.

V. INJECTABLES

APPENDIX 16. INSULIN AUTOMATIC SUBSTITUTION

Drug Ordered	Drug for Substitution*
Insulin, Aspart (Novolog) Insulin, Glulisine (Apidra)	**Insulin, Lispro (Humalog)**
Insulin, NPH (Humulin N)	**Insulin, NPH (Novolin N)**
Insulin, Regular (Humulin R)	**Insulin, Regular (Novolin R)**
Insulin, Premixed (Humulin 70/30)	**Insulin, Premixed (Novolin 70/30)**
Molina Patients Only	
Insulin, Glargine (Lantus)	**Insulin, Glargine (Basaglar KwikPen)** **+** **Pen Needles**

***If Drug for Substitution is unavailable or not covered by the patient's insurance/medication coverage**, the preferred formulary agent will be dispensed.

VI. OPHTHALMIC MEDICATIONS

APPENDIX 17. OPHTHALMIC MEDICATIONS AUTOMATIC SUBSTITUTION

Drug Ordered	Drug for Substitution*
Ofloxacin 0.3% Ophthalmic	**Ciprofloxacin 0.3% Ophthalmic**
Brimonidine 0.15% Ophthalmic	**Brimonidine 0.2% Ophthalmic**
Ketorolac 0.4% Ophthalmic	**Ketorolac 0.5% Ophthalmic**

*** If Substituted agent is unavailable or not covered by the patient's insurance/medication coverage**, the covered medication will be dispensed according to the preferred formulary agent.

VII. TOPICAL MEDICATIONS

APPENDIX 18. LIDOCAINE PATCH AUTOMATIC SUBSTITUTION

Drug Ordered	Drug for Substitution*
Lidocaine Patch 5%	**Lidocaine Patch 4%** (non-prescription strength)

***If Lidocaine Patch 5% is not covered by the patient's insurance/medication coverage**, Lidocaine Patch 4% will be dispensed according to the preferred formulary agent/patient preference for out of pocket expenses.

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RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER

Housewide

	Document No 859	Page 1 of 13

Title:	Effective Date:	
Pediatric and Neonatal Pharmacist-based Protocol for Vancomycin and Aminoglycoside Dosing Service	6/15/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By:  Jennifer Cruikshank CEO/ Hospital Director		☐ Policy ☐ Procedure ☒ Guideline

DEFINITIONS

1.1 Neonate. up to 28 days old or located in the neonatal intensive care unit

1.2 Pediatric. greater than 28 days and less than 18 years

1.3 Weight-based dose. generally utilized in patients less than 18 years and less than 40 kg up to the maximum adult dose with some exceptions (as per reputable dosing literature and standards of practice)

1.4 Extended Interval Dosing Limited data available; refers to aminoglycoside dosing for gentamicin and tobramycin only

1.5 Traditional Dosing Conventional dosing for aminoglycosides

GUIDELINES

1.6 **Purpose**

a. To establish a standardized protocol for vancomycin and extended-interval and traditional aminoglycoside dosing and monitoring in neonatal and pediatric patients

b. To allow the clinical pharmacist to

- write orders to initiate and/or adjust vancomycin and aminoglycoside dosing as necessary per protocol
- write orders for vancomycin and aminoglycoside levels and pertinent labs when needed

1.7 **Policy**

a. Neonatal and pediatric patients receiving vancomycin and/or an aminoglycoside (AMG) may be enrolled in the vancomycin/AMG Dosing Service by Pharmacy by physician order only. Physicians may initiate service by writing a chart order indicating "antibiotic (vancomycin or aminoglycoside) by pharmacy protocol" or a similar order

b. The clinical pharmacist will have demonstrated understanding and proficiency, in therapeutic drug monitoring of the pediatric and/or neonatal patient

c. The clinical pharmacist may make any dose adjustments per protocol as necessary based on the patient's serum drug levels, clinical status and indication, in addition to writing orders per protocol for serum drug levels and/or basic metabolic panels (BMP) as needed. The clinical pharmacist will consistently monitor these patients providing service until therapy is discontinued or until the patient is discharged from service

d. Hearing evaluations, if indicated, will be ordered by the Physician

e. The scope of practice of the clinical pharmacist is based on this protocol and will be in collaboration with the pediatric or neonatal attending physician. Recommendations or consults by infectious disease physician will be taken under consideration when monitor or adjusting doses

1.8 Background

a. Vancomycin is often the drug of choice to treat moderate-serious suspected gram-positive infections, most notably those caused by methicillin-resistant Staphylococcus aureas (MRSA) (Kaplan, 2011). Its concentration-independent mechanism allows for efficacy to be assessed through trough serum concentrations, with current recommendations of a goal trough of 10-15mcg/mL for infections with an organism with a minimum inhibitory concentration (MIC) <1mcg/mL and a higher trough of 15-20mcg/mL for more serious infections or organisms with a MIC = 1mcg/mL (Lexicomp, 2012). However, higher serum trough concentrations, especially troughs >20mcg/mL may lead to nephrotoxicity since vancomycin is primarily eliminated via glomerular filtration (Lexicomp, 2012)

b. Although concentration-dependent, aminoglycoside (AMG) efficacy is also measured via serum trough concentrations in addition to serum peak concentrations. They are often used in combination with β-lactam antibiotics for the treatment of serious gram-negative infections and offer the added effect of a post-antibiotic effect (Jenh, 2011). Traditionally, AMGs are dosed multiple times a day; however, studies suggest that extended-interval dosing of AMGs offers higher pharmacokinetic advantages including optimizing their concentration-dependent bactericidal activity and post-antibiotic effect, minimizing nephrotoxicity and ototoxicity associated with high troughs and peaks, respectively, and providing greater cost benefit by reducing nursing and pharmacy time, dose adjustments and the number of serum levels drawn (Jenh, 2011; Ghanshyam, 2002; Bass,98; Despina 2004). Additionally, extended-interval dosing has been associated with fewer failures to achieve appropriate peaks and troughs needed and thereby provided a better clinical response (Begg, 2009). Lastly, extended-interval dosing may also help to avoid the development of bacterial resistance by achieving a higher initial bacterial kill (Rao, 2010)

c. Since both vancomycin and AMGs are excreted almost exclusively by the kidneys, the pharmacokinetics are closely linked to the GFR at all ages (Chattopadhyay, 2002). Varying patient ages offer specific and unique pharmacokinetics that will affect the dosing and clearance of these drugs. For instance, neonates--who have a large volume of distribution and low GFR--will have a higher concentration and slower clearance of the drug (Rao, 2010). Thereby, it is imperative that serum drug levels, renal function, fluid status and the patient's clinical response be regularly and closely monitored

d. In order to provide consistent vancomycin and aminoglycoside dosing and monitoring, a vancomycin/aminoglycoside dosing service will be provided by the pharmacy department for neonatal and pediatric patients receiving intravenous vancomycin or aminoglycoside while at the hospital. The following protocol establishes and ensures continuity between health care professionals, patients and level of care of vancomycin and aminoglycoside dosing and monitoring in the neonatal and pediatric population

1.9 **Exclusions**

a. Cystic fibrosis patients require different dosing regimens and therefore will be dosed according to current literature and the pharmacist's clinical judgment based on patient specific parameters or history

b. Amikacin, while on formulary, is hardly used in the pediatric population. Due to this, dosing of amikacin will not be addressed in this policy and will be deferred to traditional dosing

c. The following policy refers to patients of average weight and normal renal function. Overweight/obese and renally impaired patients will be dosed on reputable drug handbooks and databases, current literature and the pharmacist's clinical judgment based on patient specific parameters

Procedure

d. Dosing Initiation

- Neonatal and pediatric patients receiving vancomycin and/or an aminoglycoside (AMG) will be enrolled in the vancomycin/AMG Dosing Service by Pharmacy by prescriber order only. Prescribers may initiate service by writing a chart order indicating "antibiotic (vancomycin or aminoglycoside) by pharmacy protocol" or a similar order
- A note will be placed by the clinical pharmacist in the progress note section of the patient's chart indicating that the patient has been enrolled in a vancomycin/AMG Dosing Service by Pharmacy
- If the physician order does not state a specific dose, frequency or route for either vancomycin or AMG, the pharmacist will initiate dosing per protocol. Vancomycin will be initiated per Appendix 1; aminoglycoside will be initiated per Appendix 4. The pharmacist may deviate from the protocol if clinical judgment warrants an alternate dose/frequency. Justification for deviation from protocol should be documented in the progress note
- Upon receiving the order, the pharmacist will verify the dose, route, frequency, labs and level of appropriateness based on the indication, patient characteristics and dosing guidelines per appendices. The pharmacist may write an order adjusting any of the dosing parameters in accordance with the specific drug appendices if the pharmacist deems any to be inappropriate. See "Dose Adjustment"

e. Drug Monitoring

- The clinical pharmacist will monitor the patient daily for changes in renal function, fluid status and clinical response and order appropriate laboratory levels as stated in Appendices 2 and 5

- In order to avoid unnecessary pain as well as iatrogenic anemia, the clinical pharmacist will minimize blood draws to only those necessary for the safe management of the patient
- Serum drug levels may be ordered by the pharmacist as necessary per Appendix 2 for vancomycin and Appendix 5 for aminoglycosides. The pharmacist will pay particular attention to sub/supratherapeutic dosing, concurrent antimicrobial/nephrotoxic agents and length of therapy
- The pharmacist or physician may initiate orders for any additional serum drug levels needed outside the recommendation of Appendices 2 and 5. Patients with rapidly changing clinical status may require repeat levels on a more frequent basis to ensure therapeutic levels
- Auditory function monitoring should be considered in patients receiving concomitant ototoxic drugs. The attending physicians will be contacted for consideration, if patient hearing evaluation is warranted

f. Dose Adjustment

- The vancomycin or AMG regimen will be adjusted by the pharmacist based on the desired serum drug levels, indication for use and clinical status of the patient
- Dose adjustments will be made for vancomycin per Appendix 3 and for AMG per Appendix 6. Dosing regimens varying from the protocol will be documented in the progress note section of the patient's chart as a "Clinical Pharmacy Note" explaining the reason for variance.
- Dose adjustments shall be written and signed by the pharmacist on the antibiotic order form in the patient's chart. This will constitute a complete order
- Documentation of dosing changes and monitoring plan will be placed in the progress note section of the patient's medical record as a "Clinical Pharmacy Note."
- If an Infectious Disease physician is consulted, the pharmacist will refer to the ID physician's consult for recommended vancomycin levels and length of therapy and adjust the dose accordingly. However, an ID consult is not required for initiation of vancomycin dosing

g. Communication

- The clinical pharmacist will communicate dosing changes and justification when appropriate to the attending physician or resident

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4. APPENDIX

1. Appendix 1. Vancomycin Dosing
2. Appendix 2. Vancomycin Therapeutic Monitoring
3. Appendix 3. Vancomycin Dose Adjustment
4. Appendix 4. Aminoglycoside Dosing
5. Appendix 5. Aminoglycoside Therapeutic Monitoring
6. Appendix 6. Aminoglycoside Dose Adjustment
7. Appendix 7. Pediatric Calculations for Creatinine Clearance and IBW

Appendix 1. Vancomycin Dosing

Initial vancomycin dosing in both neonatal and pediatric patients will be based on the patient's age, weight, renal function, site of infection and indication.

