FMC Adult Intravenous Titration Guidelines

Antiarrhythmics				
Drug	**Onset of Action**	**Titration Targets (T 1/2 and Monitoring Parameters)**	**Recommended Dosing (Adult)***	**Comments**
AMIODArone [Cordarone]	Variable	Half Life: 40-55 days This drip is non-titratable. **Monitor HR, rhythm, SBP, MAP, QTc**	**Bolus:** 150 mg IV in 100 mL D5W over 10 minutes. **Continuous infusion:** 1 mg/min for 6 hours then 0.5 mg/min for 18 hours **Usual Max:** 1 mg/min	Monitor for bradycardia, AV blocks, prolonged QTc > 0.50 sec.
Diltiazem [Cardizem]	2 minutes	Half Life: 3-5 hours **Monitor HR, heart rhythm, SBP, MAP**	Consider starting at 2.5 to 5 mg/hr and titrate by 2.5 to 5 mg/hr every 15 min to response. **Usual Max:** 15mg/hr	Monitor for hypotension, bradycardia, AV blocks. **Antidote is Calcium Chloride.**
Labetalol [Normodyne]	2-5 minutes	Half Life: 5 hours **Monitor HR, heart rhythm, SBP, MAP**	Consider starting at 2 mg/min and titrate by 1 mg/min every 15 min to response. **Usual Max:** 8 mg/min	Monitor for hypotension, bradycardia, AV blocks. **Antidote is Glucagon.**
Esmolol [Brevibloc]	2-10 minutes	Half Life : 9 minutes **Monitor HR, heart rhythm, SBP, MAP**	**Bolus:** 500 mcg/kg over 1 minute **Continuous infusion:** Consider starting at 50 mcg/kg/min and titrate by 50 mcg/kg/min every 5 min to response. **Usual Max:** 200 mcg/kg/min	Monitor for hypotension, bradycardia, AV blocks. **Antidote is Glucagon.**
LIDOcaine	45-90 seconds	Half Life: 0.5-2 hours **Monitor for cessation of ventricular, arrhythmias, LOC changes**	Consider starting at 1 mg/min and titrate by 1 mg/min every 15 min to response. **Usual Max:** 4 mg/min	Assess for signs of CNS toxicity: seizures, acute confusion, and delirium. Lidocaine levels may be obtained to monitor.

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Vasodilators				
Drug	**Onset of Action**	**Titration Targets (T 1/2 and Monitoring Parameters)**	**Recommended Dosing (Adult)***	**Comments**
NiCARdipine [Cardene]	10 minutes	Half Life: 2-4 hours **Monitor HR, heart rhythm, SBP, MAP**	Consider starting at 2.5 to 5 mg/hr and titrate by 2.5 to 5 mg/hr every 5-15 min to response. **Usual Max:** 15 mg/hr	Monitor for hypotension, bradycardia, AV blocks. **Antidote is Calcium Chloride.**
NitroGLYcerin [Tridil]	<2 minutes	Half Life: 1-4 minutes **Monitor CVP, PAWP, SBP, MAP**	Consider starting at 5 mcg/min and titrate by 5-10 mcg/min every 5-15 min to response. **Usual Max:** 300 mcg/min	Monitor for hypotension, decreased preload.
NitroPRUSSide [Nipride]	<2 minutes	Half Life: <10 minutes **Monitor CVP, PAWP, PVR, SVR, SBP, MAP**	Consider starting at 0.5 mcg/kg/min and titrate by 0.5 mcg/kg/min every 5 min to response. **Usual Max:** 7.5 mcg/kg/min (rarely need >4 mcg/kg/min)	Monitor for extravasation when given peripherally. Monitor thiocyanate levels if infusion is greater than 3 days or earlier if patient has renal insufficiency. Monitor for hypotension, decreased SVR, decreased SaO2 due to pulmonary shunting, worsening chest pain or infarction due to coronary steal.
Nesiritide [Natrecor]	15 minutes	Half Life: 20 minutes **Monitor CVP, PAWP, PVR, SVR, SBP, MAP, UOP, Serum Sodium.**	**Bolus:** 2 mcg/kg over 1 minute **Continuous Infusion:** Consider starting at 0.01 mcg/kg/min and titrate by 0.005 mcg/kg/min every 3 hours to response. (Some reference recommend no titration, keeping rate at 0.01 mcg/kg/min) **Usual Max:** 0.03 mcg/kg/min	Do not infuse through heparin-coated catheters. Monitor for hypotension and hyponatremia.

