Memorial EMS
Decatur Memorial EMS
Springfield Memorial EMS

Expanded Scope Tier I Infusions

Developed March 2025

Nicardipine

CLASS:

- Calcium Channel Blocker

ADDITIONAL NAMES:

- Cardene

ACTION:

- Inhibits calcium ion from entering the "slow channels" or select voltage-sensitive areas of vascular smooth muscle and myocardium during depolarization, producing a relaxation of coronary vascular smooth muscle and coronary vasodilation; increases myocardial oxygen delivery in patients with vasospastic angina

INDICATION:

1. Aortic dissection
2. Acute ischemic stroke (BP management with reperfusion therapy)
3. Angina
4. Hypertension
5. Hypertensive emergency
6. Intracerebral hemorrhage
7. Subarachnoid hemorrhage

CONTRAINDICATION:

1. Advanced aortic stenosis
2. Drug hypersensitivity/allergy

COMPLICATIONS/ADVERSE REACTIONS:

Cardiovascular:

1. Flushing
2. Pedal edema
3. Exacerbation of angina pectoris
4. Hypotension
5. Palpitations
6. Tachycardia
7. Chest pain
8. Extrasystoles
9. Hemopericardium
10. Hypertension
11. Supraventricular tachycardia
12. Edema

Nicardipine

COMPLICATIONS/ADVERSE REACTIONS (cont'd):

Central nervous system

1. Headache
2. Dizziness
3. Hypoesthesia
4. Intracranial hemorrhage
5. Pain
6. Somnolence

Dermatologic:

1. Diaphoresis
2. Skin rash

Endocrine & metabolic:

1. Hypokalemia

Gastrointestinal:

1. Nausea and vomiting
2. Nausea
3. Dyspepsia
4. Abdominal pain
5. Xerostomia

Genitourinary:

1. Hematuria

Local:

1. Injection site reaction
2. Pain at injection site

Neuromuscular & skeletal:

1. Weakness
2. Myalgia
3. Paresthesia

Nicardipine

SIDE EFFECTS:

- Angina/MI
- Hypotension
- Syncope
- Peripheral edema
- Tachycardia

HOW SUPPLIED:

- Solution, Intravenous [preservative free]:
  - 20 mg/200 mL in NaCl 0.9% (200 mL)
  - 40 mg/200 mL in NaCl 0.9% (200 mL)
- Solution, Intravenous, as hydrochloride:
  - Cardene IV:
    - 20 mg (200 mL)
    - 40 mg (200 mL)
  - Generic:
    - 2.5 mg/mL (10 mL)
- Solution, Intravenous, as hydrochloride [preservative free]:
  - 2.5 mg/mL (10 mL)

DOSE:

- Initial infusion rate: 5mg/hr; Titrate by 2.5mg/hr every 5 minutes; Max infusion rate = 15mg/hr

Labetalol

CLASS:

- Beta blocker

ACTION:

- Blocks beta-1 and beta-2 adrenergic receptors as well as alpha-1 blockade (to a lesser extent)

INDICATION:

1. Hypertension

CONTRAINDICATION:

1. Severe bradycardia
2. Heart block greater than first degree (except in patients with a functioning artificial pacemaker)
3. Cardiogenic shock
4. Bronchial asthma or a history of obstructive airway disease
5. Uncompensated cardiac failure
6. Conditions associated with severe and prolonged hypotension
7. Sick sinus syndrome (except in patients with a functioning artificial pacemaker)
8. State of hypoperfusion
9. Severe peripheral arterial circulatory disorders

COMPLICATIONS/ADVERSE REACTIONS:

1. Bradyarrhythmia
2. Bronchospasm
3. CNS effects
4. Potentiation/masking of hypoglycemia
5. Withdrawal
6. Hypotension

Labetalol

PRECAUTIONS:

1. Treatment of anaphylaxis (e.g. with epinephrine) in patients taking beta-blockers may be ineffective or less effective
2. Older adults are more prone to bradycardic response and lower dosages may be considered
3. Heart failure (HF): Use with extreme caution in patients with compensated heart failure and monitor for a worsening of the condition
4. Hepatic impairment: Use with caution in patients with hepatic impairment; bioavailability is increased due to decreased first-pass metabolism
5. Myasthenia gravis: Use beta blockers with caution in patients with myasthenia gravis
6. Peripheral vascular disease (PVD) and Raynaud disease: Beta blockers may precipitate or aggravate symptoms of arterial insufficiency in patients with PVD and Raynaud disease
7. Pheochromocytoma: Labetalol may be effective in lowering blood pressure and relieving symptoms in patients with pheochromocytoma; however, patients may experience paradoxical hypertensive responses due to inadequate alpha-1 blockade
8. Thyroid disease: Beta blockers may mask signs of hyperthyroidism (e.g. tachycardia)