Neonatal Vancomycin Dosing (adapted from Red Book [AAP 2009])

Weight based Dose: 15 mg/kg with Variable Frequency		
Weight	**< 7 Days Old**	**>7 days Old**
< 1.2 kg	24 hr	12-24 hr
>1.2-2 kg	8-12 hr	8-12 hr
>2 kg	8-12 hr	6-8 hr

OR

Initial Dosing for Serum CREATININE (adapted from Red Book [AAP 2015])

Gestational Age	Renal Function	Dose	Dosing Interval
< 60 days PNA			
≤ 28 weeks	S_{cr} < 0.5 mg/dL	15 mg/kg/dose	12 hr
	S_{cr} 0.5 -0.7 mg/dL	20 mg/kg/dose	24 hr
	S_{cr} 0.8-1 mg/dL	15 mg/kg/dose	24 hr
	S_{cr} 1.1-1.4 mg/dL	10 mg/kg/dose	24 hr
	S_{cr} > 1.4 mg/dL	15 mg/kg/dose	48 hr
≥ 28 weeks	S_{cr} < 0.7 mg/dL	15 mg/kg/dose	12 hr
	S_{cr} 0.7 -0.9 mg/dL	20 mg/kg/dose	24 hr
	S_{cr} 1-1.2 mg/dL	15 mg/kg/dose	24 hr
	S_{cr} 1.3-1.6 mg/dL	10 mg/kg/dose	24 hr
	S_{cr} > 1.6 mg/dL	15 mg/kg/dose	48 hr
> 60 days PNA	WNL	60 mg/kg/day	6-8 hr

Pediatric Vancomycin Dosing (average weight and normal renal function)

Note: Six hour interval dosing is recommended for a goal trough serum concentrations > 10 mcg/mL

Age	Dosing Regimen**
≤ 2 months	15 mg/kg/dose IV every 6-8 hours
>2 months, children and adolescents	15 mg/kg/dose IV Q6 hours
16+ years	15 mg/kg/dose IV every 8 hours
**Frequency may be adjusted per renal function and serum levels	

Pediatric Vancomycin Dosing in Renal Impairment: urine output < 1 mL/kg/hr

Consider single dose administration with serum concentration monitoring

Pediatric Vancomycin Dosing (obesity) (children with a BMI > 95th and normal renal function)

Vancomycin is moderately lipophilic and has demonstrated correlations between total body weight (TBW) and Vd and TBW and clearance in obese patients. Dosing based on ideal body weight (IBW) may result in subtherapeutic concentrations. Therefore, dosing based on TBW with shorter intervals may be recommended for obese patients.

Appendix 2. Vancomycin Therapeutic Monitoring

1. If length of vancomycin therapy is anticipated to be less than 72 hours, therapeutic drug levels are not warranted; however, therapeutic monitoring may be initiated.

2. If therapy is anticipated to be greater 72 hours, an initial vancomycin trough should be obtained 30 minutes prior to the third or fourth dose.

3. Desired vancomycin serum concentrations (Lexicomp)
   - 15 - 20 mcg/mL: For organisms with an MIC = 1 mcg/mL or complicated infections (bacteremia, endocarditis, osteomyelitis, meningitis, and hospital-acquired pneumonia caused by Staphylococcus spp., etc.)
   - 10 - 15 mcg/mL: Current recommendation for all other infections or with an organism with an MIC <1 mcg/mL. An acceptable level around 10 will achieve an AUC_{24} >400 for neonates with confirmed or suspected MRSA
   - 5 – 10 mcg/mL: may be adequate to treat some infections based on site and MIC in neonatal CoNS (coagulase negative staphylococcal or enterococcal infections)

   Data are lacking for correlating pharmacokinetic/pharmacodynamic properties of vancomycin with its clinical efficacy in the neonatal population. The recommendations are based primarily on adult data. Based on pharmacodynamic properties of vancomycin and their presumed similarity among different age groups, these recommendations may be applicable to neonates

4. Methicillin-resistant Staphylococcus aureus isolates with a vancomycin MIC greater than 2 mcg/mL (eg, vancomycin-intermediate or vancomycin-resistant S. aureus [VISA or VRSA]) require alternative therapy

5. Vancomycin troughs should be checked or rechecked as necessary based on the following:
   - With any change in vancomycin dose or frequency
   - Patients with renal dysfunction or a significant change in renal function (i.e. trending increase in serum creatinine or trending decrease in urine output)
   - Patients who are not clinically responding to treatment
   - Patients with persistent positive cultures
   - Patients recently initiated on therapy with a concurrent nephrotoxic agent (Contrast agents, furosemide, AMG)

6. To monitor renal function, a Basic Metabolic Panel (BMP) may be ordered daily initially and then every 3-4 days once therapeutic levels are achieved.
   - A BMP may be ordered more frequently if renal dysfunction is suspected.
   - Weekly BMP and trough is acceptable for long-term therapy in the stable patient

Appendix 3. Vancomycin Dose Adjustment

The following tables are simply a guide for vancomycin dose adjustment based on serum trough concentrations in order to provide consistency. The clinical pharmacist will use clinical judgment and take into account factors such as the patient's clinical status, concurrent medications and site of infection. The pharmacist may adjust outside of the protocol if clinically indicated.

Neonates

REGIMEN	TROUGH LOW	TROUGH HIGH*
10 mg/kg/dose IV q 24 hours	Higher dose q 24 hr Or Same dose q 12 hr	same dose evaluate trough at 48 hr
15 mg/kg/dose IV q 24 hours	Lower dose q 12 hr	Lower dose q 24 hr
15 mg/kg/dose IV q 12 hours	Same dose q 8 hr	Lower dose q 12 hr
15 mg/kg/dose IV q 8 hours	Higher dose q 8 hr or Same dose q 6 hr	Lower dose q 8 hr
15 mg/kg/dose IV q 6 hours	Higher dose q 6 hr	Lower dose q 6 hr
20 mg/kg/dose IV q 24 hours	Same or lower dose q 12 hr	Lower dose q 24 hr

Pediatric Patients

REGIMEN	TROUGH LOW	TROUGH HIGH*
15 mg/kg/dose IV every 6 hours	Higher dose IV every 6 hours	Same dose IV every 8 hours
15 mg/kg/dose IV every 8 hours	Same dose IV every 6 hours	Same dose IV every 12 hours
15 mg/kg/dose IV every 12 hours	Same dose IV every 8 hours Or if significantly low Same dose IV every 6 hours	Lower dose IV every 12 hours OR Same/Higher dose IV every 24 hours
20 mg/kg/dose IV every 8 hours	Higher dose IV every 8 hours	Same dose IV every 12 hours
20 mg/kg/dose IV every 12 hours	Same dose IV every 8 hours	Lower dose IV every 12 hours Or Same/Higher dose IV every 24 hours
**If the trough is significantly higher than desired (25 or greater), the pharmacist may elect to hold the dose and order a STAT trough corresponding the anticipated/expected next dosing interval. Recommendations for a new dosing regimen will be made based on the follow-up trough level.*		

Appendix 4. Aminoglycoside Dosing

Aminoglycoside dosing refers to only gentamicin and tobramycin. Please refer to traditional dosing for Amikacin.

Aminoglycosides primarily used for synergy will be referred to traditional dosing.

Traditional dosing will consist of the dosing per reputable drug handbooks and a database, using the expertise of the pharmacist and what is known of the patient's individual variables to determine the patient-specific dose.

Gentamicin and tobramycin will be dosed as follows:

Neonatal Aminoglycoside Dosing (Red Book [AAP 2015])			
Body Weight	**Postnatal**	**Dose**	**Interval (hours)**
< 1 kg	≤14 days 15-28 days	4.5 mg/kg	48 36
1-2 kg	≤ 7 days 8-28 days	4.5 mg/kg	48 36
> 2 kg	ALL	4	24
** or significant asphyxia, PDA, or treatment with indomethacin*			

Pediatric Extended-interval Aminoglycoside Dosing	
Age	**Dose**
1 month up to < 2 years	9 mg/kg/dose every 24 hours
2 years up to 8 years	8.5 mg/kg/dose every 24 hours
> 8 years	7 mg/kg/dose every 24 hours

Pediatric AMG Dosing (obesity) (children with a BMI > 95th and normal renal function)

Aminoglycosides are hydrophilic medications, and dosing based on actual TBW may result in supratherapeutic serum concentrations. An adjusted body weight is calculated using both TBW and IBW and is recommended for aminoglycoside dosing in obese patients.

Adjusted Dosing Weight:

IBW + 0.4 (TBW – IBW)

Appendix 5. Aminoglycoside Monitoring

Monitoring refers only to extended-interval dosing. For traditional dosing, please refer to reputable drug handbooks and databases.

1. If length of aminoglycoside therapy is less than 72 hours, therapeutic monitoring is not warranted; however, if anticipated to be greater than 72 hours, therapeutic monitoring may be initiated.

2. A random trough level may be drawn 24 hours post-dose for neonates

    - Alternatively, a traditional peak and trough may be done on neonates if desired, 30 minutes before and 1 hour after the start of infusion around the 2nd or 3rd dose.
        i. Therapeutic serum concentrations:
        Peak: 5 to 12 mcg/mL (or Cmax/MIC ratio greater than 8:1)
        Trough: 0.5 to 1 mcg/mL

3. A random trough level may be drawn 4 hours before the second dose for pediatric patients up to 12 years. Peak levels are not needed with extended-interval dosing, unless it is suspected that a therapeutic peak has not been achieved. Random ("peak") 15 minutes following 60 minute infusion
    - Extended Interval Dosing
        i. Therapeutic serum concentrations:
        Peak: > 15 to 20 mcg/ml (or 8 - 10x MIC of infecting organism, if known)
        Trough: Pediatric desired random trough level: < 0.5mcg/ml
4. Greater than 12 years, two random levels should be drawn, between 6 and 14 hours after the first dose. Evaluation should be made based on the Hartford nomogram.
5. Traditional monitoring levels should be drawn around the 3rd or 4th dose
    - Traditional Dosing
        i. Therapeutic serum concentrations:
        Peak: 4 to 12 mcg/mL
        Trough: 0.5 to 2 mcg/mL

6. Aminoglycoside levels should be checked or rechecked as necessary based on the following:
    - With any change in dose or frequency
    - Patients with renal dysfunction or a significant change in renal function (i.e. significant increase in serum creatinine or decrease in urine output)
    - Patients who are not clinically responding to treatment
    - Patients with persistent positive cultures
    - Patients recently initiated on therapy with a concurrent nephrotoxic agent

7. A Basic Metabolic Panel (BMP) should be ordered every 3-4 days to monitor renal function.
    - A BMP may be ordered more frequently if renal dysfunction is suspected.

Appendix 6. Aminoglycoside Dose Adjustment

1. Neonatal Peak and Trough around 2nd or 3rd dose will be adjust to achieve goal trough 0.5-1 and Peak < 12
2. Neonatal patients 24 hour post-dose will be adjusted according to the suggested intervals:

Suggested Dosing Intervals (Neofax®)		
Level at 24 hours (mcg/mL)	**Half-life (hours)**	**Suggested Dosing Interval (hours)**
≤ 1	~ 8	24
1.1 to 2.3	~ 12	36
2.4 to 3.2	~ 15	48
≥ 3.3		Measure level in 24 hours

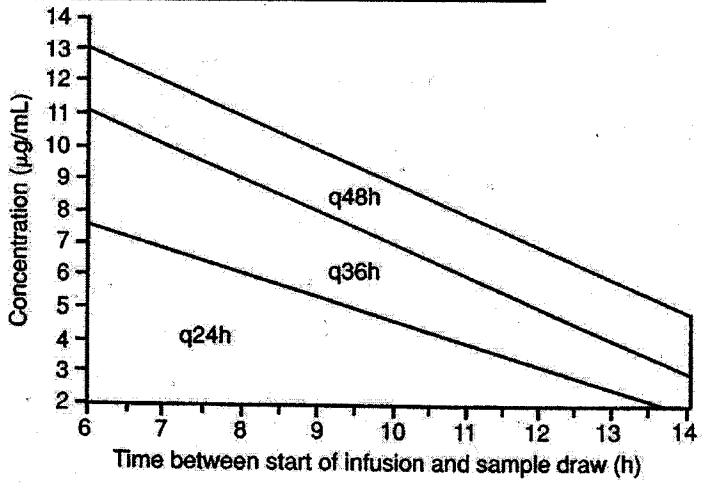
3. For pediatric patients,

Pediatric Suggested Extended Interval Dosing Adjustment		
AGE	LEVEL/Clinical Efficacy	ADJUSTMENT
1 month up to 12 years	Peak low and patient not improving	Switch to conventional therapy
1 month up to 12 years	Peak high	No change
1 month up to 12 years	Four hour trough (random) high	Switch to conventional therapy
1 month up to 12 years	Four hour trough (random) zero and patient improving	Redraw random 6 hours before 3rd dose (with a goal of less than or equal to 0.5 mcg/ml)
1 month up to 12 years	Four hour trough (random) zero and patient is NOT improving	Consider changing to 12 hour interval
12 years or greater	6 - 14 hour random high	as per Harford nomogram or refer to adult protocol

Four hour trough is 20 hours post dose

4. The pharmacist may adjust outside of the protocol if clinically indicated, taking into account factors such as the patient's clinical status, concurrent medications and site of infection as well as previous experiences and cases of aminoglycoside dose adjustments in the neonatal and pediatric population.

