Pharmacy & Therapeutics Committee Meeting

Private Dining Room

December 9, 2021 7:00 a.m.

Agenda Items	Individual Responsible
1. Call to Order	Nathan Chamberlain, MD
2. Announcement	Patrick Ellis, PharmD
3. Conflict of Interest Disclosure	Rachel Kile, PharmD
4. Approval of October 2021 Minutes	Nathan Chamberlain, MD
5. HIT Antibody Testing Update	Ann Durham, MT, Laboratory Director

Next Meeting Date: February 10, 2022 at 7:00 a.m.

PHARMACY AND THERAPEUTICS COMMITTEE

DATE: October 7, 2021 CALLED TO ORDER: 7:02 a.m.
LOCATION: Zoom conference call ADJOURNED: 7:39 a.m.

Physician Member Attendance:		Non-Physician Member Attendance:				Guests:
X	**Nathan Chamberlain, MD- Chairman**	X	**Karen Babb, PharmD- Manager**		Shannon Harris, RN- Infection Prevention	**Tina Mathew, Pharmacy Resident**
X	**Mark Anderson, MD- Infectious Disease**		Jamie Barrie, PharmD- Manager, Hixson		Rhonda Hatfield, RN-CNO	**Doug Dertien, Pharmacy Resident**
X	**Justin Blinn, MD- Anesthesiology**	X	**Patrick Ellis, PharmD- Director**		Kevin Hopkins, RT- Director of Resp Therapy	**Sabrina Curtis, Pharmacy Resident**
	David Dodson, MD- Hospitalist		Rodney Elliott- Purchasing	X	**Rachel Kile, PharmD- Clinical Manager**	
	F. Lee Hamilton MD- Hospitalist	X	**Karen Frank, RN- Quality**		Daniel Marsh, PharmD- Operations Manager	
	William Haren, MD- Psychiatry		Lori Hammon, RN- Quality	X	**Carey Smith, RPh- Manager, Georgia**	
	Matthew Kodsi, MD-Quality		Farrah Reidt, Clinical Nutrition			
X	**Aditya Mandawat, MD- Interventional Cardiology**					
X	**Chad Paxson, MD- Intensivist/Pulmonology/ICU**					
	Vimal Ramjee, MD- Cardiology					
	James Wahl, MD- Hospitalist, GA					
	Richard Yap, MD- Hospitalist					

This meeting will be convened under the protection of the Tennessee Statute 63-6-219 and the Health Care Quality Improvement Act of 1986, Public Law 99-660. All information, case reviews, meeting minutes, statistics and correspondence are confidential and protected. Included in that protection are those that are involved in the review of the information. Any discussion of this information outside the realm of Peer Review constitutes a breach and violates the protection of the persons involved in the breach.

AGENDA ITEM	FINDINGS OR CONCLUSION	ACTION, RESPONSIBILITY	STATUS
Minutes	The August 2021 minutes were approved as submitted.	Approved	Complete
CommonSpirit Health System P&T Committee	**September 2021 Decision Brief:** The medication decisions that were approved at the CommonSpirit Health System P&T committee meeting were reviewed. All new system formulary medications or changes were either consistent with existing CHI Memorial formulary decisions or are described in the "Formulary Decisions & Therapeutic Interchanges" section of the minutes below, or will be reviewed at an upcoming P&T committee meeting.	Approved	Complete
Formulary Decisions & Therapeutic Interchanges	1. **Aminolevulinic acid (Gleolan®):** Rachel reviewed a new oral imaging agent that is indicated as an adjunct agent for the visualization of grade III or IV malignant glioma tissue during surgery, to be used by Dr. Babu (Neurosurgeon). It must be administered ~3 hours prior to onset of anesthesia. Patients must be protected from natural and artificial light sources and monitored for phototoxic reactions for 48 hours after administration. The committee approved the following use criteria: May be used inpatient and outpatient for patients with high-grade glioma undergoing fluorescence-guided surgical resections. Restricted to hospitals that are confirmed to have the appropriate microscope and filters and to neurosurgeons who have completed the training program provided by the distributor. The dispensing pharmacist must confirm that the requesting neurosurgeon is an approved user prior to dispensing. (The microscope has been ordered. Dr. Babu will be completing the training program.)	Approved	Complete
	2. **Empagliflozin (Jardiance®):** The EMPEROR-Preserved trial evaluated patients with class II–IV heart failure and an ejection fraction of greater than 40% receiving empagliflozin or placebo, in addition to usual therapy). Empagliflozin demonstrated a reduced composite of cardiovascular death or hospitalization for heart failure. Based on these results, it was recommended to remove the existing empagliflozin restriction criterion "For heart failure, ejection fraction is </= 40%". This	Approved	Complete

	recommendation was supported by Cardiology. The EHR will be updated. **3.** **Albuterol sulfate/ipratropium bromide (Combivent Respimat®)**: Combivent Respimat® is a non-formulary product locally and for the CommonSpirit Health system. During the pandemic, CHI Memorial hospitals have been utilizing Combivent Respimat® for COVID positive patients who have underlying COPD or asthma and do not require ventilation. Combivent Respimat® is $344.94 per patient. In order to decrease expense, it was recommended to approve an automatic therapeutic interchange for Combivent Respimat® as follows: In COVID positive patients who have underlying COPD or asthma and are not ventilated, interchange orders for Combivent Respimat® to Ventolin HFA (albuterol sulfate) (1 puff) plus Atrovent HFA (ipratropium bromide) (1 puff) at the same ordered frequency, both administered via common canister. This recommendation was approved by Dr. Mull and Kevin Hopkins, Director of RT. **4.** **Ivermectin**: Rachel reviewed the CommonSpirit Health system P&T committee decision on the formulary status/restrictions for ivermectin. It was recommended to align our formulary status for ivermectin with the system decision as follows: a. Restricted to the treatment of parasitic infections, such as Strongyloides stercoralis, Onchocerca volvulus, Pediculus capitis, Pediculus corporis, Pediculosis pubis, Sarcoptes scabiei, Wuchereria bancrofti, larva currens, larva migrans, acne rosacea, ascariasis, enterobiasis, trichuriasis and scabies. **5.** **Medications for COVID-19**: The committee reviewed and approved an automatic pharmacist therapeutic interchange to either tocilizumab or baricitinib based on product availability; and to bamlanivimab/etesevimab or casirivimab/imdevimab based on product availability. The appropriate use/restriction criteria for remdesivir, tocilizumab, and baricitinib were also reviewed. **6.** **Annual Medication Protocol Review**: Per regulatory requirements, the current medication related protocols were reviewed. See Attachment A of the minutes for the list of protocols with committee-approved actions required. These were reviewed to ensure consistency with the latest standards of practice per evidenced-based guidelines, as well as if there have been any preventable adverse patient events resulting from use.	Approved Approved Approved Approved	Complete Complete Complete Complete
Policies	**1.** **Pharmaceutical Vendor Guidance:** The committee reviewed the new CommonSpirit Health administrative guidelines for pharmaceutical vendors. Our current policy closely matches this guidance, and we will update our policy as needed to align. **2.** **Hypertonic Saline For Adults**: Approved use of undiluted 23.4% saline boluses for administration by Neurology/Neurosurgery was added to the policy. The name of the policy was updated to remove “3%”. **3.** **Pain Management**: The Intervention section of this policy was updated to include the following statement, “Upon patient request, nurse may administer pain medication ordered for a lower pain score (not higher pain score) than the value reported by the patient. (Example: Acetaminophen is ordered as needed for mild pain (1-3), and tramadol is ordered for moderate pain (4-6). Patient reports pain score of 5 and requests acetaminophen rather than tramadol. Acetaminophen may be given.)” **4.** **TPN/PPN- Adult**: Pharmacists manage all TPN formulas and required lab monitoring. Per policy, TPN must be given via a central vascular line/device. The policy was updated to include,	Approved Approved Approved Approved	Complete Complete Complete Complete

	"Pharmacist may order a peripherally inserted central catheter (PICC) for TPN administration if a central line is not already placed." **5. Ketamine Low Dose (Sub-anesthetic Dosing) for Pain-Adults**: The policy was updated to reorganize patient location, dosing, monitoring, and documentation guidance into a chart format. Additionally, the route of slow IVP was clarified to allow use in the PACU when ordered by Anesthesia providers. **6. Look-Alike Sound-Alike Medication List**: The committee reviewed the list. Prednisone and prednisolone were added based on recent errors related to them being confused. No other additions or edits were required at this time.	Approved Approved	Complete Complete
Nutrition	7. **EHR Diet Order Changes:** Rachel reviewed the diet order standardization initiative. This standardization initiative was approved by the Texas market for our EPIC build. The goal of the initiative is to ensure consistency in how diets are ordered and compliance with the current approved diet manual. The committee reviewed the EHR diet order changes.	Approved	Complete

There being no further business, the meeting was adjourned at 7:39 a.m. The next P&T meeting is **TBD (December) @ 7:00 a.m.**

Respectfully submitted,
Patrick N. Ellis, PharmD, Director of Pharmacy; Rachel Kile, PharmD, Pharmacy Clinical Manager

Approved by,
Nathan Chamberlain, MD, Chairman

Attachment A

Medication Protocols – TJC Annual Protocol Review

October 2021

Protocol	Key contact(s)	Action Required
MCT RIS Contrasts Order Set/ Contrast Media Administration Policy	Jeff Harwood Dr. Rowlett Pharmacy	Order set and policy up to date. No medication edits are required.
Anaphylaxis & Acute Drug Hypersensitivity Protocol	Pharmacy	Remove meperidine for rigors. Recent recommendations prefer methylprednisolone to be used for rigors. Update order set and policy.
Hypoglycemia Protocol	Diabetes education, Pharmacy	No medication edits are required. Order set and policy up to date.
Narcan (Naloxone) Opioid Reversal Protocol	Pharmacy; Clinical educator critical care	Remove the requirement of donning PPE for unknown narcotic exposure. No medication edits are required. Update order set and policy.

