

## AEMC Titration of Vasoactive Medications Guideline

**Purpose:** To provide clear instructions on the titration of vasoactive agents in critical ill adult patients.

### Guidelines:

1. A provider enters an order for a titratable agent with an initial starting dose.
  - a. The order must include:
    - i. Titration parameters (dose and frequency)
    - ii. Objective titration goal (SBP, MAP, etc.)
2. The rate and frequency of dose titration indicated on the order is dependent upon the patient's clinical status and response to therapy but must be within the ranges listed in Table 1.
3. It is recommended that arterial catheters be placed as soon as practical for blood pressure monitoring in patients requiring vasopressors.
4. The lowest effective dose to achieve the titration goal should be utilized. The nurse will record each rate change while on a stable continuous infusion.
  - a. The titration goal (i.e. MAP) will be documented in the vital signs section.
  - b. The rate change will be documented in the interactive I view under IV drips and the MAR once the rate is stabilized.
  - c. Refer to Policies: C01-374 and C01-047
5. If the dose of the titratable infusion reaches the highest "Protocol Dosing Range" listed in Table 1, the provider must be notified for consideration of an additional agent or to order a dose escalation outside of the protocol.
  - a. An order detailing the new dose must be placed by a provider for the nurse to exceed the "Protocol Dosing Range"
6. When additional vasoactive agents (other than vasopressin) are ordered subsequent to the initial titratable infusion, the following will occur:
  - a. The initial agent(s) will be titrated to a maximum "Protocol Dose" prior to titrating up the subsequent agents, unless otherwise directed by a provider. (i.e. only one vasoactive medication should be titrated at a time).
  - b. The subsequent titratable infusion will be titrated based on parameters enter on the order
7. Initiation of weaning vasoactive medications to occurs after the patient maintains their blood pressure goals for 1-2 hours or if directed by a provider.
  - a. Vasoactive infusions will be titrated off in reverse order as they were started unless directed by a provider.
  - b. Vasopressin should be turned off prior to titrating off the last vasopressor (i.e. vasopressin should not be the last vasopressor to be titrated off).
    - i. **ONLY CT Surgery** should titrate down vasopressin before turning the infusion off.
    - ii. Turn off vasopressin after the patient has been hemodynamically stable at a low dose of the last vasopressor (i.e. norepinephrine running at 5 mcg/min).
    - iii. Following the discontinuation of vasopressin, wait two hours before weaning off the remaining vasopressor.

**Table 1. Vasoactive Medication Titration**

CVC: Central Venous Catheter

Drug	Concentration	Fluid	Protocol Dose Range	Titration Dose Increment	Rate of Titration	Maximum Dose	Powerplan	CVC Needed?
<b>Clevidipine</b>	25mg/50mL	Lipid	1-21 mg/hr	2 mg	2 minutes	21 mg	Antihypertensives and rate control, Stroke	No
<b>Diltiazem</b>	125mg/125mL	NSS D5W	5-15 mg/hr	5 mg/hr	15 minutes	15 mg/hr	Antihypertensives and rate control Dysrhythmias Cardiovascular Meds	No
<b>DoBUTamine</b>	500mg/250mL	D5W NSS	2.5-20 mcg/kg/min	<b>By physician order only</b>		20 mcg/kg/min	Vasopressors and Inotropes CHF Admission Orders	Refer to guidelines
<b>DOPamine</b>	400mg/250mL 800mg/250mL 1600mg/250mL	D5W NSS	2-20 mcg/kg/min	5mcg/kg/min	5 minutes	40 mcg/kg/min	Vasopressors and Inotropes Cardiovascular Meds Critical Care Meds	Refer to guidelines
<b>Epinephrine</b>	4mg/250mL 8mg/250mL 16mg/250mL	D5W NSS	1-10 mcg/min	1mcg/min	5 minutes	Indication Specific	Vasopressors and Inotropes Critical Care Meds	Yes
<b>Esmolol</b>	2500mg/250mL	NSS	50-200 mcg/kg/min	25 mcg/kg/min	5 minutes	300 mcg/min	Antihypertensives and rate control Cardiovascular Meds Cath Alert, Dysrhythmias Cardiovascular meds	No
<b>Labetalol</b>	300mg/300mL 600mg/300mL	NSS D5W	1-4 mg/min	0.5 mg/min	15 minutes	4 mg/min	Antihypertensives and rate control	No
<b>Milrinone</b>	20mg/100mL	NSS D5W	0.125-0.75 mcg/kg/min	<b>By physician order only</b>		0.75 mcg/kg/min	Vasopressors and Inotropes, CHF Admission	No
<b>Nicardipine</b>	20mg/200mL (ED) 25mg/250mL 50mg/250mL	NSS D5W	5-15 mg/hr	2.5 mg/hr	15 minutes	15 mg/hr	Antihypertensives and rate control Cardiovascular meds Chest pain Critical Care Meds Stroke	No
<b>Nitroglycerin</b>	50mg/250mL 100mg/250mL	D5W NSS	10-200 mcg/min	10 mcg/min	5 minutes	400 mcg/min	Antihypertensives and rate control Cardiovascular Meds Chest pain, CHF, Cath alert	No
<b>Nitroprusside</b>	50mg/250mL 100mg/250mL	D5W	0.25-10 mcg/kg/min	0.25 mcg/kg/min	5 minutes	10 mcg/kg/min	Cardiovascular Meds	No
<b>Norepinephrine</b>	8mg/250mL 16mg/250mL	D5W	2-30 mcg/min	5 mcg/min	5 minutes	Indication Specific	Vasopressors and Inotropes Cardiovascular Meds Critical Care Meds	Refer to guidelines
<b>Phenylephrine</b>	40mg/250mL 80mg/250mL	NSS D5W	40-300 mcg/min	10 mcg/min	5 minutes	300 mcg/min	Vasopressors and Inotropes Cardiovascular Meds Critical Care Meds	Refer to guidelines
<b>Vasopressin</b>	20units/50mL	NSS D5W	0.03 units/min	<b>CT Surgery ONLY</b>			Vasopressors and Inotropes	Yes
				0.01 units/min	30 minutes	0.2units/min		