Hartford Hospital Nomogram (for 7 mg/kg/dose)



Appendix 7. Calculations

Pediatric Creatinine Clearance

Schwartz equation:
CrCL (ml/minute/1.73m^2) = K x length in cm / SCr

K = Constant of proportionality that is age-specific
Length (Height) in cm
SCr = Serum creatinine concentration in mg/dL

Glomerular Filtration Rate: Pediatric

Schwartz equation:
eGFR = (k X Height) / Creatinine

eGFR = estimated GFR; calculated in mL/minute/1.73 m2
Height (length) in cm
K = constant of proportionality that is age-specific

k = constant of proportionality that is age-specific

AGE	K
Low birth weight ≤ 1 year	0.33
Full-term ≤ 1 year	0.45
2 to 12 years	0.55
13 to 18 years ---FEMALE	0.55
13 to 18 years -- MALE	0.7

Normal Serum Creatinine Concentrations at Different Ages

Age	Average Serum Creatinine (mg/dL)	Range (mg/dL)
Premature (< 34 weeks GA)		
< 2 weeks old	0.9	0.7 - 1.4
≥ 2 weeks old	0.8	0.7 - 0.9
Term neonates (> 34 weeks GA)		
< 2 weeks old	0.5	0.4 - 0.6
≥ 2 weeks old	0.4	0.3 - 0.5
2 weeks to 5 years	0.4	0.2 - 0.5
5 to 10 years	0.6	0.3 - 1.0
> 10 years	0.9	0.6 - 1.4

IDEAL BODY WEIGHT CALCULATION

IBW = [(height^2) x 1.65] ÷ 1000
IBW = ideal body weight in kg
Height measured in cm
This formula is intended for patients younger than 18 years old and with a height ≤60 inches (152 cm).

Adjusted Dosing Weight:

IBW + 0.4 (TBW – IBW)

Subject: Pediatric and Neonatal Pharmacist-based Protocol for Vancomycin and Aminoglycoside Dosing Service	**Document No.** 859

Keyword: Pediatric, Protocol, Pharmacokinetic, vancomycin, gentamicin, aminoglycoside, per pharmacy

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Date Reviewed	**Reviewed By:**	**Revisions Made?**	**Revision Description**
05/2016	Sheri Handford Pediatric Physicians	Yes	Update to current practice; format
6/6/16	P&T Committee	Yes	Convert to Hospital wide
7/14/16	MEC	No	
3/17/17	PAC	No	Needs Pediatric physician review. 1/30/18 It was clarified that Pediatrics did look at the policy when it was revised. See notation above.
6/15/2018	CEO	No	

RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER

HOUSEWIDE

	Document No: 865	Page 1 of 7
Title: Hazardous Drug Spill Deactivation and Waste Management	**Effective Date:** 6/15/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By: Jennifer Cruikshank CEO/ Hospital Director		☒ Policy ☒ Procedure ☐ Guideline

1. DEFINITIONS

1.1 Hazardous Drugs (HDs): Hazardous drugs include those used for cancer chemotherapy, antiviral drugs, hormones, some bioengineered drugs, and other miscellaneous drugs. Drugs considered hazardous include those that exhibit one or more of the following six characteristics in humans or animals:

a. Carcinogenicity

b. Teratogenicity or other developmental toxicity

c. Reproductive toxicity

d. Organ toxicity at low doses

e. Genotoxicity

f. Structure and toxicity profiles of new drugs that mimic existing drugs determined hazardous by the above criteria

1.2 Compounding Aseptic Containment Isolator (CACI): A compounding aseptic isolator (CAI) designed to provide worker protection from exposure to undesirable levels of airborne drug throughout the compounding and material transfer processes and to provide an aseptic environment for compounding sterile preparations. Air exchange with the surrounding environment should not occur unless the air is first passed through a microbial retentive filter (HEPA minimum) system capable of containing airborne concentrations of the physical size and state of the drug being compounded. Where volatile hazardous drugs are prepared, the exhaust air from the isolator should be appropriately removed by properly designed building ventilation.

1.3 Primary Engineering Control (PEC): A device or room that provides an ISO Class 5 environment for the exposure of critical sites when compounding compounded sterile preparations (CSPs).

1.4 Personal protective equipment (PPE): Items such as gloves, gowns, respirators, goggles, faceshields, and others that protect individual workers from hazardous physical or chemical exposures.

1.5 National Institute of Occupational Safety and Health (NIOSH): NIOSH is the main US federal agency responsible for conducting research into occupational safety

and health matters. It is part of the U.S. Centers for Disease Control and Prevention, in the U.S. Department of Health and Human Services.

1.6 High efficiency particulate air (HEPA) filter: A HEPA filter is a type of mechanical air filter. It works by forcing air through a fine mesh that traps harmful particles such as pollen, pet dander, dust mites, and tobacco smoke.

1.7 Compounded sterile preparations (CSPs): are sterile pharmaceuticals that have been prepared by a pharmacist, or under the supervision of a pharmacist.

2. POLICY

2.1 Since safe levels of exposure to HDs cannot be determined and no reliable methods of monitoring exposure exist, it is imperative that the work practice controls established to minimize exposure of employees and other environment be established and strictly adhered to by all staff.

2.2 Persons who handle HDs must have access to spill kits and be trained on spill management and use of PPE and NIOSH-certified respirator. Spill management must be part of an institution-wide safety program and developed in conjunction with other departments and disciplines.

2.3 The areas used to compound HDs must be decontaminated by chemical deactivation of the HDs prior to cleaning and disinfection.

2.4 This policy is strictly limited to the generic waste management provisions of those drugs designated as hazardous by the National Institute of Occupational Safety and Health (NIOSH). Though these substances will be handled and managed was RCRA (RCRA means the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. section 6901) waste, there are other substances that require special handling and disposal that are not the subject of this policy.

2.5 Local, state and federal guidelines have been established relative to the management of hazardous drugs; employee safety and the right to know; regulated waste management and transport and related topics and pharmacies must establish policies per individual local and state requirements. Policy and procedure must be established related to all Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Department of Transportation (DOT) requirements.

2.6 Safety Data Sheet (SDS) for all HDs shall be maintained by the Safety Department.

3. PROCEDURES

3.1 Cleaning and Decontamination of PEC

a. When working with HDs, the ISO Class 5 environment of the PEC must first be decontaminated prior to being cleaned.

b. The SDS for each HD will specify chemical agents that can be used to deactivate them, however many are deactivated by simple sodium hypochlorite solution. Sterile 70% Isopropyl Alcohol (IPA) does not deactivate HDs therefore cleaning with IPA serves only to spread existing HD contamination.

c. The following factors must be considered relative to decisions about how to decontaminate and clean PECs used for HD compounding:

- Use pre-moistened wipes for cleaning. Any cleaning tools and containers must be surface cleaned with 70% sterile IPA prior to being introduced into an ISO Class 5 area.
- Consideration must be given to the size of the PEC, containers and packages must not interfere with the unidirectional airflow or disrupt the first air in the critical area where HD compounding is to take place.
- Any decontaminating or cleaning agent used inside of a PEC that must be mixed with water should be mixed with sterile water for irrigation.
- Decontamination and cleaning of the surfaces under the work tray must also be accomplished.

d. Decontamination is performed regularly between batches/patient-specific compounding; before daily cleaning and in the event of a spill.

e. Decontamination will only occur when compounding is not taking place.

f. Person performing decontamination will be fully garbed per Hazardous Drug Compounding Techniques including gowns, head, hair, shoe covers, two pairs of chemotherapy gloves and NIOSH-certified respirators (N-95 or N-100).

g. An appropriate full-facepiece, chemical cartridge-type respirator or powered air-purifying respirator (PAPR) should be worn when there is a risk of respiratory exposure to HDs, including when attending to HD spills larger than what can be contained with a spill kit or when cleaning underneath the work surface of the CACI.

3.2 HD Spill Management

a. All personnel handling/administering HD's must be trained on the cleaning of HD spills, including the use of PPE and NIOSH-Certified respirators (N-95 or N-100).

b. Spill kits will be kept in areas where HD are handled such as inventory receiving area; inventory storage area; compounding room; carts used for HD transport and nursing units where antineoplastic HDs are administered.

c. Each department is responsible to maintain two spill kits in their department, when a spill kit gets used it will be the department's responsibility to order a replacement through a County authorized vendor.

d. Spills must be contained and cleaned immediately by all qualified personnel with appropriate PPE.

e. Call EVS and ask for secondary cleanup of hazardous spill that has been contained and picked up

f. Call EVS and ask for assistance for a hazardous spill if not contained with one spill kit

g. Signs must be available for restricting access to the spill area.

h. All spills materials must be disposed of as hazardous waste.

i. Information related to care of persons with direct eye and skin contact to HDs as a result of a spill is contained in policy Hazardous Drug Employee Training and Safety Program.

3.3 Spills occurring inside of PEC (CACI):

a. Leave the CACI blower on.

b. Opening the CACI

3.3.b.1 Do not open the CACI if the entire spill can be cleaned properly without lifting it. If the CACI must be opened, all parties in the room must don their NIOSH-Certified respirators (N-95 or N-100) prior to opening.

3.3.b.2 The CACI will not be opened until the spill has been maximally contained and cleaned to the extent possible with the CACI closed.

c. Ensure the worker is properly garbed to clean up the spill. However, if spill occurs during compounding, the worker will be properly garbed.

d. Obtain a spill kit. If possible, someone other than the compounder working in the CACI at the time of the spill should obtain the spill kit, wipe the exterior of the kit with sterile 70% IPA and use technique appropriate to the PEC being used to transfer the spill kit into the ISO Class 5 compounding area.

e. If the HD is a liquid, place an absorbent towel from the spill kit gently on top of the liquid to prevent splashing of HD liquid.

f. If HD is a solid or powder, cover and wipe with a low lint towelette moistened with a source of purified water, such as sterile water for irrigation.

g. Place saturated/contaminated towelettes into hazardous waste bag contained in spill kit.

h. Clean up any broken glass fragments and place into designated sharps container along with any contaminated sharps.

i. Place any contaminated non-sharps supplies into the hazardous waste bag contained in the spill kit.

j. Once the visually evident spill has been contained, wipe the area thoroughly with a lint free towel moistened with sterile water for irrigation.

k. Then follow by cleaning the area with a lint free towel moistened with bleach solution and allow to dry.

l. Once the spill has been contained and decontaminated, the entire CACI must be surface decontaminated and then cleaned.

m. Always work from the least contaminated (cleanest) to most contaminated (dirtiest) areas, usually top to bottom.

n. Decontaminate all surfaces including the work tray and the tray under the work tray.

o. Clean the interior and exterior of the glass.

p. Change the gauntlets per manufacturer's instructions.

q. If a HD is spilled into the intake perforations of the CACI, remove the work surface according to the manufacturer's directions and thoroughly clean the drain pan in the proper manner, discarding all cloths and other materials used in the cleaning process into the waste bag provided in the spill kit. Once the spill has been cleaned, remove PPE per policy Hazardous Drug Compounding Techniques and discard as hazardous waste.

r. If the HEPA filter of the CACI is contaminated with HD

s. Turn the CACI off.

t. Post a sign on the CACI that says "Do Not Use – Contaminated with Hazardous Drug"

u. Personnel changing the HEPA filter must be informed that the HEPA filter may be contaminated with HD. They must also be properly garbed and wear a NIOSH-certified respirator during the procedure. Respirator cartridges must be disposed of as hazardous waste.

v. The HEPA filter must be changed as soon as possible according to the manufacturer's instructions.

w. The filter must be disposed of in the appropriate hazardous waste container.