CSH SYSTEM PHARMACY AND THERAPEUTICS COMMITTEE DECISION BRIEF

November 2021 Decisions

NOTE: Local/divisional P&T committees may implement more restrictive statuses

Medication Name	Medication Used For	Formulary Decision				Comments/Restrictions/ Therapeutic Interchange	Timeline to Implementation
		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
Quadrivalent meningococcal conjugate vaccine	Infection prevention		Menquadfi				Within 60 days of System P&T Committee approval
DTaP-IPV-Hib-HepB conjugate vaccine	Infection prevention		Vaxelis				Within 60 days of System P&T Committee approval
Aducanumab-avwa	Alzheimer's disease treatment			Aduhelm			Within 60 days of System P&T Committee approval
Vibegron	Overactive bladder		Gemtesa			Vibegron therapeutic Interchange	Within 60 days of System P&T Committee approval
Ibrexafungerp	Vaginal yeast infections		Brexafemme				Within 60 days of System P&T Committee approval
Drospirenone/ Estetrol	Oral contraceptive		Nextstellis				Within 60 days of System P&T Committee approval
Viloxazine	ADHD		Qelbree				Within 60 days of System P&T Committee approval
Dasiglucagon	Severe hypoglycemia		Zegalogue				Within 60 days of System P&T Committee approval
Bendamustine hcl	NHL and CLL				Bendamustine	Procurement guidance: GPO facility infusion centers: Belrapzo preferred 340B facility infusion centers: Bendeka or Treanda preferred	Within 90 days of System P&T Committee approval
					Bendeka		
					Treanda		
					Belrapzo		
Bevacizumab	Antineoplastic, multiple				Avastin	Non-Preferred Reference - If a biosimilar is not available or payor-	

Medication Name	Medication Used For	Formulary Decision				Comments/Restrictions/ Therapeutic Interchange	Timeline to Implementation
		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
	indications					approved, the reference product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization. If possible, biosimilars should be used in preference to reference products. Preferred biosimilars	Within 90 days of System P&T Committee approval
Bevacizumab-awwb	Antineoplastic, multiple indications				Mvasi	Non-preferred Biosimilar - If the preferred biosimilar is not available or payor-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Bevacizumab-bvzr	Antineoplastic, multiple indications				Zirabev	Preferred Biosimilar - Restrictions - Inpatient (when outpatient administration not clinically appropriate) -Outpatient setting for FDA-approved indications or payer-approved off-label indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Filgrastim	Neutropenia				Neupogen	Non-Preferred Reference - If a biosimilar is not available or payer-approved, the reference product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization. If possible, biosimilars should be used in preference to reference products. Preferred biosimilars	

CommonSpirit

CSH System Pharmacy and Therapeutics (P&T) Committee
Meeting Date: November 18, 2021
DECISION BRIEF

Medication Name	Medication Used For	Formulary Decision				Comments/Restrictions/ Therapeutic Interchange	Timeline to Implementation
		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
Filgrastim-aafi	Neutropenia				Nivestym	Preferred Biosimilar - Restrictions - Inpatient (when outpatient administration not clinically appropriate) -Outpatient setting for FDA-approved indications or payer-approved off-label indications subsequent to insurance approval or prior authorization Preferred biosimilars	Within 90 days of System P&T Committee approval
Filgrastim-sndz	Neutropenia				Zarxio	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Tbo-filgrastim	Neutropenia				Granix	Restriction Criteria: Preferred Biosimilar - Restrictions -Inpatient (when outpatient administration not clinically appropriate) -Outpatient setting for FDA-approved indications or payer-approved off-label indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Infliximab	TNF blocking agent, multiple indications				Remicade	Non-Preferred Reference - If a biosimilar is not available or payer-approved, the reference product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization. If possible, biosimilars should be used in preference to reference products.	

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		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
Infliximab-abda	TNF blocking agent, multiple indications				Renflexis	Preferred Biosimilar - Restrictions - Inpatient (when outpatient administration not clinically appropriate) -Outpatient setting for FDA-approved indications or payer-approved off-label indications subsequent to insurance approval or prior authorization Preferred biosimilars	Within 90 days of System P&T Committee approval
Infliximab-axxq	TNF blocking agent, multiple indications				Avsola	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Infliximab-dyyb	TNF blocking agent, multiple indications				Inflectra	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Pegfilgrastim	Neutropenia				Neulasta	Non-Preferred Reference - If a biosimilar is not available or payer-approved, the reference product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization. If possible, biosimilars should be used in preference to reference products.	

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		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
Pegfilgrastim-bmez	Neutropenia				Ziextenzo	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	Within 90 days of System P&T Committee approval
Pegfilgrastim-cbqv	Neutropenia				Udenyca	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Pegfilgrastim-jmdb	Neutropenia				Fulphila	Preferred Biosimilar - Restrictions - Inpatient (when outpatient administration not clinically appropriate) -Outpatient setting for FDA-approved indications or payer-approved off-label indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Rituximab	Antineoplastic, multiple indications				Rituxan	Non-Preferred Reference - If a biosimilar is not available or payer-approved, the reference product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization. If possible, biosimilars should be used in preference to reference products.	

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		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
Rituximab-abbs	Antineoplastic, multiple indications				Truxima	Preferred Biosimilar - Restrictions - Inpatient (when outpatient administration not clinically appropriate) -Outpatient setting for FDA-approved indications or payer-approved off-label indications subsequent to insurance approval or prior authorization Preferred biosimilars	Within 90 days of System P&T Committee approval
Rituximab-arrx	Antineoplastic, multiple indications				Riabni	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Rituximab-pvvr	Antineoplastic, multiple indications				Ruxience	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	
Trastuzumab	Antineoplastic, multiple indications				Herceptin	Non-Preferred Reference - If a biosimilar is not available or payer-approved, the reference product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization. If possible, biosimilars should be used in preference to reference products.	

CommonSpirit

CSH System Pharmacy and Therapeutics (P&T) Committee
Meeting Date: November 18, 2021
DECISION BRIEF

Medication Name	Medication Used For	Formulary Decision				Comments/Restrictions/ Therapeutic Interchange	Timeline to Implementation
		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
Trastuzumab-anns	Antineoplastic, multiple indications				Kanjinti	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	Within 90 days of System P&T Committee approval
Trastuzumab-dkst	Antineoplastic, multiple indications				Ogivri	Preferred Biosimilar - Restrictions - Inpatient (when outpatient administration not clinically appropriate) -Outpatient setting for FDA-approved indications or payer-approved off-label indications subsequent to insurance approval or prior authorization	
Trastuzumab-qyyp	Antineoplastic, multiple indications				Trazimera	Non-preferred Biosimilar - If the preferred biosimilar is not available or payer-approved, another biosimilar product may be used in the outpatient setting for FDA-approved indications subsequent to insurance approval or prior authorization Preferred biosimilars	

Medication Name	Medication Used For	Formulary Decision				Comments/Restrictions/ Therapeutic Interchange	Timeline to Implementation
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							Within 90 days of System P&T Committee approval
Butorphanol injection	Pain	Butorphanol injection					
Nalbuphine injection	Pain and opioid dependence	Nalbuphine injection				Notes: DEA regulations must be followed for the indication of opioid dependence treatment for these agents, which includes the following: • Initiation of therapy is restricted to providers approved by the DEA for management of opioid dependence as part of a comprehensive treatment protocol. • If initiation is required in the hospital setting or by a non-approved provider, therapy is restricted to no more than 72 hours to manage withdrawal symptoms while arrangements are made to refer the patient to an addiction treatment program. • Continuation of home therapy allowed in the hospital setting utilizing the patient's prior dosing regimen.	Within 90 days of System P&T Committee approval
Cholecalciferol (vitamin d3)	Vitamin D supplementation	Vitamin D drops and liquid preparations					Within 90 days of System P&T Committee approval

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Insulin aspart prot/insuln asp	Glycemic management		Novolog 70/30			Mixed insulin therapeutic interchange	Within 90 days of System P&T Committee approval
Insulin lispro protamin/lispro	Glycemic management				Humalog 75/25	Restriction Criteria: Continuation of home dose	
Insulin nph/insulin regular	Glycemic management	Humulin 70/30					
	Glycemic management		Novolin 70/30			Mixed insulin therapeutic interchange	
Calcium gluconate premixed iv bags	Calcium supplementation	Calcium gluconate premixed IV bags					Within 90 days of System P&T Committee approval
Bamlanivimab	COVID-19				Bamlanivimab	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer approval	Within 60 days of System P&T Committee approval
Bamlanivimab/ etesevimab	COVID-19				Bamlanivimab - etesevimab	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer	

Medication Name	Medication Used For	Formulary Decision				Comments/Restrictions/ Therapeutic Interchange	Timeline to Implementation
		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
						approval	
Baricitinib	COVID-19 and rheumatoid arthritis				Olumiant	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer approval	
Casirivimab/ imdevimab	COVID-19				REGEN-COV	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer approval	
Etesevimab	COVID-19				Etesevimab	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer	

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		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
						approval	
Remdesivir	COVID-19				Veklury	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer approval	
Sarilumab	COVID-19 and rheumatoid arthritis				Kevzara	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer approval	
Sotrovimab	COVID-19				Sotrovimab	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved	

Medication Name	Medication Used For	Formulary Decision				Comments/Restrictions/ Therapeutic Interchange	Timeline to Implementation
		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
						indications subsequent to payer approval	
Tocilizumab	COVID-19, cytokine release syndrome, giant cell arteritis, juvenile arthritis, rheumatoid arthritis, system sclerosis-associated interstitial lung disease				Actemra	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer approval	
Tofacitinib citrate	COVID-19, arthritis, ulcerative colitis				Xeljanz	COVID-19 Indications Inpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines Outpatient: Per most recent CommonSpirit Health COVID-19 Treatment Guidelines subsequent to payer approval Non-COVID-19 Indications Outpatient use for FDA approved indications subsequent to payer approval	
Belumosudil	To treat chronic graft-versus-host disease after failure of at least two prior lines of systemic therapy		Rezurock				Within 60 days of System P&T Committee approval
Belzutifan	To treat von Hippel-Lindau disease under certain		Welireg				Within 60 days of System P&T Committee approval

Medication Name	Medication Used For	Formulary Decision				Comments/Restrictions/ Therapeutic Interchange	Timeline to Implementation
		Formulary Unrestricted	NonFormulary	NonFormulary - Do Not Stock	Formulary Restricted		
	conditions						
Fexinidazole	African trypanosomiasis caused by the parasite Trypanosoma brucei gambiense		Fexinidazole				Within 60 days of System P&T Committee approval
Finerenone	To reduce the risk of kidney and heart complications in chronic kidney disease associated with type 2 diabetes		Kerendia				Within 60 days of System P&T Committee approval
Odevixibat	Pruritus		Bylvay				Within 60 days of System P&T Committee approval
Acetaminophen	Pain and fever		Acetaminophen injection				Within 90 days of System P&T Committee approval
			Ofirmev				

THERAPEUTIC INTERCHANGES

Vibegron

Order	Interchange to
vibegron 75 mg daily	Mirabegron 25 mg daily

Mixed insulins

Order	Interchange to
Novolog 70/30	Humalog 75/25 at same dose and frequency
Novolin 70/30	Humulin 70/30 at same dose and frequency

Preferred biosimilars

	Bevacizumab	Rituximab	Infliximab	Trastuzumab	Pegfilgrastim	Filgrastim/Tbo-filgrastim
Preferrred biosimilar	Zirabev	Truxima	Renflexis	Ogivri	Fulphila	Nivestym Granix
Non-Preferred biosimilars	Mvasi	Ruxience Riabni	Inflectra Avsola	Kanjinti Trazimera	Udenyca Ziextenzo	Zarxio

FORMULARY REVIEW

GENERIC NAME: REMIFENTANIL

PROPRIETARY NAME: *ULTIVA®*

INDICATIONS:

- As an analgesic agent for use during the induction and maintenance of general anesthesia for inpatient and outpatient procedures.
- For continuation as an analgesic into the immediate postoperative period in adult patients under the direct supervision of an anesthesia practitioner in a postoperative anesthesia care unit or intensive care setting.
- As an analgesic component of monitored anesthesia care in adult patients.