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Vasopressors (to be administered via central line)

Drug	Onset of Action	Titration Targets (T 1/2 and Monitoring Parameters)	Recommended Dosing (Adult)*	Comments
EPInephrine [Adrenaline]	Immediate	Half Life: 3-5 minutes **Monitor HR, heart rhythm, SBP, MAP, SVR, CO/CI**	Consider starting at 1 mcg/min and titrate by 1-2 mcg/min every 2-5 min to response. **Usual Max:** 10 mcg/min	Monitor for increased HR and ectopy. *For extravasation:* Infiltrate site with 5-10 mg of Phentolamine diluted in 10-15 mL NS.
NORepinephrine [Levophed]	Immediate	Half Life: 1-2 minutes **Monitor HR, heart rhythm, SBP, MAP, SVR, CO/CI**	Consider starting at 2 mcg/min and titrate by 1-2 mcg/min every 2-5 min to response. **Usual Max:** 30 mcg/min	Monitor for increased HR and ectopy. *For extravasation:* Infiltrate site with 5-10 mg of Phentolamine diluted in 10-15 mL NS.
PHENYLephrine [NEO-synephrine]	Immediate	Half Life: 10-15 minutes **Monitor HR, SBP, MAP, SVR, CO/CI**	Consider starting at 50-100 mcg/min and titrate by 10-20 mcg/min every 3-5 min to response. **Usual Max:** 300 mcg/min	Monitor for reflex bradycardia with increasing SVR. *For extravasation:* Infiltrate site with 5-10 mg of Phentolamine diluted in 10-15 mL NS.
Vasopressin [Pitressin]	Rapid	Half Life: 10-20 minutes **Monitor SBP, MAP, SVR, CO/CI, Serum Sodium**	Consider infusing at 0.04 units/min for vasopressor activity. Usually not titrated. **Usual Max:** 0.04 units/min	Monitor serum sodium levels. (May be administered at different dosing for Diabetes Insipidus or Variceal/GI Bleeding --> contact Pharmacist for questions)

Inotropes and Inodilators

Drug	Onset of Action	Titration Targets (T 1/2 and Monitoring Parameters)	Recommended Dosing (Adult)*	Comments
DOBUTamine [Dobutrex]	1-10 minutes	Half Life: 2 minutes **Monitor HR, SBP, MAP, CO/CI, PVR, SVR**	Consider starting at 2 mcg/kg/min and titrate by 2-5 mcg/kg/min every 5-15 min to response. **Usual Max:** 20 mcg/kg/min (some sources report 40 mcg/kg/min)	Monitor for tachycardia and increased ventricular ectopy. For extravasation: Infiltrate site with 5-10 mg of Phentolamine diluted in 10-15 mL NS.
DOPamine [Intropin]	5 minutes	Half Life: 2 minutes **Monitor HR, SBP, MAP, CO/CI, SVR**	Consider starting at 2-5 mcg/kg/min and titrate by 2-5 mcg/kg/min every 2-10 min to response. **Usual Max:** 20 mcg/kg/min	Monitor for tachycardia and increased ventricular ectopy. For extravasation: Infiltrate site with 5-10 mg of Phentolamine diluted in 10-15 mL NS.
Milrinone [Primacor]	5-15 minutes	Half Life: 2.5 hours (longer in renal impairment) **Monitor HR, heart rhythm, SBP, MAP, CO/CI, PVR, SVR**	**Optional Bolus:** 50 mcg/kg over 10 min **Continuous Infusion:** Consider starting at 0.25 mcg/kg/min and titrate by 0.125 mcg/kg/min every 15-30 min to response. **Usual Max:** 0.75 mcg/kg/min	Monitor for hypotension and increased ventricular ectopy. Reduced dosing in Renal insufficiency - please contact pharmacist for recommendations.