3.4 Spill occurring outside of a PEC including patient care areas

a. Clear area of visitors and unnecessary staff to prevent exposure to spilled chemotherapy. Notify the chemotherapy certified RN of the spill where patient is receiving treatment.

b. Isolate the area of the spill to reduce the risk of exposure to additional personnel.

c. Obtain a spill kit.

d. Immediately post sign from spill kit to warn others of the presence of hazardous spill.

e. Put on one pair of chemo gloves, disposable chemo gown, second pair of gloves over cuff of gown, shoe covers, and safety glasses. Note: If the patient or the nurse is allergic to latex, use chemotherapy approved, non-latex gloves.

f. Don a NIOSH-certified respiratory protection if there is a risk of respiratory exposure to HDs (e.g. HD spills larger than what can be contained with a spill kit or suspected airborne exposure to power or vapors)

g. Respiratory cartridges used during spill cleanup must be disposed of in hazardous waste.

h. If the spill is liquid, place absorbent towels on top of spill gently to prevent splashing of HD.

i. If the spill is a solid, place absorbent towels wetted with water on top of the spill.

j. Use the absorbent towels to contain the spill and carefully place the contaminated towels in the HD waste bag provided in the spill kit.

k. Clean up any broken glass fragments using utility gloves (placed over double chemotherapy gloves) and place into designated sharps container along with any contaminated sharps.

l. Place any contaminated non-sharps supplies into the hazardous waste bag contained in the spill kit.

m. Once the visible spill has been visibly removed, use absorbent towels wetted with bleach solution to clean the affected area. Allow the bleach to dry.

n. Clean the area with the designated disinfectant solution.

o. Place pads, towels, and all contaminated materials (sheets or gowns) into leak proof waste bag. Place glass fragments in a hard sided chemo bin. Seal the bag and place inside another bag. Both bags appropriately labeled as hazardous waste. Leave outer bag open for now.

p. Once the spill has been cleaned, remove PPE per policy Hazardous Drug Compounding Techniques and discard as hazardous waste.

q. Seal the outer chemo waste disposal bag and place it in a puncture proof container chemotherapy container

r. Any linens contaminated with chemotherapy shall be disposed of as chemotherapy waste in the yellow bins.

s. Notify oncologist of the type and amount of chemotherapy spilled and how much patient actually received of that chemotherapy.

3.5 For any spill with patient exposure to chemotherapy

a. For eye exposure, immediately rinse eye thoroughly with running water at sink or eye wash station if nearby

b. For skin exposure, wear PPE and remove contaminated clothing in chemotherapy bag provided in spill kit. Place bag in yellow chemotherapy waste bin. Cleanse the patient's skin with soap and water, rinse with water, and repeat this process again.

3.6 For any staff member exposed to spill

a. For eye exposure, immediately rinse eye thoroughly with running water at sink or eye wash station if nearby.

b. Notify supervisor and follow employee work injury process.

3.7 Documentation of Spills

a. Spills and spill cleanup must be documented via the online incident reporting system.

3.8 Disposal of HD Waste

a. All items used in the preparation of hazardous drugs are considered contaminated and should be discarded in the appropriate waste container and further disposed of per local, state and federal regulations.

b. Discard all supplies used to make and administer chemotherapy medications (tubing, empty bags, bottles, vials, syringes, gloves, pads, masks, gowns, wipes, etc.) in the Chemo waste.

c. Outer gloves are to be considered contaminated. When removing/changing the outer gloves, they are to be placed into the Chemo waste.

d. The inner glove stays in place once the contaminated outer gloves are removed. The inner gloves are used to affix labels and place the CSP/s into a sealable containment bag which is used during transport.

e. Discard PPE and wash hands before leaving the preparation area. Gloves and gowns should not be worn outside the drug preparation area.

f. Documentation of waste generation and disposal will be completed in accordance with applicable local, state and federal guidelines.

g. Needles, syringes, and breakable items used to compound HDs will be handled in the same manner as those contaminated by blood or other potentially infectious materials, should be disposed in chemo sharp container.

h. HD waste must be kept inside covered waste containers clearly labeled as "Hazardous Drug Waste Only".

i. Bags are never acceptable as final waste storage containers, they are may only be used as a transport mechanism for non-sharps contaminated waste until it is disposed of a in a rigid container designated for hazardous waste.

j. At least one such receptacle will be located in each area where HDs are handled.

k. HD waste containers are moved from their location to the designated HD storage area by staff that has been trained in these procedures.

l. When containers are full, they will be sealed and dated.

m. HD waste waiting for removal by a waste hauler properly certified and licensed to remove HD waste must be kept in a secure and segregated area in sealed, labeled drugs with plastic liners to which only authorized personnel are admitted.

4. REFERENCES

4.1 USP<800> Hazardous Drugs- Handling in Healthcare Settings- 2016 USP Compounding Compendium.

Document History:

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Document Owner: Pharmacy Department	**Replaces Policy:** A151, , Nursing Policy 703.03

Date Reviewed	Reviewed By:	Revisions Made?	Revision Description
08/16/2016	Pharmacy Review Committee	Yes	New format Changes from USP 800 Remove not applicable practice.
09/22/2016	Cancer Quality of Care Committee	No	
10/3/2016	P&T Committee	No	Not patient care, does not go to MEC.
12/27/2016	PAC	Yes	Formatting
2/15/2017	HEC	No	Approved
9/28/2017	Cancer Quality of Care/Hazardous Drug SubCommittee	Yes	Add handling of spill in patient's care area, combined with nursing policy 703.03
12/28/2017	Cancer Quality of Care/Hazardous Drug SubCommittee	Yes	Combined spill occurred outside of PEC and patient care area. Add inform EVS for non-containable spill and disinfection clean up. Section 3.2 a-e.
	Minor changes no need to go to P&T. Not patient care does not go to MEC.		
6/14/2018	PAC	No	
6/15/2018	CEO	No	

RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER

Housewide

	Document No: 872	Page 1 of 2
Title: Biosimilars	**Effective Date:** 6/15/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By:  Jennifer Cruikshank CEO/ Hospital Director		☐ Policy ☐ Procedure ☒ Guideline

1. BACKGROUND/SCOPE

1.1 The Biologics Price Competition and Innovation Act was enacted to engender competition among biological medications, resulting in decreased prices and increased innovation. The inclusion of these biosimilars into RUHS-Medical Center drug formulary should be evaluated, as it was designed to enhance competition and lead to better patient access and lower cost to consumers.

2. DEFINITIONS

2.1 *FDA.* Food and Drug Administration.

2.2 *Pharmacy and Therapeutics Committee (P&T).* Committee that develops and reviews a formulary of drugs available for use in the Medical Center.

2.3 *Biological products.* Therapies used to treat diseases and health conditions, including vaccines, blood and blood components, gene therapies, tissues, and proteins. Unlike most prescription drugs made through chemical processes, biological products generally are made from human and/or animal materials. May also be called a "reference product". ***example: infliximab, filgrastrim***

2.4 *Biosimilar.* A biosimilar biological product that is deemed by the FDA to be highly similar to an already FDA-approved biological product, for which there are no clinically meaningful differences in terms of safety, purity, and potency. There may be minor differences in clinically inactive components. ***example: infliximab-dyyb, filgrastrim-sndz***

2.5 *Reference product.* The biological product already approved by the FDA, with which biosimilars strive to be highly similar.

2.6 *Interchangeables.* Biosimilars that meet additional standards and expected to produce the same clinical result as the Reference product. The FDA states that an interchangeable biological product may be substituted for the Reference product.

3. GUIDELINES

3.1 The position of Riverside University Health System – Medical Center is that:

a. Automatic substitution of biosimilars or interchangeables is not allowed unless approved by P&T.

b. Extrapolation of indications approved for the Reference biological product to completely different diseases and/or age groups should not be allowed without adequate preclinical, safety or efficacy data, and approval by P&T.

3.2 The inclusion of biosimilar medications into formulary should be evaluated and considered in order to make such medications more affordable and accessible.

3.3 Biosimilar medications will be evaluated using the standard RUHS-Medical Center formulary review process prior to use as described in policy.

3.4 The following considerations will be evaluated in addition to those as described in the formulary process for Pharmacy & Therapeutics Committee Members evaluating Biosimilars for Formulary inclusion:

a. Clinical Considerations
- Indications including populations
- Evaluation of efficacy and safety using available data
- Immunogenicity

b. Product Considerations
- Nomenclature
- Manufacturing and supply chain considerations
- Packaging, labeling, and storage

c. Institutional Considerations
- Interchangeability
- Transition of care
- Pharmacovigilance: surveillance for efficacy, safety, and immunogenicity
- Cost
- Reimbursement
- Provider and patient education
- Information technology

4. REFERENCES

4.1 HW 842 Drug Formulary and Non-Formulary Process. *Effective 12/28/15.*

4.2 California Board of Pharmacy law. Business and Professions Code 4073.5.

4.3 TJC, Revision to: Elements of Performance of Medication Management, MM.02.01.01; July 1, 2017

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Document Owner: Pharmacy	**Replaces Policy:** new

Date Reviewed	**Reviewed By:**	**Revisions Made?**	**Revision Description**
08/08/2017	Pharmacy Review Committee	No.	New Policy.
11/6/17	Pharmacy & Therapeutics Committee	No	
5/1/2018	Policy Approval Committee	Yes.	Update defintions for clarity of biosimilar. Correct grammar. Update industry specific language to lay person terms – 3.1b "originator" to original biological product.
6/15/2018	CEO	No	

RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER
Housewide

	Document No: 873	Page 1 of 7
Title: Cleaning and Disinfection of the Sterile Compounding Area	**Effective Date:** 6/15/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By:  Jennifer Cruikshank CEO/ Hospital Director		☒ Policy ☐ Procedure ☐ Guideline

1. SCOPE

The policy of Riverside University Health System- Medical Center is to describe, standardize and define the process by which the controlled environments (ISO Class 5, 7, and 8), segregated compounding areas (SCAs) and the general pharmacy preparation area are cleaned, disinfected, and maintained in a manner that ensures an environment suitable for compounding sterile preparations.

2. DEFINITIONS

2.1 ISO Class 5 not more than 3520 particles 0.5 mm and larger size per cubic meter of air for any LAFW, BSC, CAI, and CACI

2.2 ISO Class 7 not more than 352,000 particles of 0.5 mm size and larger per cubic meter of air for any buffer area/clean room

2.3 ISO Class 8 not more than 3,520,000 particles or 0.5 mm size and larger per cubic meter of air for any ante-area.

2.4 Primary Engineering Control (PEC): a device that provides an ISO Class 5 or better environment through the use of non-turbulent, unidirectional HEPA-filtered first air for compounding sterile preparations. Example of PEC devices include Laminar Airflow Workbenches (LAFWs), Compounding Aseptic Isolators (CAIs), Biological Safety Cabinets (BSCs), and Compounding Aseptic Containment Isolators (CACIs)

2.5 Segregated Sterile Compounding Areas (SCAs): a designated space for sterile to sterile compounding where PEC is located within either a demarcated area or in a separate room.