CLINICAL PHARMACOLOGY: Remifentanil is a potent μ-opiate receptor agonist. The analgesic effects of remifentanil are rapid in onset and offset. The effects and side effects to remifentanil are dose dependent and similar to other opioids.

PHARMACOKINETICS: Remifentanil is rapidly hydrolyzed by plasma esterases. Its clearance is not dependent on organ (kidney or liver) function. Peak effect occurs within 3-5 minutes and duration of action is approximately 5-10 minutes. Remifentanil has no significant accumulation in adipose tissue which allows for ideal body weight dosing in obese patients.

CONTRAINDICATIONS: Remifentanil is contraindicated for use in epidural or intrathecal administration due to the presence of glycine in the formulation. It also should not be used in patients with hypersensitivity to fentanyl or to fentanyl analogs.

WARNINGS & PRECAUTIONS: Due to an increased risk of apnea and respiratory depression, remifentanil should be administered only by providers trained in the management of respiratory effects of potent opioids, including cardiopulmonary resuscitation. Continuous oxygen saturation monitoring is recommended.

Skeletal muscle rigidity has been reported after single doses of 1 mcg/kg or at infusion rates >0.1 mcg/kg/min and is related to both dose and speed of infusion. Rigidity can be managed in nonintubated patients by stopping or slowing the infusion, as the rigidity will self-resolve within minutes, due to the short half-life of the drug. Life-threatening rigidity should be managed with administration of a neuromuscular blocker or opioid antagonist.

The package insert for remifentanil recommends that IV bolus administration should be used only during maintenance of general anesthesia, and should be given over 30-60 seconds in nonintubated patients.

Rapid offset of action: within 5-10 minutes after the discontinuation of remifentanil, no residual analgesic activity will be present. Additionally, remifentanil should not be used as a sole agent for induction of anesthesia because loss of consciousness cannot be assured and because of a high incidence of apnea, muscle rigidity, and tachycardia.

ADVERSE REACTIONS: Common adverse reactions associated with administration of remifentanil and other mu-opioids include respiratory depression (3%), bradycardia (4%), hypotension (4%), and skeletal muscle rigidity (3%). Due to the short half-life of the drug, these effects dissipate quickly after dose decrease or drug discontinuation. Other adverse effects as reported in ≥5% of adult patients in clinical trials of remifentanil as an anesthetic agent included nausea (44%), vomiting (22%), pruritus (18%), headache (18%), sweating (6%), shivering (5%), and dizziness (5%).

DRUG INTERACTIONS: Use of additional opioids or other respiratory depressants such as alcohol are likely to increase the depressant effects of remifentanil. There are no known drug interactions with regard to metabolism.

DOSING: Remifentanil should be dosed based on total body weight in patients who are not obese but should be dosed based on IDEAL BODY WEIGHT in patients greater than 30% over their IBW.

Due to the fast onset and short duration of action, remifentanil may be titrated upward in 25-100% increments in adult patients during maintenance of anesthesia.

General anesthesia and continuing as an analgesic into the PACU or ICU

Phase	Continuous IV Infusion of ULTIVA (mcg/kg/min)	Infusion Dose Range of ULTIVA (mcg/kg/min)	Supplemental IV Bolus Dose of ULTIVA (mcg/kg)
Induction of Anesthesia (through intubation)	0.5 - 1*		
Maintenance of anesthesia with:			
Nitrous oxide (66%)	0.4	0.1 - 2	1
Isoflurane (0.4 to 1.5 MAC)	0.25	0.05 - 2	1
Propofol (100 to 200 mcg/kg/min)	0.25	0.05 - 2	1
Continuation as an analgesic into the immediate postoperative period	0.1	0.025 - 0.2	not recommended

Analgesic component of monitored anesthesia care

Method	Timing	ULTIVA Alone	ULTIVA + 2 mg Midazolam
Single IV Dose	Given 90 seconds before local anesthetic	1 mcg/kg over 30 to 60 seconds	0.5 mcg/kg over 30 to 60 seconds
Continuous IV Infusion	Beginning 5 minutes before local anesthetic	0.1 mcg/kg/min	0.05 mcg/kg/min
	After local anesthetic	0.05 mcg/kg/min (Range: 0.025 - 0.2 mcg/kg/min)	0.025 mcg/kg/min (Range: 0.025 - 0.2 mcg/kg/min)

COST & AVAILABILITY:
Available as 1, 2, & 5 mg vials (stable 24 hrs once reconstituted)
$36.60 per 1 mg

Cost analysis of 1 hour surgery (based on 80 kg patient)
0.2 mcg/kg/min 0.96 mg/hr ($36.60)
0.25 mcg/kg/min 1.2 mg/hr ($73.20)
0.5 mcg/kg/min 2.4 mg/hr ($109.80)

Cost analysis of 2 hour surgery (based on 80 kg patient)
0.2 mcg/kg/min 0.96 mg/hr ($73.20)
0.25 mcg/kg/min 1.2 mg/hr ($109.80)
0.5 mcg/kg/min 2.4 mg/hr ($183.00)

Comparative Cost of Precedex® (dose of 0.2-1 mcg/kg/hr)
(1) 50 ml bag of Precedex® (4 mcg/ml) would be sufficient for a 2 hour case $66.34

CONCLUSION/RECOMMENDATION:
Due to remifentanil's rapid metabolism by plasma esterases it does offer the advantage of rapid onset and short duration of action which may be beneficial in cases in which it is beneficial for the patients to be awake or under lighter sedation/analgesia during the surgery. The brief duration of action allows for potent analgesia without residual respiratory depression post-operatively. It appears to be best suited in settings where a potent, short acting opioid is required and there is little associated post-procedure pain. However, due to the high cost it will likely be important to limit the use to shorter duration procedures.
It is recommended that remifentanil be restricted for ordering as follows:

- Ordering restricted to Anesthesia providers
- Craniotomies with very low associated post-op pain
- Awake fiberoptic intubations

GP IIb/IIIa Inhibitors

FORMULARY UPDATE

CURRENT FORMULARY AGENT:
Aggrastat® (tirofiban)

BACKGROUND:
The platelet integrin receptor $\alpha_{IIb}\beta_3$ (GPIIb/IIIa) plays a crucial role in thrombosis and hemostasis by mediating interactions between platelets and several ligands, primarily fibrinogen. It is found on platelets and is composed of two separate subunits, α_{IIb} (GPIIb) and β_3 (GPIIIa). When the platelet becomes activated, the receptor undergoes conformational changes and several binding sites for fibrinogen and other ligands are exposed. Fibrinogen binding to the activated GPIIb/IIIa mediates platelet aggregation by crosslinking adjacent platelets. Since fibrinogen binding to the activated receptor GPIIb/IIIa constitutes the final common pathway of platelet aggregation, GPIIb/IIIa antagonists inhibit platelet aggregation independently of the type of platelet agonist. Currently, two GPIIb/IIIa antagonists are available: eptifibatide (Integrilin®) and tirofiban (Aggrastat®).
Note: Aggrastat became the sole formulary GPIIb/IIIa antagonist in 2017 due to a system-wide cost savings opportunity.

PRODUCT COMPARISON:
Clinical studies and meta-analyses have demonstrated that all FDA-approved glycoprotein IIb/IIIa inhibitors at current FDA-approved doses have a similar efficacy and safety profile. As such, the 2014 ACC/AHA guidelines recommend all glycoprotein IIb/IIIa inhibitors equally for the treatment of non-ST elevation-acute coronary syndrome and for PCI in their respective doses.

There are key similarities between tirofiban and eptifibatide, which makes them comparable in this respect (similar onset of action, similar half-life, both bind reversibly to the GPIIb/IIIa receptor, both are adjusted for renal insufficiency). Tirofiban can be stored at room temperature storage. Eptifibatide is now available as a generic product and therefore provides the best value on a per-patient treatment cost basis. However, it requires refrigeration and a second bolus dose. It is also contraindicated in patients dependent on hemodialysis.

RATIONALE FOR FORMULARY MODIFICATION TO INTEGRILIN (eptifibatide):
Availability of Aggrastat is currently limited. Eptifibatide is also preferential for utilization in neurointerventional procedures requiring stent placement. Therefore an updated financial analysis of Aggrastat versus eptifibatide was performed.

PHARMACOECONOMICS/COST:

Product (Drug, Strength, Form)	Cost/Course (90 kg patient)	Cost/Course (125.5 kg patient-Max dose)
Eptifibatide boluses (two 10 mL vials) + maintenance infusion for 18 hours (three 100 mL vials)	**$189.70**	**$276.72**
Tirofiban bolus (one 15 mL vial) + maintenance infusion for 18 hours (three 100 mL vials)	**$302.07**	n/a

RECOMMENDATION:
This proposed formulary conversion has been discussed with Memorial's cath lab leadership and with Dr. Brian Negus and they are agreeable to the formulary conversion. Integrilin (eptifibatide) will be the only GPIIb/IIIa agent on CHI Memorial's formulary.