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Sedatives				
Drug	**Onset of Action**	**Titration Targets (T 1/2 and Monitoring Parameters)**	**Recommended Dosing (Adult)***	**Comments**
Dexmedetomidine [Precedex]	5-15 minutes	Half Life: 6 minutes (terminal 2 hours) **Monitor HR, SBP, MAP, RASS or Ramsey Scale.**	**Optional Bolus:** 1 mcg/kg over 10 min **Continuous Infusion:** Consider starting at 0.2 mcg/kg/hr and titrate by 0.1 mcg/kg/hr every 5 min to response. **Usual Max:** 1.7 mcg/kg/hr	Monitor for hypotension and bradycardia.
Propofol [Diprivan] 1000mg in 100ml	10-60 seconds	Half Life: 3-10 minutes **Monitor HR, SBP, MAP, RASS or Ramsey Scale.**	Consider starting at 5 mcg/kg/min and titrate by 5-10 mcg/kg/min every 5 minutes to response. **Usual Max: 100 mcg/kg/min**	Do Not use in patients with Egg or Soy Allergy. Monitor serum triglycerides every 48 hours. Monitor for hypotension.
LORazepam [Ativan]	5-20 minutes	Half Life: 6-10 hours **Monitor sedation score. Utilize bolus dosing as ordered to achieve target RASS or Ramsey Score.**	Consider starting at 2-4 mg/hr and titrate by 1 mg/hr every 15 min to response. **Usual Max:** See Comments	Monitor serum osmolality. Monitor for metabolic acidosis. Should be administered to achieve specified endpoint (e.g. RASS score or cessation of seizure activity). It is recognized that a generalized maximum dose is not applicable due to the necessity of individualizing dosing based on patient response and sedation requirements. **Antidote is Flumazenil.**
Midazolam [Versed]	1-5 minutes	Half Life: 1-4 hours (more prolonged if infusion >48 hours) **Monitor sedation score. Utilize bolus dosing as ordered to achieve target RASS or Ramsey Score.**	Consider starting at 2-4 mg/hr and titrate by 1 mg/hr every 10 min to response. **Usual Max:** See Comments	Consider Lorazepam if length of sedation expected to be greater than 48 hours. Should be administered to achieve specified endpoint (e.g. RASS score or cessation of seizure activity). It is recognized that a generalized maximum dose is not applicable due to the necessity of individualizing dosing based on patient response and sedation requirements. **Antidote is Flumazenil.**

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Analgesics

Drug	Onset of Action	Titration Targets (T 1/2 and Monitoring Parameters)	Recommended Dosing (Adult)*	Comments
Morphine sulfate	5-10 minutes	Half Life: 1-4 hours. **Monitor pain cues, HR, BP. Utilize ordered bolus dosing for breakthrough pain.**	Consider starting at 2-4 mg/hr and titrate by 1-2 mg/hr every 15 minutes to response. **Usual Max:** See Comments	Monitor for hypotension and respiratory depression. It is recognized that a generalize maximum dose is not applicable due to the need to individualize narcotic dosing, i.e. patients with opioid tolerance. **Antidote is Naloxone.**
FentaNYL	Rapid	Half Life: 0.5-4 hour **Monitor pain cues, HR, BP. Utilize ordered bolus dosing for breakthrough pain.**	Consider starting at 25-50 mcg/hr and titrate by 25-50 mcg/hr every 5-10 minutes to response. **Usual Max:** See Comments	Monitor for hypotension and respiratory depression. It is recognized that a generalize maximum dose is not applicable due to the need to individualize narcotic dosing, i.e. patients with opioid tolerance. **Antidote is Naloxone.**

Maternity Medications

Drug	Onset of Action	Titration Targets (T 1/2 and Monitoring Parameters)	Recommended Dosing (Adult)*	Comments
Magnesium Sulfate	Immediate	Half Life: 30 minutes **Monitor respiratory rate and LOC.**	**Loading dose:** 4-6 grams over 20-30 minutes **Continuous Infusion:** Consider starting at 1 gram/hr and titrate by 0.5 -1 gram/hr every 30 minutes to response **Usual Max:** 4 grams/hr	Monitor for signs of magnesium toxicity: respiration rate less than 12/minute, loss of deep tendon reflexes, urine output less than 120 mL in 4 hours or 30 mL in 1 hour, cardiac abnormalities, signs of fetal distress, serum magnesium greater than 8 mEq/L. **Antidote is Calcium Gluconate.**
Oxytocin [Pitocin]	< 1 minute	Half Life: 1-5 minutes **Monitor fetal heart rate and uterine activity.**	Consider starting at 1 milliunit/min and titrate by 1-2 milliunits/min every 15 min until adequate labor is established. **Usual Max:** 20 milliunits/min (higher doses may be required for post-partum patients)	Monitor for side effects: hypertonic and/or tetanic contractions, maternal hypertension, antidiuretic effect, uterine rupture, fetal distress, decreased sensitivity to oxytocin which may decrease contractions and lead to failure to progress. Continuous fetal monitoring is required.

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