2.6 Ante-Area: an area where personnel hand hygiene and garbing procedures, staging of components and other high-particulate-generating activities are performed, that is adjacent to the area designated for sterile compounding.

2.7 Buffer Area: an area where the primary engineering control (PEC) is physically located.

3. POLICY

3.1 This policy is limited to cleaning and disinfection of PECs: LAFWS and CACIs as well as ISO Class 7 buffer area/clean room, ISO Class 7/8 ante-area, segregated compounding areas (SCAs).

3.2 All ISO Class 5 surfaces, work table surfaces, carts, counters and the cleanroom floor shall be cleaned at least daily. After each cleaning, disinfection using a suitable sterile agent shall occur on all ISO Class 5 surfaces, work table surfaces, carts, and counters.

3.3 Walls, ceilings, storage shelving, tables, stools, and all other items in the ISO Class 7, ISO Class 8 environment or segregated compounding areas shall be cleaned at least weekly.

3.4 Cleaning shall also occur after any unanticipated event that could increase the risk of contamination.

3.5 Only hospital approved cleaning agents will be used.

3.6 Cleaning shall be done using a germicidal detergent and sterile water. The use of a sporicidal agent is required to be used at least monthly.

3.7 Sterile water (sterile water for injection or irrigation) must be used to dilute disinfectant solutions if they will be used inside of the ISO Class 5 areas.

3.8 Though the general pharmacy preparation area is not an ISO "classed" environment it is must be kept clean and orderly and is included in the cleaning schedule in this policy.

3.9 Cleaning of the general compounding area (buffer area/clean-room and ante-area) must occur at least daily.

3.10 If cleaning occurs at the start of the compounding day, adequate time must be given to allow all cleaned surfaces to dry PRIOR to starting any compounding activity.

3.11 Cleaning and disinfection of the controlled environments will not be performed while compounding is taking place, or compounding activity must be limited to emergency situations.

3.12 Pharmacy and Environmental Services (EVS) personnel responsible for cleaning duties must have been adequately trained on this policy as well as on Hand Hygiene and Garbing.

3.13 Only trained pharmacy compounding personnel may access, clean and disinfect the inside of any PECs.

3.14 Cleaning of the buffer area/clean-room, segregated compounding area, and ante-area may be performed by trained EVS personnel.

3.15 All personnel who perform cleaning and disinfecting functions must successfully complete both of the following competencies and in this order:

a. Hand Hygiene and Garbing which includes gloved fingertip samples that verify the person's ability to don sterile gloves without contaminating them. EVS personnel do not have to complete gloved fingertip samples since they do not put their hands inside the PECs, but still need to don sterile gloves while cleaning.

b. Cleaning and Disinfecting

3.16 Cleaning equipment and supplies

a. Shall be stored in a designated area to ensure segregation from compounding supplies.

b. Materials used (wipers, sponges, mops, etc.) must be non-shedding and preferably composed of synthetic micro fibers.

c. Materials used must be dedicated to use in particular areas (buffer area/clean-room, ante-area, segregated compounding area, etc.) and will not be moved from these areas except for disposal.

d. Separate and dedicated cleaning materials and equipment must be used for non-HD and HD sterile compounding environments. Floor mops may be used in both the buffer area/clean-room and the ante-area as long as they are used in that order.

e. For any reusable cleaning equipment:

- Hang mops vertically to promote drying when not in use
- Buckets must be inverted and allowed to dry.
- Manufacturer's instructions on the product used must be used to ensure that the effectiveness of the device is maintained and that repeated use does not add to the bio-burden of the areas cleaned.

3.17 Since disinfectant solutions are irritants and can damage the skin and eyes, safety glasses must be worn during cleaning of ceiling and walls when there is an increased likelihood of splashing or dripping of solution.

3.18 Safety Data Sheets must be readily available for reference to all staff in the pharmacy for all cleaning agents (germicidal detergents, sporicidals, isopropyl alcohol) used in the cleaning and disinfecting process.

3.19 Tacky Mats:
a. Placed at the entrance to controlled areas within the pharmacy compounding area to remove debris from personnel and equipment as they enter these areas.

b. Must be changed at least daily, or more frequently depending on need as they become soiled.

3.20 Any compounding equipment (i.e. automated compounders, devices, or pumps) placed into ISO Class 5 PECs are subject to the same cleaning requirements as the LAFW, CACI or itself. These devices

a. Must be moved during daily cleaning so that the surface underneath and behind the device may be cleaned and disinfected.

b. Must be part of the daily cleaning

c. Must be part of the surface sampling that occurs inside the PECs

3.21 If any equipment or device used to compound sterile preparations is removed from the ISO Class 5 buffer area/clean-room, it must be cleaned with a germicidal detergents followed by a sporicidal agent followed by the sterile IPA prior to being placed back into service within that environment.

3.22 Document the cleaning procedure in Simplifi

4. PROCEDURE

4.1 Prior to beginning cleaning, staff will gather supplies needed including the pre-mixed cleaning agent, Sodium Hypochloride 0.65%

4.2 Cleaning must occur from the cleanest to the dirtiest areas. The lowest class room or environment (i.e. ISO Class 5) must be cleaned before the ISO Class 7 buffer area/clean-room followed by the ISO Class 7/8 ante-area then general pharmacy preparation area.

4.3 General consideration when washing floors

a. Wash floors after the ISO Class 5 areas, counters and other easily cleanable work surfaces have been cleaned and disinfected.

b. Begin at the location farthest from the buffer area/clean-room entrance working toward the exit to avoid walking over cleaned areas.

c. Move any rollable carts, shelving and chairs as cleaning is accomplished.

d. Perform necessary restocking or other in room activities prior to cleaning and floor washing so that buffer area/cleanroom may be exited and allowed to dry and remain at rest until the next shift.

4.4 No high particle shedding materials may enter the buffer area/cleanroom. This includes corrugated cardboard, paper documents (i.e. compounding worksheets and order forms are allowed, but should be kept to a minimum). No worksheets or order forms may enter the ISO Class 5 environment compounding surface at any time.

4.5 Cleaning LAFW and CACI

a. Perform hand hygiene and garbing in accordance with Hand Hygiene and Garbing Procedure.

b. If the LAFW / CACI have been turned off, restart and allow it to run a minimum of 30 minutes prior to cleaning. Ideally, PECs should never be turned off.

c. If cleaning CACI used for hazardous drug compounding, refer to the policy Hazardous Drug Decontamination, Spill and Waste Management since the CACI must be decontaminated before it can be cleaned.

d. Inspect the inside of the hood/bench for any spills or puddles of crystallized compounding components. Clean the spills with sterile water prior to proceeding with the routine cleaning procedure.

e. If daily cleaning was performed the night before, at the start of each new workday, the LAFW / CACI must be wiped down with a wipe wetted with 70% IPA.

f. Begin cleaning activity within the LAFW / CACI environment moving in a general top to bottom and from inner to outer surface.

g. Do not splash or spray the HEPA filter with disinfectant solution. Carefully clean the HEPA grills.

h. For CACI, clean the main chamber first then the antechamber. The tray underneath the deck will be decontaminated, cleaned and disinfected at least weekly.

i. NOTE: DO NOT wipe in a large circular motion across the work surface, as it is likely contaminants and particulate matter will be introduced into the rear portion of the hood as they are captured, carried and deposited from the front edge of the LAFW.

j. Additionally ISO Class 5 critical work areas will be cleaned with sterile 70% IPA at the beginning of each compounding shift, between batches, every 30 minutes during continuous compounding, after spills and if contamination is suspected.

4.6 Daily Cleaning of Buffer area/Clean room, Ante-area and Segregated Compounding Areas

a. Clean all easily cleanable horizontal and high touch surface in the buffer area/clean room first followed by the ante-area. The same must be done for the surfaces inside the perimeter of the SCA followed by those outside the perimeter.

b. Each compounding day the following must be cleaned in both the buffer area/clean-room and in the ante-area:

- The inside surfaces of all ISO Class 5 PECs
- Other counters and easily cleanable work surfaces (horizontal surfaces of shelves, carts, tables, chair seats and back, computer, keypads, telephones, door handles, sink, faucets, top of carts and other items in the ante-area)
- Floors

c. Cleaning is performed in this order:

- Inside surfaces of ISO Class 5 PECs by pharmacy compounding personnel.
- Counters and easily cleanable work surfaces in the buffer area/clean room, ante-area or SCA as listed in 4.6.b.2
- Floors in the buffer room from farthest point away from the door progressing toward the door to the ante-area while moving easily moveable carts and shelving.
- Counters, sink and easily cleanable work surfaces in the ante-area as long as those areas are on the "clean side" of the line of demarcation.
- Counters and easily cleanable work surfaces in the ante-area beyond the line of demarcation ("dirty side").
- Floors of the ante-area.
- Perform any required daily activities related to cleaning the pharmacy general preparation area as required by organizational policy.

4.7 Weekly Cleaning of Controlled Environments: weekly cleaning includes all of the elements of the daily cleaning plus additional activities in the following order:

a. During weekly cleaning all of the surfaces of any furniture installations, PEC in the controlled environments are cleaned with a germicidal detergent, Sodium Hypochlorite 0.65%. The buffer area/clean-room is cleaned before the ante-area

b. All of the daily cleaning activities are required.

c. Additionally the following must be cleaned during weekly cleaning:

- Ceilings and the top of PECs.
- Walls and the horizontal surfaces of PECs (sides, back and front)
- All surfaces of moveable carts, storage shelving and stools (including underside, legs and feet/wheels;

- All storage bins must have contents removed; bins cleaned inside and out, allowed them to dry and contents replaced.
- All surfaces in room including doors, door handles, pass through, permanent shelving, etc.

4.8 Three-Time Cleaning of Controlled Environments:

a. Three-time cleaning may be performed when the following conditions occur:
   - Before the first use and testing of a new facility
   - Before the introduction of new furniture or equipment into controlled environments
   - After action levels are exceeded occurring during environmental monitoring air or surface sampling procedures.
   - After any maintenance work performed in the buffer area/clean room or ante-area that would compromise environmental integrity.
   - Power outages of greater than 59 minutes affecting the primary and secondary engineering controls. Validate effectiveness by performing surface sampling.
   - After a filter integrity test (which demonstrates a filter leak) or facility smoke test.
   - Additionally, at the discretion of the pharmacy manager.

b. Three-time cleaning will be performed using 0.65% sodium hypochlorite for the first clean followed by two additional cleanings with the hospital approved cleaning agent.

c. The areas cleaned in a Three-time cleaning, unless otherwise noted, include all surfaces inside the PECs as well as all surfaces in the controlled environment (all activities of both daily and weekly cleaning)

d. Perform and document all required cleaning.

5. REFERENCES

USP <797> http://www.usp.org/usp-healthcare-professionals/compounding

California Board of Pharmacy CCR 1735 and 1751

Document History:

Prior Release Dates: 1/20/15	Retire Date: N/A
Document Owner: Pharmacy	Replaces Policy: A117

Date Reviewed	Reviewed By:	Revisions Made Y/N	Revision Description
05/31/2017	EVS Department (approved by Marvin Granados)	no	Revised with 2017 requirement from California state Board of Pharmacy
06/13/2017	Pharmacy Review Committee	Yes	Changed wording to clarify on 3.16.d.
8/7/17	P&T	No	Not patient care. No need to send to MEC.
5/1/2018	PAC	No	
6/15/2018	CEO	No	

RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER
Housewide

	Document No: 874	Page 1 of 4
Title: Hand Hygiene and Garbing for Sterile Compounding	**Effective Date:** 5/2/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By: Jennifer Cruikshank CEO/ Hospital Director		☒ Policy ☒ Procedure ☐ Guideline

1. SCOPE

To standardize the process of hand hygiene and garbing for all authorized personnel working in controlled environments of the ante-area and buffer/clean room to reduce sources of viable and nonviable contamination.