MEDICATION USE EVALUATION- UPDATE

Impact of the MRSA nasal PCR paired with pharmacist interventions on IV vancomycin use in patients with pneumonia

BACKGROUND:
Intravenous (IV) vancomycin is frequently utilized for the empiric treatment of patients with suspected *Methicillin-resistant Staphylococcus aureus* (MRSA) pneumonia. The American Thoracic Society and Infectious Disease Society of America recommend using an MRSA nasal polymerase chain reaction (PCR) and sputum culture to help guide the de-escalation of empiric anti-MRSA coverage. Recent studies have found that MRSA nasal PCRs have a 95-99% negative predictive value for MRSA pneumonia. Furthermore, studies have demonstrated the test's utility in the de-escalation of IV vancomycin without compromising clinical outcomes, particularly when combined with pharmacist-driven protocols.

Based on the available clinical data, a policy was approved at the June 2020 P&T meeting allowing pharmacists to automatically order MRSA nasal PCRs when consulted for dosing IV vancomycin for the treatment of pneumonia. Pharmacists were then provided with training to order the test and make recommendations to providers to stop empiric vancomycin therapy as clinically appropriate. The purpose of this evaluation was to assess the impact of the pharmacist-driven protocol combined with antimicrobial stewardship interventions on IV vancomycin days of therapy for the management of pneumonia.

METHODS:
- Retrospective chart review
- Inclusion: Adult, inpatients with a diagnosis of pneumonia who received empiric IV vancomycin
- Exclusion: One dose of IV vancomycin only, concomitant (non-pneumonia) infection, vancomycin initiated prior to admission, positive MRSA respiratory culture prior to IV vancomycin initiation
- Pre-intervention: May-June 2020
- Post-intervention A: July-August 2020
- Post-intervention B: June-July 2021 (this arm was added post evaluation of initial data & post re-education of pharmacy and physician staff)

RESULTS:

	Pre-intervention (N=51)	Post-intervention A (N=62)	Post-intervention B (N=39)
Duration of IV vancomycin, median days	4	4	2
Vancomycin levels drawn, median	1	1	0
MRSA nasal PCRs ordered, n (%)	29 (56.9)	57 (92.0)	35 (90%)
MRSA nasal PCRs ordered by MD, n (%)	29/29 (100)	27/57 (47.4)	24/35 (68.6)
Respiratory cultures, n (%)	29 (56.7)	32 (52.6)	27 (69.2)
Pharmacist interventions, n (%)*	5/20 (25)	26/46 (56.5)	18/26 (69)
Time to pharmacist intervention, median hours	N/A	42	20
Physician acceptance, n (%)**	4/5 (80)	20/26 (77.0)	18/18 (100)
Antibiotic re-escalation***, n	3	1	0
Length of stay, median days	10	9	11
* % calculated out of total de-escalation opportunities (negative MRSA nasal PCR result) ** % calculated out of total pharmacist interventions made *** Re-initiation of IV vancomycin after discontinuation			

MRSA nasal PCR results & respiratory cultures (n=84)	Respiratory culture MRSA (+)	Respiratory culture MRSA (-)	
MRSA nasal PCR (+) (n=19)	12	7	Positive predictive value: 63.2%
MRSA nasal PCR (-) (n=65)	0	65	Negative predictive value: 100%

CONCLUSION:

- When pre-intervention and post-intervention A arms were compared after the initial data collection phase, significant opportunities for improvement were identified
    - Reeducation campaigns were conducted April & May of 2021
        - Pharmacists were given an anonymous survey to help us identify gaps in knowledge. The results of the survey informed reeducation sessions. The reeducation sessions focused on results of initial data collection, reviewing pneumonia guidelines & primary literature supporting the use of MRSA nasal PCRs, addressing questions from the survey, and reviewing complicated patient cases. A FAQ sheet was also developed and provided to the group.
        - Physicians were provided with the initial data from our evaluation and reeducated at their monthly meetings
    - Post-intervention B arm was added to the study in order to capture the impact of these secondary interventions
- Post-intervention B arm had a lower median IV vancomycin duration (2 days) compared to pre-intervention and post-intervention A arms (4 days)
- Most patients in the post-intervention B arm had no vancomycin levels drawn whereas the median number of levels drawn in pre- and post-intervention arm A was one.
- Most patients in both post-intervention arms had MRSA nasal PCRs ordered ($\geq$ 90%)
- A higher rate of pharmacist interventions was seen in the post-intervention B arm compared to the other two arms & the physician acceptance rate was 100%
    - Median time to pharmacist intervention decreased from 42 hours to 20 hours in the post-intervention B arm
- No difference was seen in hospital length of stay and no patients in the post-intervention B arm was re-escalated to IV vancomycin
- Negative predictive value of the MRSA nasal PCR in this study was 100%

ADR SUMMARY
July-Sept 2021

IRIS ADRs/ADEs INPATIENT

Inpatient ADRs/ADEs reported through IRIS July-Sept 2021

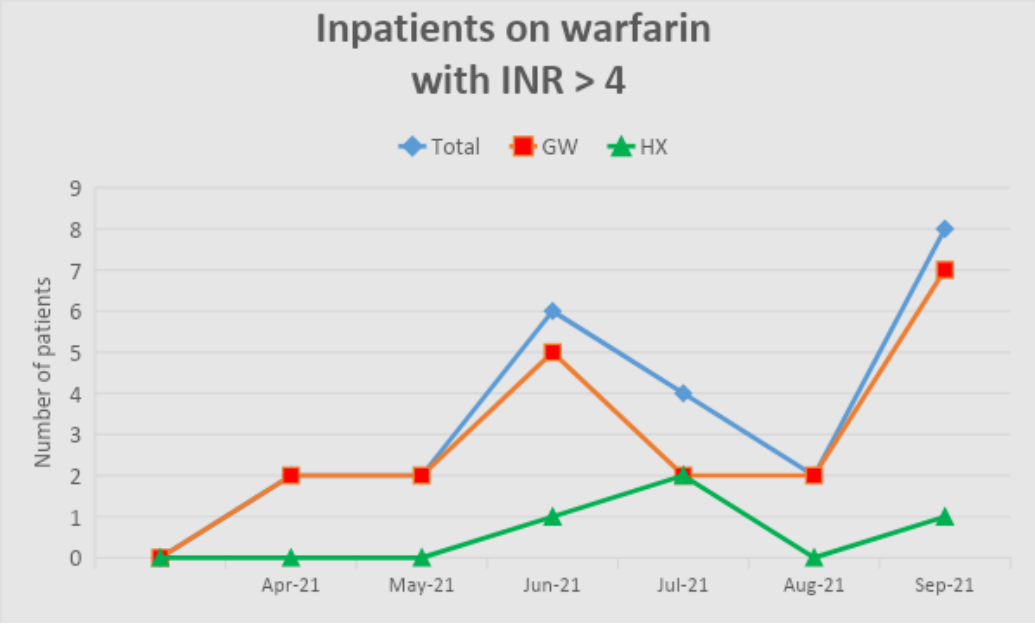
Incident Number	Event Date	Generic	Reaction	Primary Injury		Level of Harm	Location
210070003	8/1/2021	levophed	extravasation	Tissue damage		2	ICU HX
210076730	8/22/2021	amiodarone	extravasation	Redness at IV site		2	5 North

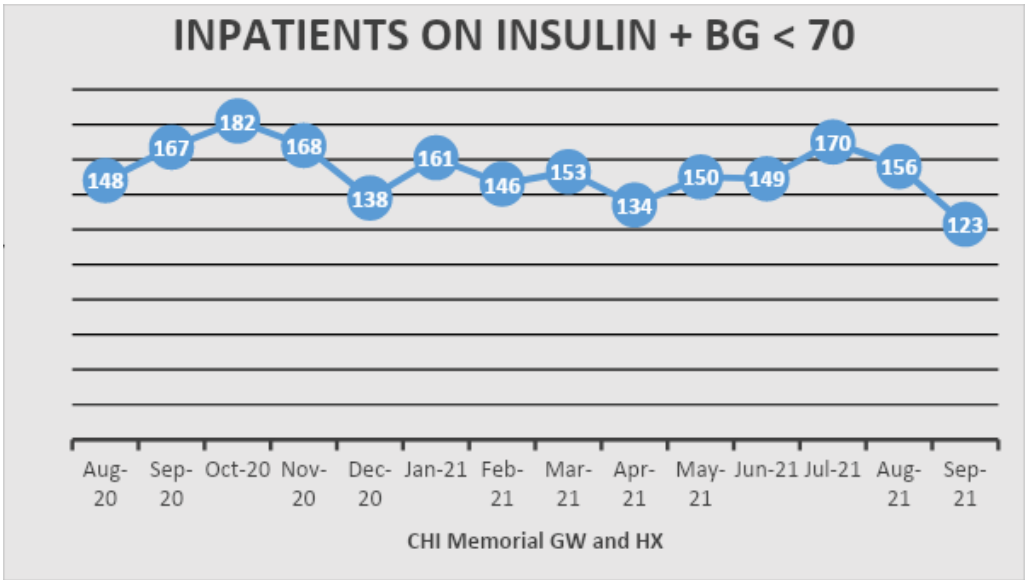
EPIC ADRs/ADEs INPATIENT

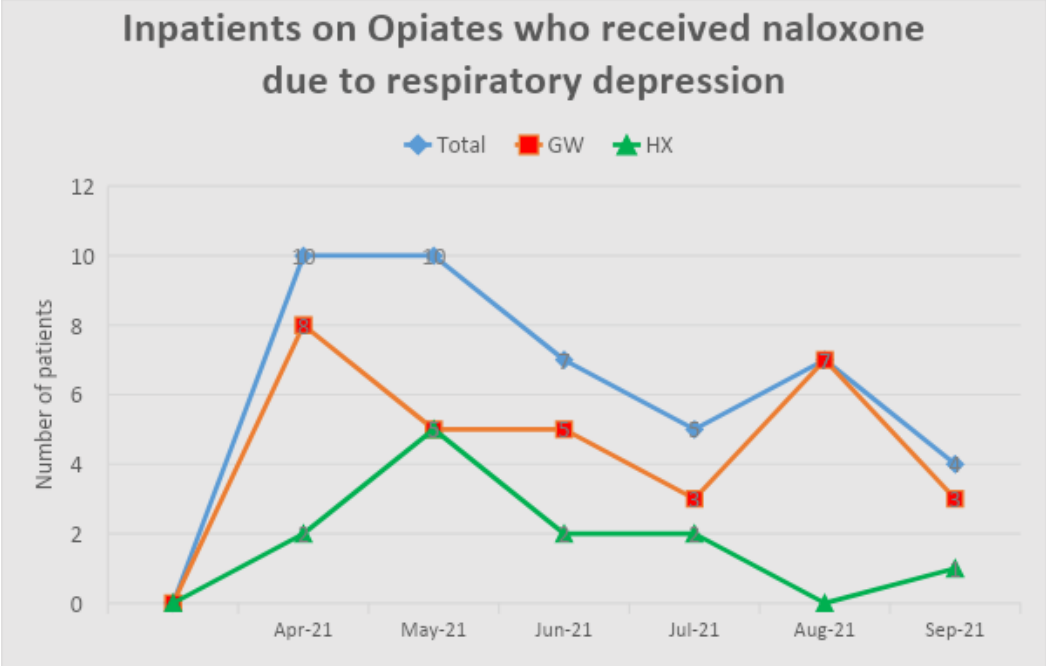
INPATIENT ADRs/ADEs reported through EPIC July-Sept