SIDE EFFECTS:

Cardiovascular:

- Orthostatic hypotension
- Edema
- Flushing
- Hypotension
- Ventricular arrhythmia

Dermatologic:

- Diaphoresis
- Pruritus
- Skin rash

Gastrointestinal:

- Nausea
- Dysgeusia
- Dyspepsia
- Vomiting

Nervous system:

- Dizziness
- Drowsiness
- Fatigue
- Headache
- Paresthesia
- Vertigo
- Yawning

Ophthalmic:

- Visual disturbance

Respiratory:

- Dyspnea
- Nasal congestion
- Wheezing

Labetalol

HOW SUPPLIED:

- 5 mg/mL (4 mL, 20 mL, 40 mL)
- 100 mg/100 mL (1 mg/mL) with NaCl 0.72% (100 mL)
- 200 mg/200 mL (1 mg/mL) with NaCl 0.72% (200 mL)
- 200 mg/200 mL (1 mg/mL) with dextrose 5% (200 mL)
- 300 mg/300 mL (1 mg/mL) in NaCl 0.72% (300 mL)

Solution Prefilled Syringe, Intravenous [preservative free]:

- 10 mg/2 mL (2 mL)

DOSE:

- **Intermittent IV:** Initial: 10 to 20 mg over 2 minutes followed by increasing dosages from 20 to 80 mg every 10 minutes until target heart rate and BP are reached; may transition to continuous infusion if unable to obtain target goals. Caution in older adults who may be more prone to bradycardic response (consider lower dosages). Contact Medical Control if exceeding cumulative IV dose of 300mg
- **Continuous IV infusion:** Initial loading dose: 20 mg over 2 minutes (optional if intermittent dosing is used), followed by 0.5 to 2 mg/minute; some patients may require titration up to 10 mg/minute for optimal response

Prothrombin Complex Concentrate (Human)

ADDITIONAL NAMES:

- **KCENTRA**

CLASS:

- Anticoagulant Reversal Agent

ACTION(S):

- Reversal of Vitamin K antagonists (Warfarin) and Factor X inhibitors

INDICATIONS:

1. Acute Major Bleeding and/or need for acute surgery/invasive procedures in the setting of Vitamin K antagonists or Factor X inhibitor use

CONTRAINDICATIONS:

Absolute:

1. Known anaphylactic or severe systemic reactions to KCENTRA or any of its components
2. Disseminated Intravascular Coagulation (DIC)
3. Patients with Heparin Induced Thrombocytopenia (HIT)

COMPLICATIONS/ADVERSE REACTIONS:

1. Hypersensitivity Reactions- allergy or anaphylaxis

SIDE EFFECTS:

- Headache, Nausea, Vomiting, Hypotension, Anemia

HOW SUPPLIED:

- 500 unit and 1000 unit vials

DOSE:

- Based weight in combination with pretreatment INR or standard dose for factor X inhibitors. Maximum total dose of 5000 units

Prothrombin Complex Concentrate (Human)

STANDING ORDERS:

1. Any dosage of > 300 units/minute during interfacility transfer requires **Medical Control** order.
2. Must be on cardiac monitor
3. Monitor for Mental status decline

IV Fluids with Potassium Chloride (KCl) Added

CLASS:

- Electrolyte

ACTION:

- Participates in several physiological processes in the body including the transmission of nerve impulses, the maintenance of normal renal function & intracellular toxicity and the contraction of skeletal, cardiac & smooth muscle.