2. DEFINITIONS

2.1 Garbing: The act of donning personal protective equipment.

2.2 Line of Demarcation: A visible line on the floor of the Ante room distinguishing the clean and dirty side of the room.

2.3 Ante-area: An area where personnel hand hygiene and garbing procedures, staging of components and other high particulate generating activities are performed, that is adjacent to the area designated for sterile compounding.

2.4 Buffer/clean room: An area where the primary engineering control (PEC) is physically located.

2.5 Primary Engineering Control (PEC): a device that provides an ISO Class 5 or better environment through the use of non-turbulent, unidirectional HEPA-filtered first air for compounding sterile preparations.

2.6 IPA. Isopropyl Alcohol 70%.

2.7 HD(s). Hazardous drugs.

3. POLICY

3.1 All compounding and/or maintenance personnel (persons other than trained compounding personnel), who perform facility cleaning must receive training on hand hygiene and garbing as well as successfully complete the Competency Assessment: Hand Hygiene and Garbing prior to entering the buffer area/cleanroom environment.

3.2 Individuals not trained on this procedure can enter controlled areas only if accompanied by a trained and qualified person.

3.3 Individuals experiencing rashes, sunburn, weeping sores, conjunctivitis, active respiratory infections or other communicable disease, or those wearing cosmetics, nail polish, or artificial nails shall be excluded from the ISO Class 5 and compounding areas until their conditions are remedied.

3.4 Compounding personnel shall not wear any wrist, hand, finger, or other visible jewelry, piercing, headphones, ear-buds, or personal electronic devices.

3.5 Until the hand hygiene and garbing activities described in this procedure are completed, no personnel may enter the clean area of the ante-area or enter the buffer area for any reason.

3.6 When preparing hazardous agents, appropriate gowns and personal protective equipment shall be worn.

3.7 Personal protective equipment consisting of a non-shedding gown, head cover, face mask, facial hair covers (if applicable), and shoe covers must be worn inside the designated area at all times.

3.8 When compounding HDs, a second pair of shoe covers must be donned before entering the clean room and doffed when exiting. Shoe covers worn in HD handling areas must not be worn to other areas to avoid spreading HD contamination and exposing other healthcare workers.

3.9 Sterile gloves must be used for compounding.

3.10 Gloves are to be routinely disinfected with sterile IPA before entering or re-entering the PEC and after contact with non-sterile objects. Gloves shall also be routinely inspected for holes, punctures, or tears and replaced immediately if such are detected.

3.11 Eye-shields are not required unless the staff member is performing an activity that has a relatively higher likelihood of splashing of cleaning materials such as performing cleaning of controlled area ceilings.

3.12 Personal protective equipment must be donned and removed in an ante-area or immediately outside the segregated compounding area.

3.13 Personnel shall don personal protective equipment in an order that proceeds from those activities considered the dirtiest to those considered the cleanest. Compounding personnel scrubs must be clean and not soiled. Scrubs must be free of human and animal hair/fur.

3.14 Legs must be completely covered below the hem of the gown:

a. Shorts or skirts worn without stockings are not acceptable.

b. Closed toe shoes must be worn at all times.

c. Nylon stockings are acceptable.

4. PROCEDURES

4.1 Hand Hygiene and Garbing activity proceeds in an order from dirtiest to cleanest and generally occurs in this order:

a. Don shoe covers.

b. Don head cover, face mask and facial hair cover (if applicable) in any order, must cover all of hair.

c. Use lint-free towel to wipe corrective eyeglasses with sterile IPA or other appropriate disinfectant (if applicable)

d. Remove debris from underneath fingernails using a nail cleaner under running water followed by vigorous hand washing.

e. Perform 30 seconds hand and forearm up to elbows wash with soap.

f. Dry hands and forearms thoroughly with lint-free towel.

g. Don no-shedding gown with full closure.

h. Apply alcohol-based surgical rub with persistent activity to all surfaces of hand and fingers and allow hands to dry.

i. Don sterile gloves in the anteroom or buffer area.

j. Sanitize all surfaces of gloved hands with sterile IPA

4.2 Gloving

a. Antiseptic hand cleansing must be performed using an alcohol-based surgical hand scrub with persistent activity.

b. Allow hands to dry completely.

c. Sterile gloves shall be the last item donned before compounding begins

d. Don the first glove with an ungloved hand by grabbing an inner surface, sliding the hand into it and pulling it on.

e. Don the second glove by slipping the gloved hand into the cuff of the second and placing the ungloved hand into the free glove.

f. Inspect both gloves for damage and replace if any defects (tears, holes and rips) are noted.

g. For hazardous compounding that use Compounding Aseptic Containment Isolator (CACI), the operator will be donning the sterile gloves over the isolator gloves rather than donning the sterile gloves in the ante-area.

h. Gloves may become punctured or torn. If tearing or a puncture occurs, the compounder must perform hand hygiene again and re-glove.

i. Gloved hands will be sprayed with sterile IPA at the following times:

- Prior to entering the Class 5 space (for instance to put materials into the hood);
- At the start of each batch prior to compounding;
- Any time the compounder's hand re-enter the ISO Class 5 area;
- Periodically during prolonged periods of compounding within the Class 5 area.

j. Spraying gloved hands with sterile IPA must occur away from the hood in order to prevent damage to the HEPA filter.

k. Spray gloved hands with sterile IPA and rub hands together to completely coat surfaces of gloves with IPA.

l. Allow sterile IPA to dry completely.

4.3 Exiting the Buffer Area/Clean Room

a. <u>Temporary exit from the buffer area</u>:

- Remove gloves.

- Remove the gown which may be saved for subsequent use during the same compounding day/shift provided it is not visibly soiled. If retained, it must be hung on a hook on the clean side of the anteroom and operator initials should be written inside.
- Remove the face mask, facial hair cover, head cover, gloves and shoes cover on "dirty side" of the ante-area.

b. Exiting at the end of the shift or day:

- The disposable gown must be discarded at the end of the compounding shift or day.

4.4 Considerations during the use of Compounding Aseptic Containment Isolator (CACI)

a. Compounding personnel must follow all of the steps outlined above.

b. Gloved Fingertip Sampling must occur inside of the isolator.

5. REFERENCES

5.1 USP <797> Pharmaceutical Compounding-Sterile Preparations- 2017.

5.2 California Code of Regulations Title 16 Section 1751.5 Sterile Compounding Attire.

Document History:

Prior Release Dates: 05/2013		**Retire Date:** N/A	
Document Owner: Pharmacy		**Replaces Policy:** Pharmacy A103	
Date Reviewed	**Reviewed By:**	**Revisions Made Y/N**	**Revision Description**
08/08/2017	Pharmacy Review Committee	Yes	New format, change hospital name. Remove high risk compounding information. Widespread changes to policy to be consistent with California board of pharmacy verbiage.
08/08/2017	EVS- Granados, Marvin	No	
9/11/17	P&T Committee	No	Not Patient care.
10/11/2017	Infection Prevention and Control Nurse	Yes	Minor wording
2/6/2018	PAC	Yes	Minor wording clarifications
4/25/2018	HEC	No	

RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER
Administrative

	Document No: 876	Page 1 of 6
Title: Management of Adult Patients with Personal Insulin Pumps during Hospitalization	**Effective Date:** 8/6/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By:  Jennifer Cruikshank CEO/ Hospital Director		☐ Policy ☐ Procedure ☒ Guideline

1. SCOPE

1.1 This guideline will provide the inpatient multidisciplinary teams guidance to ensure safe patient management of personal insulin pumps along with safe timing and dosing of insulin administration during admissions or patient observation status to Riverside University Health System- Medical Center (RUHS-Medical Center).

1.2 Inpatient adults must be established pump users, cognitively alert and fully capable of continuing self-management of their personal insulin pump as determined by the inpatient Primary Physician.

1.3 Inpatient self-administration of insulin via insulin pump will be permitted in all qualified adult patients.

1.4 Initial Inpatient Insulin Pump Use Exclusion Criteria

a. Critically ill adults

b. Adults admitted for Diabetic Ketoacidosis (DKA)/ Hyperosmolar Hyperglycemic State (HHS) and Hypoglycemia

c. Adults at risk for suicide or other self-harm

d. Adults unable/ not willing to sign and follow the Continuation of Patient Insulin Pump Use Agreement Form

e. Insulin pumps with U-500 insulin

2. DEFINITIONS

2.1 Adult Patient: Age 18 and older.

2.2 Basal Dose/ Rate: A continuous delivery of insulin via a self-administering insulin pump. This is the amount of insulin the patient requires to maintain a normal metabolic state when fasting.

2.3 Bolus Dose: Dose of insulin given at meal times/and or for correction/ sliding scale coverage. Rapid/short acting insulin is used.

2.4 Continuous Glucose Monitors/ Sensor (CGM): An external device that's used to measure real-time glucose levels throughout the day. Not all insulin pump users will have these monitors.

2.5 Infusion Site: The site where the catheter tip is inserted into the subcutaneous tissue connected by tubing to the insulin pump.

2.6 Inpatient Diabetes Team: Including but not limited to an endocrinologist, nurse practitioner and diabetes nurse educators.

2.7 Insulin Pump: An insulin pump is a small, battery-powered device that delivers insulin automatically and continuously via a plastic infusion site into the subcutaneous tissue. The infusion site is attached to an insulin containing reservoir that is driven by an electric motor and controlled by the pump.

2.8 POCT: Point of Care Testing (also called "finger-stick," "accu-check," "blood sugar test." This test must ALWAYS be done using a hospital (multi-patient) glucometer, not the patient's personal glucometer.

2.9 Primary Physician Team: Physicians assigned to patient's medical care management.

3. GUIDELINES

The RUHS-Medical Center Management of Adult Patients with Personal Insulin Pumps during Hospitalization guideline is to ensure safety for the patients who are using their personal insulin pumps when hospitalized.

3.1 General Information

a. Insulin pump orders must be written by either the Primary Physician Team or the Endocrinologist.

b. Insulin pumps require rapid acting insulin analogs. In addition to the insulin pump itself, additional supplies that are usually required include: 1.8 or 3 ml pump reservoirs, infusion sets, adhesive dressings, and batteries.

c. Initial basal rate setting(s), along with any changes to basal settings, are documented during hospitalization by the Primary Physician Team, primary care RN and/ or the Inpatient Diabetes Team nurse.

d. Basal dose is given via the insulin pump

e. Bolus dose and correction/ scale coverage insulin is usually not given via the insulin pump. Bolus insulin needs alternative insulin orders by the Primary Physician Team or the Endocrinologist.

f. The insulin pump and the CGM must be REMOVED prior to any surgical procedure or Radiological procedure (such as MRI, CT scan, and/or X-rays). The infusion site may be left in place only during Radiological procedures.

g. The Primary Physician Team needs to consult the Endocrinologist prior to surgical procedures for insulin medication management.

h. Subcutaneous Basal- Bolus insulin or Drip insulin orders must be written by the Primary Physician Team or Endocrinologist if the insulin pump is discontinued for more than two hours and/or the insulin pump malfunctions.

3.2 General Insulin Pump Handling Requirements

a. Initial insulin that is currently in the insulin pump's reservoir should be discarded upon admission and a new reservoir should be filled with hospital supplied insulin per Primary Physician Team or Endocrinologist order.
   i. If the patient does not have a fresh reservoir once admission orders are written, then orders to discontinue insulin pump along with subcutaneous basal/ bolus insulin or drip insulin orders must be written by the Primary Physician Team or Endocrinologist.

b. If changes are made to the insulin pump basal/bolus settings during hospitalization, the Primary Physician Team or Endocrinologist should consider adjusting the settings back to pre-hospital settings if appropriate prior to discharge.