Patient HAR	Date Created	Age	Drug	Reaction	Severity	Patient Type	Facility Name	Unit
20991028735	7/7/2021	39	Vanco	AKI	2	Inpt	GW	IMCU
20991046491	7/12/2021	67	Bactrim	AKI	2	Inpt	GW	CDU
20991092406	8/9/2021	88	Haldol an	SVT	3	Inpt	GW	6 NO
20991161408	9/1/2021	64	TNKase	Hemorrha	4	Inpt	GW	ED
20991167873	9/6/2021	69	Protamine	vasoplegi	3	Inpt	GW	OR
20991178916	9/15/2021	74	Vanco	AKI	2	Inpt	GW	3 SO

TARGETED ADRs/ADEs INPATIENT




INPATIENTS ON INSULIN + BG < 70
148
167
182
168
138
161
146
153
134
150
149
170
156
123
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
CHI Memorial GW and HX


Inpatients on Opiates who received naloxone due to respiratory depression
Total
GW
HX
Number of patients
0
2
4
6
8
10
12
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21

POLICY

Title: **DIET ORDERS**			
		Page **1** of **4**	
Policy Number: PC-07017		Date Last reviewed/Revised: 11/21	Valid Until: 11/24
Campus: ☒ CHI Memorial Glenwood ☒ CHI Memorial Hixson ☒ CHI Memorial Georgia *Check all that apply*			
Department(s) Affected: Nutrition Services, Nursing Services		Review Period: Every 3 Years	

OUTCOME: To provide a process for standardized, accurate and timely nutrition care for patients.

POLICY:

Diet orders are initiated by the physician or approved discipline and communicated by the hospital information system to Food & Nutrition Services. Diet orders that are not written according to accepted terminology as defined by the approved diet manual will be clarified. Food & Nutrition will honor current diet orders as documented in the medical record in the provision of meal trays, enteral formulas and oral nutrition supplements. Approved discipline is a credentialed health care professional who has been granted diet order writing privileges as designated in the Medical Staff Bylaws.

PROCEDURE:

1. Upon admission the physician/approved discipline initiates a diet order in the patient's medical record, including NPO status as applicable and inclusive of food allergies within 24 hours and prior to provision of food or meals.
2. Diet orders are written according to accepted terminology as defined in the *Nutrition Care Manual* and are specific with respect to nutrient level for quantified diets.
3. Food & Nutrition receives the order through the hospital information system.
    - A diet office employee will call the nursing unit for clarification, if necessary, and/or refer questions to the Clinical Dietitian.
    - Verbal communication of diet orders by the nurse or physician may be accepted during downtime procedures.
4. Diet orders for new admissions or diet order changes will be honored with the next meal period. Patients may receive house selections for the first meal following the new order if entered during the meal service period.
    - No tray will be served to a patient without a confirmed diet order sent to Nutrition Services following established procedures.
5. The diet order sheet is kept on file or accessible in the computer for a minimum of 30 days. The sheets will be discarded according to facility confidentiality policies.
6. Changes to a diet order require entry of a new diet order using approved procedures.
7. Telephone orders for missing or additional food items after the patient tray has left the kitchen are not honored until the diet order is confirmed.
8. If a patient requires a diet with a softer texture than that ordered, the RN or dietitian may communicate this to the diet office without further physician order. Documentation in the patient's medical record will state the reason why this change has been made. This will in no way alter the Physician Ordered Therapeutic Diet but only downgrade the texture of said diet per the expressed desire/need of the patient.
9. Menu selections will be processed by the diet office according to the most recent diet order
10. If, after patient assessment, the Clinical Dietitian recommends a change in consistency and/or diet order, the dietitian will request the change according to approved procedures:
11. Patients who are not receiving a tray must still have an order sent, i.e. "NPO (Nothing per Oral)", a tube feeding order, or notification of TPN initiation, for Nutrition Services to monitor and provide appropriate care/service.

12. An "NPO" diet order cancels all previous diet orders. When a patient is able to eat again, a new written order must be issued.
13. In the case of computer malfunctions, computer downtime procedures will be followed for communication of diet orders/changes. Orders will be keyed into the system once computer functions are restored.
14. A Registered Dietitian may restrict a diet from Regular to a more restrictive diet (Example: Cardiac, Consistent Carbohydrate) for patients who request these restrictions.
15. In order to most effectively achieve the appropriate nutrient intake of the patient and to honor food preferences within the therapeutic diet order, the dietitian may add snacks or supplements (Example: Ensure, Glucerna, etc.) that are consistent with the ordered diet without further orders by a physician.
16. If a licensed independent practitioner orders a tube feed diet and then delegates authority by placing an order in the chart for the registered dietitian to "manage" the tube feed, the dietitian may change the formula, strength or rate of the tube feed without further physician order. Additionally, if the licensed independent practitioner orders "tube feeds per dietitian" or "dietitian for tube feeds" it will be interpreted as an order to manage the tube feeding unless otherwise specified.
    - If a licensed independent practitioner orders tube feeding goal per dietitian, the dietitian will write the order for the tube feeding goal, but not assume continued management of the feeding unless otherwise ordered.
17. On the Oncology Unit (4 East) a decision tree will be utilized by nursing (RN) to quickly administer nutrition supplementation (Ensure, Glucerna Shake and Suplena) to those patients who are appropriate. Patients must receive a ≥2 on the Malnutrition Screening Tool which is completed by nursing during the admission process in order to qualify for nutritional supplementation. When the nurse administers the initial supplement, they will also key in a diet order reflecting this so supplementation can continue at all meals. (*Decision tree attached*).
18. When unclear diet orders written by a physician are received in the diet office, the following diets will be used.

Non-Specified Diet Ordered	**Diet Selected/Sent**
Low Sodium	2g Sodium
Low Salt	4g Sodium
No Added Salt	4g Sodium
AHA	Cardiac
ADA (without specified calorie level)	2000 Calorie Carb Controlled
Diabetic (without specified calorie level)	2000 Calorie Carb Controlled
Weight Management	1600 calories for women/1800 calories for men or as determined by RD
Low Fat	50g fat
Low Protein	40g Protein
Low Potassium	2g Potassium
Renal	80 gm Protein, 2 gm Sodium, 2 gm Potassium
Renal Diabetic	80 gm Protein, 2 gm Sodium, 2 gm Potassium, 2000 calorie
Liquid	Full Liquid
Hepatic without encephalopathy	1.5 gm protein / kg / day
Hepatic with encephalopathy	40 – 50 gm protein / day or 0.5-0.7 gm /kg /day
NDD1	Pureed
NDD2	Mechanically Altered with Ground Meats with Gravy
NDD3	Mechanical Soft with Chopped Meats with Gravy

POLICY

Title: HYPERTONIC SALINE ~~(3% NS)~~ FOR ADULTS			
		Page 1 of 2	
Policy Number: MM-05465		Date ~~Last~~ reviewed/Revised: ~~9/20~~12/21	Valid Until: ~~9/23~~12/24
Campus: ☒ CHI Memorial Glenwood ☒ CHI Memorial Hixson ☒ CHI Memorial Georgia *Check all that apply*			
Department(s) Affected: All Clinical Areas		Review Period: Every 3 years	

OUTCOME:
To outline the necessary requirements for the safe ordering, dispensing and administration of hypertonic saline solution (HTS), which is a concentrated electrolyte solution and a high risk medication.

POLICY:

Ordering Requirements and Restrictions

1.) Hyponatremia Treatment
HTS may be ordered by any prescriber for the treatment of symptomatic hyponatremia although any orders from providers other than nephrology or critical care must use the hospital approved "Hypertonic Saline (3% NS) IV Infusion– Hyponatremia Treatment" order set. All orders must have total volume/dose or duration in the order. All orders must comply with minimum requirements for laboratory monitoring.

2.) Acute Neurologic Indications
HTS (3% NS) for acute neurological indications other than hyponatremia treatment (increased intracranial pressure or other acute neurological deficits, etc.) should be ordered using the Hypertonic Saline Panel - Neurology Indication (Elevated ICP) order panel. Mandatory laboratory monitoring is still required as indicated below.
   a. Undiluted **23.4%** hypertonic saline may be ordered emergently by a Neurology or Neurosurgery provider through a central line as a single 15 to 60 mL bolus dose infused over 10 to 20 minutes. Emergent short-term administration via peripheral IV access is permissible in the setting of acute ICP elevation, however, while central access is obtained.

3.) Maximum infusion rates:
   a. Peripheral line: ≤ 30 ml/hr
   b. Central line: ≤ 50 ml/hr (Hyponatremia); < 70 ml/hr (Acute Neurologic Indications)

4.) Maximum order volume:
   a. No more than 500 ml of HTS may be ordered for treatment of hyponatremia. If the ordered volume exceeds 500 ml, prescriber will be contacted after initial infusion of 500 ml for continuation order.
   b. HTS for acute neurologic indications may be ordered as a continuous infusion exceeding 500 ml if ordered by neurology provider. Mandatory laboratory monitoring is still required for duration of infusion.

Laboratory and Patient Assessment Monitoring

1.) Required labs*:
   a. Baseline serum sodium required prior to treatment initiation
   b. BMP at least every 4 hours for duration of HTS infusion (if not already ordered). May be ordered more frequently at discretion of provider.