INDICATION:

1. Hypokalemia

CONTRAINDICATION:

1. Hyperkalemia

COMPLICATIONS/ADVERSE REACTIONS:

1. Burning along the vein of infusion
2. Local site irritation
3. Lower extremity weakness

PRECAUTIONS:

1. Alkalosis/acidosis (serum potassium levels may not represent total body potassium)
2. Acidosis (risk of hyperkalemia)
3. Burn patients (risk of hyperkalemia due to extensive tissue breakdown)
4. Concomitant use of ACE inhibitors (inhibits aldosterone production resulting in potassium retention)
5. Concomitant use of potassium-sparing diuretics (risk of hyperkalemia)
6. Acute dehydration (risk of hyperkalemia)
7. Chronic renal failure (risk of hyperkalemia)
8. Patients taking Digoxin or suspected of having Digoxin toxicity.

IV Fluids with Potassium Chloride (KCl) Added

SIDE EFFECTS:

- Abdominal pain
- Nausea/vomiting
- EKG changes associated with hyperkalemia:
  - Tall, tented (peaked) T waves
  - Depressed ST segments
  - Prolonged PR intervals
  - Flattened P waves
  - Prolonged QRS & QT intervals
  - Heart block
  - Bigeminy
  - V-fib/cardiac arrest

HOW SUPPLIED:

- Potassium chloride (KCl) should be diluted in a 500 mL bag of Normal Saline (NS)
- **KCI concentrations may not exceed 40 meq in 500 mL NS**

DOSE:

- **Maximum dose of 10 meq/hr**
- KCl infusion must be initiated at the transferring hospital and can be run through either a central or peripheral line.

STANDING ORDERS:

1. Verify lab values (serum electrolytes, BUN & creatinine) prior to departure (if available).
2. Incompatible with Phenergan (promethazine), Sodium Bicarbonate, Sodium Nitroprusside and Atropine.
3. Assess IV insertion site for any redness, swelling or tenderness. If any one of these is present, stop the infusion, discontinue IV. Establish a new IV site and restart infusion. Notify the receiving hospital of the area of the previous IV site and reason for discontinuing the original IV.
4. **Monitor patient closely** en route. If signs & symptoms of hyperkalemia occur, stop the infusion and **contact Medical Control.**
5. **Monitor urinary output** (long-distance transports) and **contact Medical Control** if urinary output is < 30mL/hr for two (2) consecutive hours.

Dobutamine

CLASS:

- Sympathomimetic

ADDITIONAL NAMES:

- Dobutex

ACTION:

- Increases cardiac contractility
- Some chronotropic activity

INDICATION:

1. Short term management of CHF
2. Decreased cardiac output
3. Cardiogenic shock

CONTRAINDICATION:

1. Should only be used on patients with adequate heart rate
2. Tachydysrhythmias
3. Hypertrophic subaortic stenosis

COMPLICATIONS/ADVERSE REACTIONS:

1. Infusion site reaction

PRECAUTIONS:

1. Ventricular irritability
2. Use with caution in myocardial infarction
3. Can be deactivated by alkaline solutions

SIDE EFFECTS:

- Increased heart rate
- Palpitations
- Dyspnea
- Hypokalemia

Dobutamine

HOW SUPPLIED:

- 250 mg/ 250 mL

DOSE:

- 2.5-20 mcg/kg/min
- Reduce does by 5mcg/kg/min in the event of tachydysrhythmias

Naloxone

CLASS:

- Narcotic Antagonist

ADDITIONAL NAMES:

- Narcan

ACTION:

- Reverses the effects of narcotics

INDICATION:

1. Narcotic overdoses from
    a. Codeine
    b. Demerol
    c. Dilaudid
    d. Fentanyl
    e. Heroin
    f. Lortab
    g. Methadone
    h. Morphine
    i. Paregoric
    j. Percodan
    k. Tylox
    l. Vicodin
2. To rule out possible overdose of unknown origin

CONTRAINDICATION:

- None

COMPLICATIONS/ADVERSE REACTIONS:

1. Use with caution for patients with long term drug use and/ or prescription opioid use.

PRECAUTIONS:

1. Be alert for patient reaction to medication.

Naloxone

SIDE EFFECTS:

- Allergic reaction
- Anaphylaxis

HOW SUPPLIED:

- 2mg/500mL
- 4mg/250mL

DOSE:

- Typical infusion is 50-67% of dose that was needed to reverse patient. Typically 1-6 mg/ hour.