**Table 2. Non-Vasoactive Medication Titrations**

Drug	Concentration	Fluid	Load	Usual Dose	Suggested Rate Adjustments	Clinical Endpoint
<b>Dexmedetomidine</b>	200 mcg/50 mL 400 mcg/100 mL	NSS	No loading dose	0.5 - 1 mcg/kg/hr	Titrate by 0.1 mcg/kg/hr every 30-60 minutes	SAS = 3-4
<b>Fentanyl</b>	1000 mcg/100 mL 3000 mcg/300 mL	NSS or D5W	<u>Bolus Recommendations:</u> 12.5 mcg q5 mins for CcPOT 2-3 25 mcg q5 mins for CcPOT 4-6 50 mcg q5 mins for CcPOT 7-8	25 – 300 mcg/hr	Titrate by 25 mcg/hr every 30 minutes.	CcPOT 0-2; SAS 3-4
<b>Hydromorphone</b>	10 mg/100 mL	NSS or D5W	<u>Bolus Recommendations:</u> 0.2 mg q10 min for CcPOT 2-3 0.4 mg q10 min for CcPOT 4-6 0.8 mg q10 min for CcPOT 7-8	0.4 – 3 mg/hr	Titrate by 0.25 mg/hr every 30 minutes	CcPOT 0-2; SAS 3-4
<b>Ketamine</b>	500 mg/250 mL 1000 mg/500 mL	NSS or D5W		0.05 – 0.4 mg/kg/hr	Titrate by 0.05 mg/kg/min every 30 minutes	SAS = 3-4
<b>Lorazepam</b>	100 mg/50 mL	NSS or D5W	0.01 – 0.06 mg/kg	0.01 – 0.1 mg/kg/hr	Titrate by 0.5 mg/hr every 30-60 minutes	SAS = 3-4
<b>Midazolam</b>	50 mg/50 mL 100 mg/100 mL	NSS or D5W	0.02 – 0.05 mg/kg <u>Bolus Recommendations:</u> 2 mg q10min for SAS 5-6 4 mg q10min for SAS 7	1-10 mg/hr	Titrate by 1 mg/hr every 30 minutes	SAS = 3-4
<b>Morphine</b>	100 mg/100 mL	NSS or D5W	<u>Bolus Recommendations:</u> 1 mg q10 min for CcPOT 2-3 2 mg q10 min for CcPOT 4-6 4 mg q10 min for CcPOT 7-8	1 – 10 mg/hr	Titrate by 1 mg/hr every 30 minutes	CcPOT 0-2; SAS 3-4
<b>Propofol</b>	1000 mg/100 mL 500 mg/50 mL 200mg/20mL(ED)			5-50 mcg/kg/min	Titrate by 5 mcg/kg/min every 5-10 min *Consider reducing infusion by 50% if SBP < 100 mmHg	SAS 3-4

**Table 3. Miscellaneous Infusions and Protocols**

Drug	Concentration	Fluid	Load	Usual Dose	Notes
<b>Amiodarone</b>	450 mg/250 mL	D5W	150 mg/100 mL D5W over 10 minutes	1 mg/min x 6 hrs; 0.5 mg/min x 18 hrs	No titrations
<b>Argatroban</b>	50 mg/50 mL 250mg/250 mL	NSS or D5W		<u>Starting Rates:</u> 0.5 mcg/kg/min (ICU or Liver) 2 mcg/kg/min (non-ICU)	Argatroban calculator for titration on the E-net Therapeutic aPTT: 1.5-3 x normal (Max = 90 sec)
<b>Heparin</b>	25,000 units/ 250 mL	D5W or NSS	<u>Thrombotic:</u> 80 units/kg <u>Non-thrombotic:</u> 60 units/kg	<u>Thrombotic:</u> 18 units/kg/hr <u>Non-thrombotic:</u> 12 units/kg/hr	Titrate per nomogram Therapeutic aPTT 76-112
<b>Insulin</b>	100 units/100 mL	NSS or D5W	DKA: 0.15 units/kg	<u>DKA:</u> 0.1 units/kg/hr <u>NON-DKA:</u> BG 130-220 mg/dL: 2 units/hr BG>220 mg/dL: 4 units/hr	DKA: Titrate per physician order Non-DKA: Per protocol, calculator on the E-net

## References:

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