** If labs are not ordered by provider these may be ordered by pharmacy.*

2.) The infusion must be held and provider notified for the following conditions:

Hyponatremia Treatment:

a. Serum sodium increases by more than 2 mEq/L in any 4 hour period
b. Serum sodium increases by more than 8 mEq/L during 24 hour period.
c. Serum sodium ≥ 130

Neurologic Indications:

a. Serum sodium ≥ 155 mEq/L or < 135 mEq/L
b. Serum osmolality > 320

3.) Nursing - patient assessment:

a. Strict input and output every 4 hours
b. Neurological checks Q 4 hours for duration of infusion

Storage and Dispensing

1.) Only pharmacy will stock pre-mixed HTS for intravenous use. Pharmacy will dispense the exact volume to be administered (transferred to an empty IV bag) and no more than a 500 ml premix bag at one time.

2.) Specific for hyponatremia indication: Further doses will only be sent after pharmacist review of sodium levels to prevent overly rapid correction (as outlined above).

Administration

1.) Administration via central line is preferred. If central line is not available, infusion via the largest peripheral vein available is acceptable for durations < 24 hours. If prolonged infusion is required, central line administration is highly recommended.

2.) HTS is a High Alert medication. An independent double check (documentation of 2nd nurse verification) is required and will be performed/documented with every new bag administration and at shift change (verification of pump setting and drug).

Key Contact: Pharmacy Review Team
Approved/Reviewed by: P & T Committee, Director of Pharmacy
Related Document(s): HIGH ALERT MEDICATIONS (MM-05402)
Date First Effective & Revision/Review dates: 5/17, (9/20), 12/21

POLICY

Title: **TITRATING MEDICATIONS**			
		Page **1** of **1**	
Policy Number: MM-05405		Date Last reviewed/Revised: ~~2~~12/21	Valid Until: 12/24
Campus: ☒ CHI Memorial Glenwood ☒ CHI Memorial Hixson ☒ CHI Memorial Georgia *Check all that apply*			
Department(s) Affected: All Clinical Areas		Review Period: Every 3 years	

OUTCOME:
Patient will receive adequate medication for desired outcome.

POLICY:
Medications will be titrated in a safe and accurate manner as established by Pharmacy recommendations from appropriate drug information sources, physician order and clinical assessment. In the absence of specific MD/Practitioner orders for titrating and tapering certain IV medications, the attached guidelines will be followed and titration instructions will be defined on the EHR. A change in patient condition requiring a significant increase in the rate of a titrated medication requires physician notification by the nurse. Unless otherwise specified by the physician, all the required titration order elements below will be included within the medical record (EHR) as defined by this policy.

Standard concentrations listed in the attachment will be routinely followed. If standard concentrations are utilized, the nurse can document the rate on the MAR without specifying the concentration. When non-standard concentrations are used, the nurse must have the concentration per ml and rate documented on the MAR.

All titration orders should contain the following:

- Medication name
- Medication route
- Initial infusion rate
- Incremental units the rate can be increased or decreased
- Frequency of incremental dose adjustments
- Maximum infusion rate
- Objective clinical endpoint, to be specified at the time of order*

*Any order without an objective clinical endpoint (BP target, RASS goal, etc.) as defined by the ordering practitioner must be clarified with the prescriber and clarified via order in electronic health record (EHR).

Paused Titrating Medications:

- **It is acceptable to intermittently pause (< 24 hours) the infusion of a titrated medication if the patient no longer meets criteria for the infusion based on assessed physiological parameters.**
- **If the infusion needs to be restarted after being paused < 24 hours based on assessed physiological parameters, it should be resumed at the previously ordered initial rate and the physician should be notified.**
- **Titrated medications that have been stopped for >24 hours require a physician approval to resume.**

Key Contact: Pharmacy Clinical Manager
Approved/Reviewed by: Medication Management Chapter Leader, Nursing Professional Practice Council
Reference(s): Clinical Pharmacology
Joint Commission Standard: MM 04.01.01
Attachment(s): IV Drug Standards Chart
Date First Effective/Revisions: 1/04, 9/08, 11/09, 3/13, 01/15, 02/15, 10/15, 12/15, 1/16, 4/16, 8/16, 9/17, 9/18, 2/19, 5/19, 6/20, 2/21, 12/21

IV DRUG STANDARDS

Drug Name Brand *(Generic)*	Drug Category	Mixing & Concentration	Pyxis	Dosing *(Titrating & Tapering)*	Precautions or Special Instructions	Dosed as
Angiomax *bivalirudin*	Anticoagulant	250 mg/250 ml NS Concentration = 1 mg/ml Non-procedural use – HIT treatment 250 mg/50 ml NS Concentration = 5 mg/ml Cath lab, procedural use, etc.		Wt Based Protocol: For treatment of HIT or suspected heparin intolerance: See *Angiomax (bivalirudin) Weight Based Dosing ~~Protocol~~ Guidelines* for starting rates and titration information Dose adjustments depend upon aPTT results (see protocol)	• Initial dose dependent upon patient's renal function • Observe patient for bleeding. • Angiomax weight based protocol in Meditech • d/c all other parenteral anticoagulants • ECMO order set also available for ECMO anticoagulation	mg/kg/hr
~~**Argatroban**~~	~~Anticoagulant~~	~~50 mg/50 ml D_5W Concentration = 1 mg/ml~~		~~Wt Based Protocol: For treatment of HIT or suspected heparin intolerance: See *Argatroban Orders and Dosing Protocol* for starting rates and titration information Dose adjustments depend upon aPTT results (see protocol)~~	~~• Reduce initial dose for hepatic insufficiency • Observe patient for bleeding. • Argatroban usage guidelines in Meditech • d/c all other parenteral anticoagulants~~	~~mcg/kg/min~~
Ativan *lorazepam*	Benzodiazepine Anxiolytic, sedative	50 mg/250 ml D_5W Non- PVC bag only Concentration = 0.2 mg/ml		Starting Dose: 0.5 mg/hr Maximum Dose: 10 mg/hr Increase or decrease by 0.5 mg/hr at 30-minute intervals based on parameters as determined by physician	• Patients receiving > 0.1 mg/kg/hr for > 48 hrs should be evaluated for propylene glycol toxicity	mg/hr
Brevibloc *Esmolol*	Beta-blocker Antiarrhythmic	2.5 gm/250 ml NS Premix Concentration = 10 mg/ml	,	Starting Dose: 50 mcg/kg/min Maximum Dose: 300 mcg/kg/min Titrate/taper in 50 mcg/kg/min increments every 5 minutes based on parameters as determined by physician	• Monitor ECG and blood pressure closely during infusion • For SVT load c/ 500 mcg/kg over 1 min up to 3 doses q4min • Contraindicated for bradycardia	mcg/kg/min
~~**Bumex**~~ ~~*Bumetanide*~~	~~Loop Diuretic~~	~~25 mg/100 ml Concentration = 0.25 mg/ml~~		~~Starting Dose see MD orders Maximum Dose: generally, 2 mg/hr **continuous infusion – dose titration to be specified by prescriber~~	~~• Monitor patient response (edema, SOB, etc.), BUN, Scr, electrolytes~~	~~mg/hr~~
Cardene *Nicardipine*	Calcium Channel Blocker Antihypertensive	25 mg/250 ml NS Concentration = 0.1 mg/ml		Starting Dose: 2.5 mg/hr if SBP ≥ 180 Or 5 mg/hr if SBP ≥ 200 Maximum Dose: 15 mg/hr Increase or decrease by 2.5 mg/hr. May increase by 5 mg/hr if SBP ≥ 200. Titrate every 5-15 minutes until desired blood pressure (as directed by physician) is reached	• With constant peripheral vein infusion, infusion site should be changed at least every 12 hours • Incompatible c/ HCO_3 and LR	mg/hr
Cardizem *Diltiazem*	Calcium Channel Blocker Antiarrhythmic	100 mg/100 ml NS or D_5W Concentration = 1mg/ml	,	Starting Dose: 10 mg/hr Maximum Dose: 15 mg/hr See *Diltiazem ~~Protocol~~ (Cardizem) Orders* for starting rates, bolus information and titration information or as parameters as determined by physician	May depress cardiac conduction; headache, hypotension, dizziness, flushing or fatigue	mg/hr
Cordarone *Amiodarone*	Antiarrhythmic	Infusion: 250 mg/250 ml D_5W Non- PVC bag only Bolus: 150 mg/100 ml D_5W (bolus may be mixed in PVC bag)		Bolus 150mg over 10-30 min, then 1mg/min x 6 hours, then 0.5mg/min x 18 hours or as determined by physician	Should not be given to pts w/bradycardia, AV block, severe hypotension, or severe respiratory failure. Contraindicated in cardiogenic shock Caution in allergies to iodine	mg/min

Drug Name Brand *(Generic)*	Drug Category	Mixing & Concentration	Pyxis	Dosing *(Titrating & Tapering)*	Precautions or Special Instructions	Dosed as
				See *Amiodarone (Cordarone) IV ~~Protocol~~Orders*		
Corlopam *Fenoldopam*	Antihypertensive Vasodilator	10 mg/250 ml NS Concentration = 40 mcg/ml		Starting Dose: 0.03 mcg/kg/min Maximum Dose: 1.6 mcg/kg/min Increase or decrease by 0.05 mcg/kg/min at 15 minutes intervals until target blood pressure (as determined by physician) is reached	Hypotension, flushing, dizziness, headache, reflex tachycardia, nausea and vomiting Unlabeled use: Renal protection	mcg/kg/min
Diprivan *Propofol*	Sedative-hypnotic	1000 mg/100 ml (lipid emulsion) Concentration = 10mg/ml Change bottle & tubing q 12 hours	,	Starting Dose: 5 mcg/kg/min if RASS ≤ 2 or 10 mcg/kg/min if RASS ≥ 3 Max dose: generally, 50 mcg/kg/min Increase or decrease by 5 mcg/kg/min. May increase by 10 mcg/kg/min if RASS ≥ 3. Titrate at 5-10 minute intervals based on parameters as determined by physician	• Patient MUST be mechanically ventilated while receiving Propofol in the ICU. • Do not bolus • May cause hypotension, profound bradycardia, increase triglycerides, green urine, hiccough • Reduce dose by ½ in elderly	mcg/kg/min
Dobutrex *Dobutamine*	Inotropic agent Cardiac stimulant	250 mg/250 ml D_5W Premix Concentration = 1000 mcg/ml	,	Starting Dose: 2.5 mcg/kg/min Maximum Dose: generally 20 mcg/kg/min Increase or decrease by 2.5 mcg/kg/min every 15 minutes based on parameters determined by physician	HTN, tachycardia, angina, increased ventricular ectopy, hypokalemia, nausea, HA Incompatible with HCO_3	mcg/kg/min
Dopamine	Inotropic agent Cardiac stimulant Vasopressor	400 mg/250 ml D_5W Premix Concentration = 1600 mcg/ml	,	Starting Dose: 5 mcg/kg/min Maximum Dose: 20 mcg/kg/min (Hypotension/shock) 10 mcg/kg/min (AV Block/ bradycardia) Increase or decrease by 1 mcg/kg/min every 5-15 minutes based on parameters determined by physician	• Tachycardia, palpitations, nausea, vomiting • Caution c/ allergies to sulfites • Inactivated by HCO_3 • Avoid extravasation ##	mcg/kg/min
Epinephrine	Cardiac Stimulant Vasopressor Bronchodilator	2 mg/250 ml D_5W Concentration = 8 mcg/ml		~~(Utilize mcg/min dosing unless weight based dosing ordered.)~~ ~~MCG/MIN DOSING~~ ~~Starting Dose: 1 mcg/min if MAP ≤ 65 or 2 mcg/min if MAP ≤ 55~~ ~~Maximum Dose: generally, 50 mcg/min~~ ~~Increase or decrease by 1 mcg/min at 3-5 minute intervals based on parameters determined by physician~~	Vasoconstriction-induced tissue sloughing can occur.	mcg/min -OR- mcg/kg/min

