

Irritants and Vesicants Guide to Intravenous Administration via Midline Catheters

Intermountain Medical Center

General recommendations for midline administration:

- A. Avoid continuous vesicants or irritants (chemotherapy, vasopressors)
- B. Avoid parenteral nutrition containing >10% dextrose
- C. Check midline for high pressure injector status before administering radio contrast
- D. Avoid infusate with osmolarity >900 mOsm/L
- E. Caution with intermittent vesicant administration as extravasation more difficult to detect
- F. In emergent situations, although not ideal, can be used instead of central line access

Drug	Vesicant vs Irritant	PIV	Midline	Central line	Comments
Adrenergic agents					
Dobutamine	Vesicant	No (F)	No (A, E)	Yes	Time-dependent PIV (F)
Dopamine	Vesicant	No (F)	No (A, E)	Yes	
Epinephrine	Vesicant	No (F)	No (A, E)	Yes	
Norepinephrine	Vesicant	No (F)	No (A, E)	Yes	
Vasopressin	Vesicant	No (F)	No (A, E)	Yes	
Antiemetics					
Promethazine	Vesicant	Monitor	No (E)	Yes	For PIV: administer slowly and in a non-hand, non-wrist vein; or give IM
Antimicrobials					
Acyclovir >7 mg/mL	Irritant	Monitor	Yes	Yes	Prefer <7 mg/mL concentration, especially peripherally
Amphotericin B	Irritant	Monitor	Yes	Yes	
Ampicillin	Irritant	Yes	No (if A)	Yes	For continuous infusions, central administration is preferred.
Cefotaxime	Irritant	Yes	Yes	Yes	
Doxycycline	Irritant	Monitor	Yes	Yes	
Ganciclovir	Irritant	Yes	Yes	Yes	
Gentamicin	Irritant	Yes	Yes	Yes	
Metronidazole	Irritant	Yes	Yes	Yes	
Nafcillin	Irritant	Monitor	No (if A)	Yes	For continuous infusions, central administration is preferred.
Penicillin	Irritant	Yes	No (if A)	Yes	
Pentamidine	Irritant	Yes	Yes	Yes	
Piperacillin	Irritant	Yes	Yes	Yes	
Vancomycin	Irritant	Monitor	Yes	Yes	Monitor closely, limited data suggest safety via midline administration
Cardiovascular Drugs					
Acetazolamide	Irritant	Yes	Yes	Yes	
Amiodarone	Vesicant	Monitor	No (E, F)	Yes	Boluses should be diluted if giving for arrhythmias when patient has a pulse
Chlorothiazide	Irritant	Yes	Yes	Yes	Give slowly
Digoxin	Vesicant	Monitor	No (E, F)	Yes	
Nicardipine	Irritant	Yes	No (if A)	Yes	Large veins only, give slowly
Nitroprusside	Irritant	Yes	Yes	Yes	Central line preferred
Tromethamine (THAM)	Vesicant	Monitor	No (E)	Yes	In emergency: use largest vein, elevate extremity, and give slowly.
Contrast - Radiographic	Vesicant	Monitor	Yes	Yes	Only high pressure injector midlines (all Intermountain approved midlines)

Drug	Vesicant vs Irritant	PIV	Midline	Central line	Comments
Electrolytes/hyperosmolar					
Mannitol (≥5%)	Vesicant	Monitor	No (E, F)	Yes	Central line preferred; in emergency, push slowly, monitor for extravasation
Dextrose (≥10%)	Vesicant	Monitor	No (B)	Yes	
Magnesium sulfate	Irritant	Yes	Yes	Yes	Peripheral concentrations only: refer to electrolyte replacement protocols
Calcium chloride 10%	Vesicant	Monitor	No (E)	Yes	Causes calcium deposition; If giving peripherally non-emergently, dilute in 100mL NS
Calcium gluconate 10%	Vesicant	Monitor	No (E)	Yes	Causes calcium deposition; Preferred over calcium chloride if peripheral
Potassium 20 mEq/250 mL or 40 mEq/500 mL	Irritant	Yes	Yes	Yes	Peripheral concentrations only: refer to electrolyte replacement protocols
Potassium 20 mEq/100 mL or 40 mEq/100 mL	Irritant	No	No	Yes	Central line only concentration: refer to electrolyte replacement protocols
Sodium bicarb ≥ 8.4%	Irritant	Monitor	Yes	Yes	Central line preferred, do not wait for central line if emergent
Sodium chloride 3%	Irritant	Monitor	No (D)	Yes	
Sodium chloride >3%	Irritant	Monitor	No (D)	Yes	
Sodium chloride 23.4%	Irritant	No (D)	No (D)	Yes	
Parenteral nutrition (PN)					
Clinimix 4.25/5	Vesicant	Yes	Yes	Yes	Guidelines allow if ≤ 10% dextrose, monitor closely for extravasation
Peripheral PN (PPN)	Vesicant	Yes	Yes	Yes	
Total PN (TPN)	Vesicant	No (B, D)	No (B, D)	Yes	
Sedatives/anesthetics					
Diazepam	Vesicant	Monitor	Yes	Yes	
Etomidate	Irritant	Yes	Yes	Yes	
Propofol	Irritant	Yes	Yes	Yes	Case reports of extravasation injury
Thiopental	Irritant	Yes	Yes	Yes	
Other agents					
Albumin	Irritant	Yes	Yes	Yes	
Aminophylline	Vesicant	Monitor	No (A)	Yes	
Dantrolene	Vesicant	Monitor	No (E, F)	Yes	Central line preferred, do not wait for central line if emergent
Epoprostenol	Irritant	Yes	Yes	Yes	Long-term infusion should be given centrally. If access lost, may be given peripherally or via midline short-term
Methylene blue	Vesicant	Monitor	No (E, F)	Yes	Central line preferred, do not wait for central line if emergent
Mycophenolate	Irritant	Yes	Yes	Yes	Peripheral: over 2 hours
Phenytoin	Vesicant	Monitor	No (E, F)	Yes	

Primary Reference: Infusion Nursing Standards of Practice

Additional References:

- Capras JV, Hu JP. Safe administration of vancomycin through a novel midline catheter: a randomized, prospective clinical trial. *J Assoc Vasc Access*. 2014;15(4):251-6.
- Le A, Patel S. Extravasation of noncytotoxic drugs: a review of the literature. *Ann Pharmacother*. 2014;48(7):870-86.
- Loubani OM, Green RS. A systematic review of extravasation and local tissue injury from administration of vasopressors through peripheral intravenous catheters and central venous catheters. *J Crit Care*. 2015;653.e9-653.e17.
- Payne AS, Savarese DMF. Extravasation injury from chemotherapy and other non-antineoplastic vesicants. UptoDate. Last updated Nov 18, 2015. Accessed Feb 17, 2016.