3.3 Escalation Guideline

a. If at any time there is a concern related to patient compliance with the Continuation of Patient Insulin Pump Use Agreement Form and/or physician provider compliance with this guideline, a discussion by the multidisciplinary team should be elevated through the appropriate chain of command for timely resolution.

3.4 Multidisciplinary Team Responsibilities

a. Patient Responsibilities
   i. Patient must comply with all of the guidelines in this guideline.
   ii. Disclose the insulin pump's programmed basal rate(s) and bolus settings on admission.
   iii. Complete the Continuation of Patient Insulin Pump Use Agreement Form upon admission to the hospital. (Form # 6 or 6a)
   iv. Provide insulin pump supplies (infusion sets, reservoirs, etc.).
   v. Change the infusion set every 48-72 hours or as needed in the presence of the Primary RN and/or Inpatient Diabetes Team RN.
   vi. Agree to use ONLY hospital-supplied insulin to fill new reservoirs
   vii. Patients should be knowledgeable of their insulin pump's manufacturer 24-hr toll-free emergency assistance telephone number (usually printed on the back of the actual insulin pump)

b. Primary Physician Team Responsibilities
   i. Assess and determine if it's appropriate for the patient to use their insulin pump/ CGM and if NOT appropriate, orders need to include:
      - Discontinuation of personal insulin pump/ CGM and reason for discontinuation
      - Subcutaneous Basal/ Bolus insulin or Insulin Drip orders
   ii. If appropriate, orders need to include:
      - To continue the use of patient's insulin pump with current pump settings along with CGM, if available.

- Basal rate(s) settings: in Basal Review pump option. Patient provides this information to the primary physician team on admission.
- Type of insulin pump/ CGM
- Frequency of blood glucose monitoring
- Subcutaneous bolus correction/ scale insulin

iii. Consult orders for Endocrinology and Diabetes Team

iv. Obtain a signed Continuation of Patient Insulin Pump Use Agreement Form which includes: reviewing the agreement form with the patient, answering any questions/ concerns the patient may have and explaining that failure to comply with agreement will result in discontinuation of their insulin pump. Located: on all unit Nursing Stations

v. Documentation of insulin pump location on patient's body, including skin site assessment.

c. RN Responsibilities

i. Be familiar with the General Information and General Insulin Pump Handling Requirements of this guideline.

ii. Assess:

- Assess and determine patient's ability to use their personal insulin pump/ CGM
- Assess and monitor for any signs and symptoms of hypoglycemia/ hyperglycemia
- Assess for and place a dietician consult as needed

iii. Verify:

- Patient has orders to continue person insulin pump use during hospitalization along with consult orders for Endocrinologist and for Diabetes Team.
- Orders written for bedside glucose POCT with hospital glucometer.
- Patient has signed the Continuation of Patient Insulin Pump Use Agreement Form upon admission to the hospital. (Form # 6 or 6a)
- Appropriate alternative insulin orders are written if insulin pump is discontinued.

iv. Document:

- Patient's ability to use their personal insulin pump/ CGM.
- Order present to continue insulin pump use during hospitalization
- Insulin pump/ CGM type and location on patient's body, including skin site assessment.
- Any infusion set/ insertions site changes, usually every 48-72 hours and as needed.
- Current basal rate(s) and bolus settings if applicable along with any changes made to rates or setting.
- Bedside hospital glucose POCT
- Insulin amount used to fill the reservoir in the patient's medication administration record.
- If ordered by the Primary Physician or Endocrinologist, the discontinuation of the insulin pump/ CGM and reason for discontinuation.

d. Inpatient Diabetes Team RN Responsibilities

i. Assess for and place a dietician consult as needed
ii. Verify an order to continue or discontinue patient's personal insulin pump/ CGM along with alternative insulin orders when appropriate.
iii. Document:
- Patient's ability to use their personal insulin pump/ CGM
- Order present to continue insulin pump use during hospitalization
- A Continuation of Patient Insulin Pump Use Agreement Form is completed and in the hard chart
- Insulin pump/ CGM type and location on patient's body, including skin site assessment.
- Current basal rate(s) and bolus settings if applicable along with any changes made to rates or setting.
- Any infusion set/ insertions site changes, usually every 48-72 hours and as needed.

e. Inpatient Pharmacy Responsibilities
i. When insulin orders for pump use are noted, confirm with the Primary RN that the patient plans to continue personal insulin pump therapy.
ii. Ensure that the Primary Physician Team has written orders for subcutaneous bolus insulin if appropriate.
iii. Supply a vial of short-acting or rapid-acting insulin per physician order. The pharmacist may auto-substitute when necessary.

f. Registered Dietician Responsibilities
i. Review patient's dietary needs, dietary history and counsel as necessary.
ii. Advise the Primary Physician Team of any suggested changes to diet orders.
iii. Assess and document patient's understanding of and competence with carbohydrate counting.

4. EDUCATION

4.1 Patient, Family/ Caregiver Education:
a. Patients, family and caregivers will be educated about the guideline for continuing/discontinuing the use of the personal insulin pumps during hospital admissions. The patient, family and/or caregivers will demonstrate proper use of the insulin pump to the management care team.

4.2 RN Education:
a. The primary RN will be familiar with the care related to inpatients and their insulin pump management including but not limited to: how to suspend or detach the pump when applicable.
b. The Inpatient Diabetes Team nurses will keep the primary nurse aware of education regarding the pump and will be available to answer questions as they arise.

5. REFERENCES

5.1 The Joint Commission standards MM.01.01.03 and MM.06.01.06 and –Effective January 1, 2018.

5.2 American Diabetes Association (January, 2018). Standards of Medical Care in Diabetes – 2018. The Journal of Clinical and Applied Research and Education, 41 (Supplement 1). Retrieved on April 30, 2018 from http://care.diabetesjournals.org

5.3 Draznin, B. MD, PhD (2016) Managing Diabetes and Hyperglycemia in the Hospital Setting: A clinician's Guide. Alexandria, VA: American Diabetes Association.

5.4 G. Grunberger et al. Statement by the American Association of Clinical Endocrinologist Consensus Panel on Insulin Pump Management. Endocrine Practice, Volume 15, No. 5, September/October 2010.

5.5 BJ Leonhardi et al. Use of Continuous Subcutaneous Insulin Infusion (Insulin Pump) Therapy in the Hospital: A Review of One Institution's Experience. Journal of Diabetes Science and Technology, Volume 2, Issue 6, November 2008.

6. ATTACHMENTS

6.1 Continuation of Patient Insulin Pump Use Agreement Form in the Hospital (Form # 6, 6a)

Document History:

Prior Release Dates: N/A	**Retire Date:** N/A
Document Owner: Diabetes Care Committee	**Replaces Policy:** N/A

Date Reviewed	Reviewed By:	Revisions Made?	Revision Description
3/28/17	Compliance/ County Privacy Officer	Yes (to agreement form)	Rewording and removing some statements
06/21/17	Diabetes Care Committee	No	n/a
06/21/17	Nutrition and Dietary Dept.	No	n/a
06/21/17	OB & L/D Dept.	No	n/a
8/16/17	Nursing Policy and Procedure Committee	Yes (to guideline)	2.6, removing: "non-pregnant"
8/21/17	BioMed Dept.	No	
11/02/17	Pharmacy Dept.	Yes (to guideline)	3.2.b and 3.6.e.III: rewording
12/4/2017	Pharmacy & Therapeutics Committee (P&T)	Yes (to guideline)	3.4 d rewording
12/18/2017 5/22/2018	Forms Committee	Yes (to agreement)	Rewording and made Spanish translation/ statements removed
7/3/2018	PAC	Yes, to guideline	Rewording and alphabetization
Approved thru P&T Minutes 1/11/18	MEC	No	

I, _____, am requesting to use my personal insulin pump during my hospitalization. I understand that for safety during this hospital stay, I must agree to each of the following conditions in order to use my insulin pump. If I feel that I cannot agree to these conditions, I will need to discontinue the use of my insulin pump and the medical care team will treat my diabetes with insulin injections.

Please read and initial each statement

During my hospital stay:

1) _____ I will only use the basal infusion delivery method on my insulin pump, as prescribed.
   a) Bolus and correction insulin **WILL NOT** be given through my pump.
   b) Bolus and correction insulin will be given through subcutaneous injections by the nurse, based on the doctor order.

2) _____ I will review my insulin basal rate(s) with my admitting nurse. I agree not to change rate of basal infusion by myself. Changes in any of my basal rates will only be made by the Diabetes Team nurse when there is an order from the Doctor/Endocrinologist.

3) _____ I will change the insertion site and tubing at least every 72 hours in the presence of my bedside nurse or with the Diabetes Team nurse. I will routinely check for kinked tubing or skin irritation.

4) _____ Any bolus or correction insulin dose I receive must be based on a reading from the hospital glucometer. I will not use any other glucometer to measure my blood sugars.

5) _____ The hospital will supply insulin for my pump. It is my responsibility to provide all other pump supplies during my stay.

6) _____ I will report signs of low blood sugar to my nurse.

7) _____ I will report any insulin pump problems to my nurse.

8) _____ My insulin pump will be discontinued if I cannot care for it myself for any reason or if deemed necessary by my primary care physician/ Diabetes Team. (examples may include: confusion or medications that may make me sleepy or less alert)

9) _____ My insulin pump may be discontinued if my blood sugars are consistently too high or too low. Assessment of the possible reasons of blood sugar inconsistency will be reviewed by my primary care team and insulin dose adjustments may be made based on inpatient blood sugar goals.

10) _____ My insulin pump may be discontinued for certain tests and procedures, including surgery (examples of tests may include: MRI, CT Scan, or X-rays)

11) _____ I have received training in the use of my personal insulin pump.

The manufacturer and model of my insulin pump is: _____

The doctor coordinating my diabetes care or my Certified Diabetes Educator:

Name: _____ Tel no: _____

My signature indicates that I have read this agreement, understand it completely and agree to be bound by its terms.

Patient (Print Name): _____ Date: _____

Patient's Signature: _____ Time: _____

Yo, _____, solicito utilizar mi bomba de insulina personal durante mi hospitalización. Para poder utilizar mi propia bomba de insulina durante esta estadía hospitalaria, entiendo que por motivos de seguridad debo conceder a cada una de las siguientes condiciones. Si siento que no puedo aceptar estas condiciones, tendré que dejar de usar mi bomba de insulina y el cuerpo médico me administrará tratamiento para la diabetes con inyecciones de insulina.

Por favor, lea y coloque sus iniciales al inicio de cada una de las siguientes declaraciones:

Durante mi hospitalización,

1) _____ Utilizaré solo la modalidad de tasa basal de la bomba de insulina según se me recetó.
   a) **NO SE ADMINISTRARÁ** tratamiento con esquema bolo ni corrección de la insulina a través de mi bomba.
   b) El tratamiento con esquema bolo o corrección de la insulina se administrará con inyecciones dadas por el personal de enfermería y según las órdenes del médico.

2) _____ Revisaré la tasa basal de la insulina con mi enfermera de admisión. Estoy de acuerdo en no cambiar la tasa basal de infusión por mi cuenta. Cualesquier cambios en las tasas basales las realizará la enfermera del Equipo de Diabetes y solamente según las órdenes del médico o endocrinólogo.

3) _____ Cada 72 horas, ante la presencia de mi enfermera asignada o la enfermera del Equipo de Diabetes, cambiaré el punto de inyección y la sonda (tubo). Revisaré rutinariamente para ver si la sonda se ha retorcido o si hay irritación en la piel.

4) _____ Cualquier bolo o dosis de corrección de insulina que reciba deberá basarse en la lectura del glucómetro del hospital. No utilizaré ningún otro glucómetro para medirme la glucemia (niveles de azúcar en la sangre).