Drug Name Brand *(Generic)*	Drug Category	Mixing & Concentration	Pyxis	Dosing *(Titrating & Tapering)*	Precautions or Special Instructions	Dosed as
				MCG/KG/MIN DOSING Starting Dose: 0.05 mcg/kg/min If MAP ≤ 65 or 0.1 mcg/kg/min if MAP ≤ 55 Maximum Dose: 0.5 mcg/kg/min Increase or decrease by 0.05 mcg/kg/min every 3-5 minutes based on parameters determined by physician		
Fentanyl	Narcotic analgesic Anesthesia adjunct	1500 mcg/30 ml* Concentration: 50 mcg/ml *To be infused via PCA pump as continuous infusion	,	Starting Dose: 50 mcg/hr unless SBP < 100, then start at 25 mcg/hr Maximum Dose: generally, 200 mcg/hr Increase or decrease by 50 mcg/hr unless SBP< 100, then 25 mcg/hr at 30-minute intervals based on parameters determined by physician	• Observe for respiratory depression, bradycardia, urinary retention • Tolerance can develop with prolonged use • Avoid abrupt cessation	mcg/hr
Giapreza *Angiotensin II*	Vasopressor	2.5 mg/250 ml NS Concentration = 10,000 **ng**/ml *Note: dosed in nanograms*		Starting Dose: 20 ng/kg/min Maximum Dose (hours 1-3): 80 ng/kg/min Maximum Dose (after 3 hours): 40 ng/kg/min Titration phase (hours 1-3): *Maximum dose 80 ng/kg/min* Start at 20 ng/kg/min and increase by 5 ng/kg/min every 5 minutes until MAP > 65-74 or until max dose reached (80 ng/kg/min) Maintenance phase (after 3 hours): *Maximum Dose: 40 ng/kg/min* After target MAP achieved (65-70)*: 1.Titrate off phenylephrine and epinephrine, if ordered, then 2. Titrate off vasopressin, then 3. Decrease norepinephrine to 0.05 mcg/kg/min, then 4. Decrease angiotensin II (Giapreza) by 5 ng/kg/min every 5 minutes as long as target MAP maintained. Once rate of 5 ng/kg/min achieved, further reductions should be by 50% every 5 minutes to minimum rate of 1.25 ng/kg/min (usual dose range 1.25 – 40 ng/kg/min). Minimally effective dose should be utilized. Then, 5. Alternate decreasing the rates of angiotensin II (Giapreza) and norepinephrine in a stepwise approach while maintaining target MAP.	• VERY EXPENSIVE ($1500-3000 per day) • Appropriate use criteria: ▪ Levophed rate of ≥ 0.5 mcg/kg/min ▪ PLUS utilizing a 2nd vasopressor ▪ Infusion should not exceed 48 hours • Should be used at the minimum rate required to maintain BP along with other vasopressors • Note maximum infusion rate differences (first 3 hours versus after 3 hours) • Risk of VTE – patient should be on pharmacologic VTE prophylaxis (Lovenox or Heparin)	ng/kg/min

Drug Name Brand *(Generic)*	Drug Category	Mixing & Concentration	Pyxis	Dosing *(Titrating & Tapering)*	Precautions or Special Instructions	Dosed as
				*If at any time MAP falls below target, increase rate of angiotensin II (Giapreza) and other vasopressors until target MAP is maintained.		
Isuprel *isoproterenol*	Inotropic/chronotropic Antiarrhythmic	1 mg/250 ml D5W Concentration = 4 mcg/ml		Starting dose: 2 mcg/min Maximum Dose: generally, 10 mcg/min Increase or decrease by 1 mcg/min every 15 minutes until desired effect as per physician parameters	• Cardiovascular effects include: sinus tachycardia, atrial and ventricular tachycardia. Fatal ventricular arrhythmias have been seen when heart rates increased above 130 bpm. • May precipitate angina or coronary insufficiency, especially in patients with cardiogenic shock or ischemic heart disease due to increased oxygen demand. • Monitor BP closely. Can initially cause hyper-tension followed by profound hypotension.	mcg/min
Labetalol *Trandate*	Alpha and Beta-Blocker Antihypertensive	300mg/300 ml D5W Concentration: 1 mg/ml		Starting Dose: 2 mg/min Maximum Dose: generally, 300 mg total daily dose Increase or decrease by 0.5 mg/min at 10-minute intervals	Monitor B/P closely during direct IV injection and at least every 15 minutes during infusion.	mg/min
Levophed *Norepinephrine*	Vasopressor	4mg/250 ml D_5W Concentration = 16 mcg/ml		~~(Utilize mcg/min dosing unless weight based dosing ordered)~~ ~~MCG/MIN DOSING~~ ~~Starting Dose: 4 mcg/min if MAP ≤ 65~~ ~~8 mcg/min if MAP ≤ 55~~ ~~Maximum Dose: 80 mcg/min~~ ~~Increase or decrease by 1 mcg/min at 5 minute intervals. If MAP ≤ 55, may increase by 5 mcg/min at 5 minute intervals based on parameters determined by physician~~ **MCG/KG/MIN DOSING** Starting Dose: 0.05 mcg/kg/min if MAP ≤ 65 or 0.1 mcg/kg/min if MAP ≤ 55 Maximum Dose: 1 mcg/kg/min Increase or decrease by 0.02 mcg/kg/min at 5 minute intervals. If MAP ≤ 55, may titrate by 0.05 mcg/kg/min at 5-minute intervals based on parameters determined by physician	• Avoid extravasation ## • Anxiety, N/V, HTN, urinary retention, arrhythmias	mcg/min -OR- mcg/kg/min

Drug Name Brand *(Generic)*	Drug Category	Mixing & Concentration	Pyxis	Dosing *(Titrating & Tapering)*	Precautions or Special Instructions	Dosed as
Morphine	Narcotic analgesic	30 mg/30 ml NS (PCA at basal rate) Concentration = 1mg/ml		Starting Dose: 2 mg/hr Maximum Dose: generally, 20 mg/hr Increase or decrease by 1 mg/hr at 30-minute intervals until adequate analgesia is maintained.	• Observe for respiratory depression, constipation, N/V • Tolerance can develop with prolonged use	mg/hr
Narcan *Naloxone*	Opioid Reversal	4 mg/250 ml NS Concentration = 16 mcg/ml		Starting Dose: 0.4 mg bolus, then 2.5 mcg/kg/hr Maximum Dose: variable Increase or decrease by 0.5 mcg/kg/hr every 15-30 minutes as needed for signs of opioid over-sedation or respiratory depression	• If patients require repeated intermittent IVP doses for initial reversal larger initial infusion rates may be necessary (10-15 mcg/kg/hr)	mcg/kg/hr
Neosynephrine *Phenylephrine*	Vasopressor	10 mg/250 ml D_5W Concentration = 40 mcg/ml Should not be given undiluted. All bolus doses should be mixed in 50 ml NS prior to administration		Starting Dose: (severe hypotension): 20 mcg/min if MAP ≤ 65 or 40 mcg/min if MAP ≤ 55 Maximum Dose: generally 360 mcg/min Increase or decrease by 10 mcg/min. If MAP ≤ 55, may increase by 20 mcg/min. Titrate at 10-minute intervals based on parameters as determined by physician	• Avoid extravasation ## • Use with caution in elderly, bradycardia, partial heart block, hyperthyroid, myocardial disease, severe atherosclerosis • Correct volume deficiency before considering this drug	mcg/min
Nimbex Cisatracurium	Neuromuscular Blocker (paralytic)	200 mg/100 ml D5W Concentration = 2 mg/ml		Bolus: 150-200 mcg/kg per MD Orders Initial maintenance Dose: 1 mcg/kg/min Normal maintenance dose range 0.5-10 mcg/kg/min (max dose generally 10 mcg/kg/min) Monitor depth of blockade every 20 mins initially until stable dose (increase or decrease by 0.5 mcg/kg/min), then every 1 hr according to patient's clinical response with peripheral nerve stimulator or BIS based on parameters as determined by physician.	• Preferred NMBA for patients with multi-system organ failure – organ independent metabolism. • Patients must have sedation and medication for analgesia while on paralytic	mcg/kg/min
Nitroglycerin	Anti-hypertensive Antianginal Vasodilator	50mg/250 ml D_5W Premix Concentration = 200 mcg/ml	,	**CARDIAC TELEMETRY ONLY**: Starting Dose: 5 mcg/min. Maximum Dose: 50 mcg/min For chest pain: increase rate by 5 mcg/min every 3-5 minutes until pain free & to maintain SBP greater than 90. **ER, ICU, IMCU, SSU or PACU ONLY:** Starting Dose: 5 mcg/min Maximum Dose: usually 200 mcg/min	• Headache, hypotension, tachycardia • Do not filter (Gahart, 2004) • Tolerance may develop if administered over 12 hr. • Use extreme caution with inferior MI c/ RV involvement • For Cardiac Telemetry, refer to: Nursing Workflow for Nitroglycerin Drip for Chest Pain Outside of ICU	mcg/min

Drug Name Brand *(Generic)*	Drug Category	Mixing & Concentration	Pyxis	Dosing *(Titrating & Tapering)*	Precautions or Special Instructions	Dosed as
				Increase by 5 mcg/min every 3-5 minutes up to 20 mcg/min based on parameters determined by physician. If no response once rate is 20 mcg/min, increase by 10 mcg/min every 3-5 minutes. Taper per MD order.		
Norcuron *Vecuronium*	Neuromuscular Blocker (paralytic)	50 mg/500 ml D5W Concentration = 0.1 mg/ml (100mcg/ml)		Bolus: 80-100 mcg/kg per MD Orders Initial maint. dose: 0.8 mcg/kg/min Normal maintenance dose range: 0.8-1.7 mcg/kg/min (max dose generally 1.7 mcg/kg/min) Monitor depth of blockade every 20 mins initially until stable dose (increase or decrease by 0.3 mcg/kg/min), then every 1 hrs. according to patient's clinical response with peripheral nerve stimulator or BIS based on parameters as determined by physician.	• Dose adjustment not necessary for renal impairment. • Patients must have sedation and medication for analgesia while on paralytic	mcg/kg/min
Precedex *Dexmedetomidine*	Alpha$_2$ agonist Sedative-hypnotic	400 mcg/100 ml NS 400mcg/96cc NS from OR Concentration = 4 mcg/ml		Starting Dose: 0.1 mcg/kg/hr if RASS ≤ 2 or 0.4 mcg/kg/hr if RASS ≥ 3 or 1 mcg/kg/hr if RASS equals 5. Monitor for bradycardia and hypotension Maximum Dose: 2 mcg/kg/hr Increase or decrease by 0.1 mcg/kg/hr. May increase by 0.5 mcg/kg/hr if RASS ≥ 3. Titrate at 10-15 minute intervals on parameters as determined by physician	• Observe for hypotension and bradycardia with loading dose or when starting at high doses. Use with caution in patients with advanced heart block. Decreases SNS activity.	mcg/kg/hr
Primacor *Milrinone*	Inotropic agent	20 mg/100 ml D$_5$W Premix Concentration: 200 mcg/ml		Starting Dose: 0.25-0.375 mcg/kg/min per MD order Maximum Dose: 0.75 mcg/kg/min, not to exceed 1.13 mg/kg/24 hrs Increase or decrease by 0.025 mcg/kg/min every 60 minutes based on parameters determined by physician	• Has positive inotropic effect with vasodilator activity – may cause hypotension • Forms precipitate with Bumex or Lasix • Should not be used longer than 48 hours	mcg/kg/min
Procainamide	Antiarrhythmic	1 gm/250 ml NS Concentration = 4 mg/ml		Usual Dose: 2 mg/min Maximum Dose: 6 mg/min Increase or decrease by 1 mg/min every 15 to 30 minutes until desired effect as per physician parameters	• Decreases HR, monitor ECG, BP • Infusion > 24 hrs: monitor Procainamide and NAPA levels (active metabolite) esp. with renal failure	mg/min
Vasopressin *Pitressin*	Vasopressor	20 units/50 ml NS Concentration 0.4 units/ml		Starting Dose: 0.03 units/min (**do not titrate unless ordered by MD**) Maximum Dose: 0.07 units/min Increase or decrease by 0.005 units/min every 10 – 15 minutes based on parameters as determined by physician If used for GI hemorrhage, Maximum	• Minimal information available for dosing in vasodilatory shock. Dosing is research-based. • Must be administered via central line	units/min

IV DRUG STANDARDS (continued)

Drug Name Brand *(Generic)*	Drug Category	Mixing & Concentration	Pyxis	Dosing *(Titrating & Tapering)*	Precautions or Special Instructions	Dosed as
				Dose: 1 unit/min		
Versed *Midazolam*	Benzodiazepine Sedative-hypnotic Anesthesia adjunct	100 mg/100 ml NS Concentration = 1 mg/ml		Starting Dose: 1 mg/hr Maximum Dose: generally, 10 mg/hr Increase or decrease by 1 mg/hr at 15 min. intervals based on parameters as determined by physician	• Monitor for respiratory depression and/or hypotension • May be dosed 0.02 – 0.1 mg/kg/hr • Adjust for GFR < 30 ml/min	mg/hr
Zemuron *rocuronium*	Neuromuscular Blocker (paralytic)	250 mg/250 ml NS Concentration = 1 mg/ml		Bolus: 0.6 – 1 mg/kg per MD Order Initial maint Dose: 8 – 12 mcg/kg/min per MD Order (max dose generally 16 mcg/kg/min) Monitor depth of blockade every 20 mins initially until stable dose (increase or decrease by 1 mcg/kg/min), then every 1 hrs. according to patient's clinical response with peripheral nerve stimulator or BIS based on parameters as determined by physician.	• Dose adjustment not necessary for renal impairment. • Patients must have sedation and medication for analgesia while on paralytic.	mcg/kg/min

Call IV Team for infiltration of this drug
** May also be dosed in mcg/kg/min

POLICY

Title: **ANTIMICROBIAL STEWARDSHIP PROGRAM**			
		Page **1** of **2**	
Policy Number: MM-05463		Date ~~Last~~ reviewed/Revised: 5/19	Valid Until: 5/22
Campus: ☒ CHI Memorial Glenwood ☒ CHI Memorial Hixson ☒ CHI Memorial Georgia ***Check all that apply***			
Department(s) Affected: All Departments		Review Period: Every 3 years	

PURPOSE:
The CHI Memorial Antimicrobial Stewardship Program (ASP) monitors appropriate use of antimicrobial agents and develops interventions to improve antimicrobial use across ~~Glenwood and Hixson~~ all campuses. The goals of the ASP are to improve clinical outcomes while reducing unintended consequences of antimicrobial use for both individual patients and the broader clinical population of the Health System. This policy describes the structure, responsibilities and essential activities of the ASP.

PERSONNEL:
The core personnel include:
1. A Medical Director with expertise in infectious diseases. The Medical Director is responsible for co-direction of the ASP with the Clinical Pharmacist, development of antimicrobial stewardship policy and procedures, reporting antimicrobial utilization and other outcomes to quality committees and clinicians, identifying target areas for intervention, developing interventions to improve antimicrobial use, and interacting with clinicians to provide education and implement stewardship interventions.
2. A Clinical Pharmacist with expertise in infectious diseases and training in antimicrobial stewardship from a recognized professional organization. The Clinical Pharmacist is responsible for co-direction of the ASP with the Medical Director, developing guidelines for antimicrobial use, monitoring antimicrobial utilization, and conducting prospective audit and feedback of antimicrobial orders and making recommendations to prescribers to improve appropriateness of therapy.
3. Additional personnel include pharmacy clinical ~~coordinator~~manager, clinical microbiologist, infection control member(s) and additional ASP pharmacists.

POLICY:
The ASP prioritizes collaboration with stakeholders, use of evidence-based best practices, and data tracking to promote appropriate antimicrobial use. Appropriate antimicrobial use includes timely therapy with the right agent, at the right dose, for the right duration, and avoidance of unnecessary therapy.

PROCEDURE:
A. Responsibilities:
In order to achieve the goals of the program, the ASP Medical Director, affiliated ASP Pharmacists, and other qualified ASP program staff have the following responsibilities with regard to oversight of antimicrobial therapy:
1. Identification and review of medical records for patients on antimicrobial therapy, and patients with positive microbiology findings in whom antimicrobial therapy may be indicated, but has not been initiated.
2. Provision of feedback to providers regarding antimicrobial therapy choices.
3. Documentation of antimicrobial therapy recommendations in the medical record in the form of clinical interventions.
4. Approval of restricted anti-infective agents.
5. Access to data reports on institutional antimicrobial use and ability to report these data to regulatory organizations and/or external benchmarking systems.

B. Core Activities:
The Medical Director, Clinical Pharmacist, Infection Control, and Microbiology collaborate with each other as well as seek stakeholder input to develop specific interventions and procedures according to the needs of the clinical populations served. Specific procedures are developed and updated on an ongoing basis. The

following is an overview of the core activities of the ASP. The ASP may also initiate special projects that align with institutional goals.

1. Prospective Audit and Feedback:
Inpatient antimicrobial use is monitored prospectively to identify opportunities to improve therapy with regard to agent selection, dose, frequency, or duration. Feedback is given to prescribers with education and recommendations to modify therapy. Infectious Diseases consultation may also be recommended if the problem is deemed to be too complex for a focused recommendation. The frequency of audit and procedures for feedback to providers are determined by the ASP Medical Directors and Clinical Pharmacists.

2. Monitoring Antimicrobial Utilization:
The ASP monitors overall antimicrobial utilization and utilization of specific targeted antimicrobial agents using standard metrics. Utilization data are used for internal and external benchmarking, to identify target areas for intervention. Quality improvement activities, policies and interventions are implemented in a scientific/evidence-based manner towards the goal of improving antimicrobial utilization for inpatients.

3. Formulary Review, Restriction and Pre-Authorization:
The ASP Medical Director and ASP Pharmacists serve on the Antimicrobial Subcommittee. In this capacity, they participate in management of the antimicrobial formulary, including review of new agents for inclusion, review of dosing references, and modifications based on emerging evidence and/or institutional resistance patterns. They develop the annual institutional antibiogram and distribute it to clinicians with accompanying education. ASP personnel oversee implementation of Pharmacy and Therapeutics Policies regarding antimicrobial use, including oversight of restricted antimicrobial agents.

4. Guideline Development:
ASP personnel develop evidence-based guidelines, clinical pathways, and order sets for appropriate use of antimicrobial therapy for common infectious syndromes, oversee approval of guidelines and distribute guidelines to clinicians with accompanying education.

5. Education:
ASP personnel provide education to clinicians regarding trends in antimicrobial use and resistance, appropriate antimicrobial use, and management of common infectious syndromes. Education may take many forms including, but not limited to: presentations, distribution of written materials, and focused consultation on antimicrobial selection.

6. Regimen Optimization and Therapeutic Drug Monitoring:
ASP personnel collaborate with Prescribers and Pharmacy staff to implement dose optimization and therapeutic drug monitoring strategies for special circumstances, such as drug resistant infections, narrow therapeutic index antimicrobials, and/or patients receiving long term antimicrobial therapy.

C. Reporting:
The CHI Memorial ASP reports directly to the Pharmacy and Therapeutics Committee. Informational reports will also be provided to additional interested groups.

Key Contact: Pharmacy Review Team
Approved/Reviewed by: Infection Prevention Medical Staff, Director of Pharmacy, P & T Committee
Reference(s): CMS
Date First Effective & (Revision/Review dates): 3/16, 5/19