5) _____ El hospital me proporcionará la insulina para la bomba. Durante mi internación, la provisión de los demás suministros para la bomba será mi responsabilidad.

6) _____ Informaré a mi enfermera de cualquier síntoma de hipoglucemia (niveles bajos de azúcar).

7) _____ Informaré a mi enfermera de cualquier problema con la bomba.

8) _____ Se suspenderá el uso de mi bomba de insulina si no pudiera, por cualquier motivo, realizar los cuidados de la misma por mi propia cuenta o si mi médico de cabecera o el Equipo de Diabetes lo considerara necesario (por ejemplo: si padezco de confusión o si se me administran medicamentos que me adormezcan o me ocasionan una disminución de lucidez).

9) _____ Se podría suspender el uso de mi bomba de insulina si mis niveles de glucemia (azúcar en la sangre) constantemente resultaran demasiados altos o bajos. El cuerpo médico a cargo de mi atención evaluará los posibles motivos por las discrepancias en mis niveles de glucemia y modificará las dosis de insulina basándose en los niveles meta de glucemia para pacientes internados.

10) _____ Se podría suspender el uso de mi bomba de insulina para poder realizar ciertos estudios [como son los estudios de resonancia magnética (MRI), tomografías computarizadas (CT) o radiografías] y procedimientos, incluyendo una cirugía.

11) _____ He recibido instrucción sobre el uso de mi bomba de insulina personal.

El fabricante y el modelo de mi bomba de insulina es: _____

El médico quien coordina la atención de mi diabetes o el educador certificado de la diabetes es:

Nombre: _____ N.º Tel.: _____

Con mi firma a continuación indico haber leído el presente acuerdo, que lo entiendo en su totalidad y que acepto cumplir con las condiciones contenidas en el mismo.

Paciente: _____ Fecha: _____
(Nombre en letra de molde)

Firma del paciente: _____ Hora: _____

RIVERSIDE UNIVERSITY HEALTH SYSTEM – MEDICAL CENTER
Housewide

	Document No: 903	Page 1 of 2
Title: Food from Outside	**Effective Date:** 10/1/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☒ RUHS – Medical Center ☐ RUHS – Public Health ☐ Departmental
Approved By:  Jennifer Cruikshank CEO/Hospital Director		☐ Policy ☐ Procedure ☒ Guideline

1. DEFINITIONS

1.1 Food from Outside: Food not provided to patient as part of normal meal service by Food and Nutrition Services.

1.2 Therapeutic Diet: All diets except: Regular, transitional diets, (i.e. GI Soft diet, Full Liquid and Clear Liquid diets) and diets modified for patients' preferences or lifestyle choice (Vegan or Vegetarian).

2. GUIDELINES

2.1 Due to the potential for foodborne illness, Riverside University Health System - Medical Center discourages visitors from bringing patients food from outside.

2.2 When made aware of a request to consume food from outside, the licensed independent practitioner writes an order in the medical record that grants permission for the patient to consume food from the outside, taking into consideration the patient's diet and medical condition.

2.3 Nursing staff or dietitian will educate the patient and family/visitors regarding hospital guidelines for safe food handling practices.

a. Food from outside must be ready to eat. No cooking of food items is allowed at RUHS – Medical Center.
b. Perishable food items should not remain at the bedside for longer than two (2) hours.
c. RUHS – Medical Center does not provide refrigeration services for food from the outside.

2.4 Nursing staff may request a consult from Nutrition Services for the purposes of family and/or patient education.

2.5 Nursing staff will document in the patient's medical record that food from outside sources is being consumed by a patient.

3. REFERENCES

3.1 RUHS – Medical Center policy HW 901 Nutritional Screening and Assessment

3.2 Title 22, 70273 Dietetic Services General Requirements

Document History:

Prior Release Dates: New Housewide	**Retire Date:** N/A
Document Owner: Food and Nutrition Services	**Replaces Policy:** Departmental FNS policy last reviewed 05/20/2014

Date Reviewed	Reviewed By:	Revisions Made Y/N	Revision Description
06/07/2018	Director of Nutrition Services; Nursing Leadership; Supervising Dietitian	Yes	New Template; Added: Nursing staff or dietitian will educate patient and family/visitors regarding guidelines for safe food handling. Dietitian can be consulted for therapeutic diet guidelines, if applicable. Deleted: allowing food to be stored in the pantry refrigerator.
8/15/2018	Nursing P&P	Yes	Add definition for therapeutic diet Clarify precautions to be taken Add that nursing does not provide refrigeration
9/4/2018	Policy Approval Committee	Yes	Add 'licensed independent practitioner' Clarification of nutrition services consultations in 2.4 Delete 2.6 (repetitive)
9/13/2018	Medical Executive Committee	No	

RIVERSIDE UNIVERSITY HEALTH SYSTEM

Ambulatory Care

	Document No: 1100	Page 1 of 3
Title: Department Time off and/or RUHS Closed Clinic Request	**Effective Date:** 10/1/2018	☐ RUHS – Behavioral Health ☐ RUHS – Care Clinics ☐ RUHS – Medical Center ☐ RUHS – Public Health ☒ Departmental
Approved By:  Jennifer Cruikshank Hospital Director/CEO		☒ Policy ☒ Procedure ☐ Guideline

1. PURPOSE AND AUTHORITY

1.1 To establish a process to manage pre-arranged clinic closures or reductions by any provider providing direct patient care or supervision in the RUHS-MC clinics and to ensure that RUHS ambulatory services will be provided on a regularly scheduled basis.

1.2 To ensure open lines of communication between providers and clinic administration, who support the operational aspects of the clinics.

1.3 To minimize the disruption for patients caused by untimely notification of cancelled appointments for non-emergent reasons.

1.4 This policy and procedure applies to Riverside University Health Systems (RUHS) hospital based clinics and is authorized by the ambulatory care committee.

2. DEFINITIONS

2.1 **Service Line Chief:** The head of a department or section of a clinically oriented services in a hospital or healthcare facility.

2.2 **Extreme Emergency:** A serious or unexpected situation requiring immediate intervention and remedial action.

2.3 **Nurse Coordinator:** The Nurse Coordinator is responsible for direct oversight of daily clinic activities, functions, and staff. The title is commonly referred to as the clinic manager.

3. POLICY

3.1 All non-emergency clinic closures or reductions shall be requested in writing greater than 30 days prior to the date(s) affected by such request. Exceptions may be made in emergent circumstances deemed appropriate by the service line chief.

3.2 This policy addresses specifics implied in physician contracts which requires "advanced notice and cooperation with administration."

3.3 Scheduled clinics can only be cancelled or reduced with the approval of an RUHS Service Line Chief in consultation with the nurse coordinator.

3.4 Individual academic departments may choose to require additional oversight (Chief of Ambulatory Department).

3.5 The *Department Time Off and/or RUHS Closed Clinic Request* form (attached) supports this policy in the following ways:

a. Section II is tied to this policy and shall remain standardized.

b. Sections I & III can be flexed by academic departments as necessary for their operational and/or human resource needs.

3.6 No clinic closure or reduction will be approved by email notification, only by obtained signatures on section II of the attached form.

3.7 If an emergency arises requiring closure of a clinic the nurse coordinator will complete the *Department Time Off and/or RUHS Closed Clinic Request* form as a report rather than a request for tracking purposes for Human Resources and financial services needs. Approval signatures are not required in these circumstances.

4. RESPONSIBILITIES

4.1 The Executive Director of Ambulatory Care and the Medical Director of Ambulatory Care will ensure compliance to this policy and procedure.

4.2 Ambulatory Care Administration is responsible for:

a. Verifying the need for the clinic closure.

b. Assisting the requesting provider with the required process outlined below.

5. PROCESS/GUIDELINES

5.1 The provider requesting time away from clinic for any reason must complete the *Department Time Off and/or RUHS Closed Clinic Request* form and then obtain the approving signature of his/her Service Line Chief. Retroactive forms shall be completed when a clinic is closed on and emergent basis.

5.2 The Service Line Chief must obtain the Nurse Coordinator's (or covering manager's) signature and work with the Nurse Coordinator to determine the plan for rescheduling patients, including who will be responsible to reschedule patients (centralized scheduling vs. clinic staff).

5.3 The Medical Director for Specialty Care's signature is required on all forms requiring time off from any specialty clinic.

5.4 If an academic department requires the Department Chief's signature, either the Service Line Chief or the Nurse Coordinator ensures the form reaches the appropriate person.

5.5 Once all required signatures are obtained in Section II, the form is to copied and distributed as follows:

a. Copy to scheduling personnel who are to immediately block the schedule template and begin implementing the rescheduling plan approved by the Service Line Chief and Nurse Coordinator.

b. Copy to Director of Nursing Services, Ambulatory Care.

c. Copy to Medical Director of Ambulatory Care.

d. Copies to the Nurse Coordinator(s) of affected clinic as well as the requesting provider.

e. If the clinic closure/reduction is requested by a contracted provider (as opposed to a county employed provider), the original is sent to the RUHS CFO's office.

f. If the clinic closure/reduction is requested by a county employed provider, the original is to be forwarded to the academic department secretary for human resources processes.

6. ATTACHMENTS

6.1 Department Time off and/or RUHS Closed Clinic Request Form.

Document History:

Prior Release Dates: NA		**Retire Date:** N/A	
Document Owner: Ambulatory Care Committee		**Replaces Policy:** NA	
Date Reviewed	**Reviewed By:**	**Revisions Made Y/N**	**Revision Description**
	Ambulatory Care Committee	Yes	Minor Grammatical Changes
08/07/18	Policy Approval Committee	Yes	Add definitions, remove form #
9/13/2018	Medical Executive Committee	No	

Riverside University HEALTH SYSTEM

Academic Department of Internal Medicine

DEPARTMENT TIME OFF and/or RUHS CLOSE CLINIC REQUEST

Submit separate request for each time off episode

Requesting Physician/Provider: _____ **Submission Date:** _____

Clinic service line (Please circle): Card Derm Endo/DM GenMed GI/Hep Heme HemeOnc ID Nephro Neuro Pulm Rheum

PROPOSED TIME-OFF

Date(s) Off	Last Day at Work	Day Resume Work	Event	Vacation Days	Meeting Days

***In case of an emergency I may be reached at:** _____

PROPOSED COVERAGE

	PERSON COVERING
Inpatient Service	
Mental Health	
Committee Assignments	
Other (clinic, etc.)	

Clinic closure or reduced schedule request (RUHS Form ACC-001)

Request Clinic: **REDUCTION** Dates: _____ **AM / PM**
Request Clinic: **CLOSED** Dates: _____ **AM / PM**
Reason for closure if not time off (wards, etc): _____

Is there a backlog of patients for this clinic? ☐ Yes ☐ No
If there is a backlog, have arrangements been made to either add an additional clinic day or distribute additional patients to other clinic days to avoid worsening the backlog? ☐ Yes ☐ No

_____ **Service Line Chief-RUHS / Date**

_____ **Clinic Nurse Manager (ANM) / Date**

_____ **Chief of Amb IM (Stottlemyer) / Date**

Three signatures denotes approval for clinic closure or reduction, but not for department time off.

Post approval: ☐ If clinic is a specialty must be signed by Med Dir of Specialty Care: _____
MedDir Specialty (Thomazin) / Date
☐ Scheduling blocked. Rescheduling will be done by: ☐ Clinic ☐ Central Scheduling
☐ Copy to Ambulatory Director of Nursing, Clinic Manager, Service Line Chief, Person Requesting
☐ Copy to Ambulatory Medical Director, Chief of Amb IM
☐ Original to Department Secretary if requesting provider is employed by County of Riverside else Finance

REVIEW & APPROVAL for IM: This time off request has been reviewed and approved.

_____ **Department Chair or Designee / Date**

Post approval: ☐ Department Secretary files, copy to requester, and enter approval into log