N-Acetylcysteine

CLASS:

- Antidote

ADDITIONAL NAMES:

- NAC
- Acetadote
- Acetylcysteine 20%

ACTION:

- Protects the liver by maintaining or restoring glutathione levels or by acting as an alternate substrate for conjunction with, and therefore detoxification of, the acetaminophen reactive metabolite

INDICATION:

1. Acetaminophen toxicity
2. Acute liver failure

CONTRAINDICATION:

1. Sensitivity to acetylcysteine

COMPLICATIONS/ADVERSE REACTIONS:

1. Anaphylaxis
2. Bronchospasm
3. Rash
4. Nausea
5. Vomiting

PRECAUTIONS:

1. Use with caution in asthma patients

SIDE EFFECTS:

- Tachycardia
- Hypotension
- Vomiting

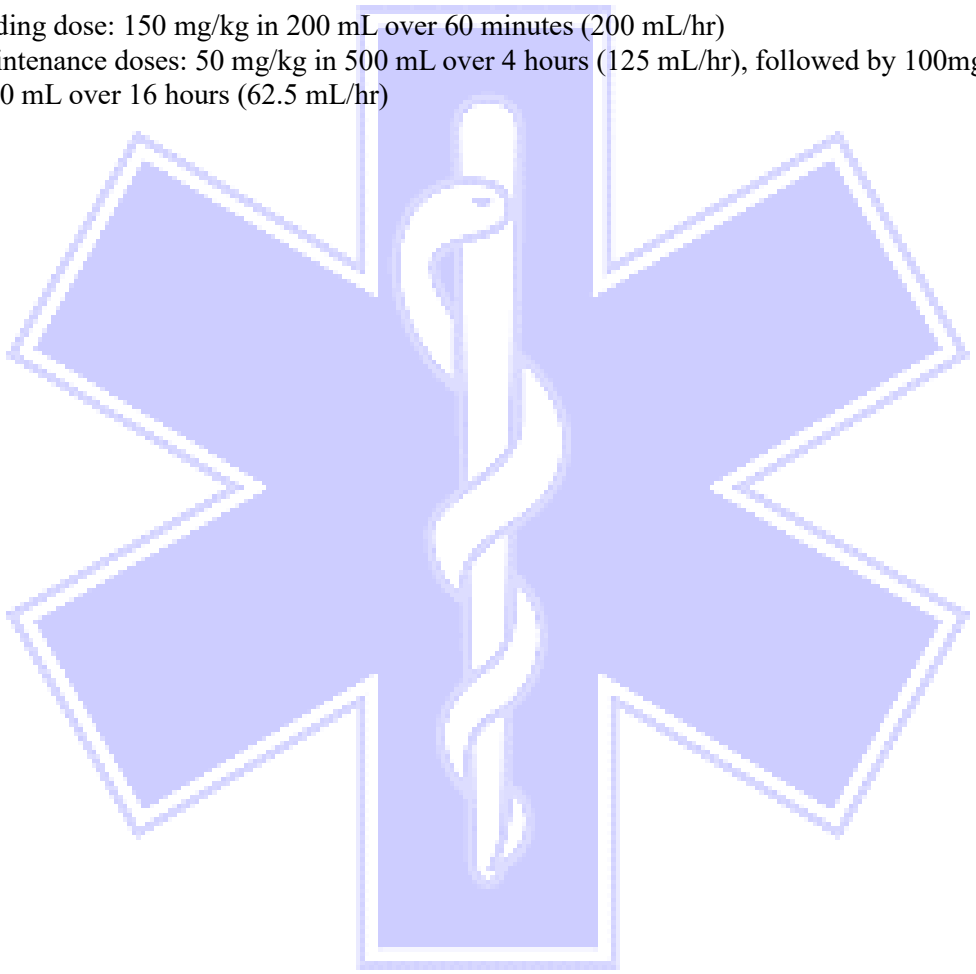
N-Acetylcysteine

HOW SUPPLIED:

- 30 mL vials
- Given as infusion in D5W

DOSE:

- Loading dose: 150 mg/kg in 200 mL over 60 minutes (200 mL/hr)
- Maintenance doses: 50 mg/kg in 500 mL over 4 hours (125 mL/hr), followed by 100mg/kg in 1,000 mL over 16 hours (62.5 mL/hr)



Insulin

CLASS:

- Hormone
- Hypoglycemic agent

ADDITIONAL NAMES

- Humulin

ACTION:

- Causes uptake of glucose by the cells
- Decreases blood glucose level
- Promotes glucose storage

INDICATION:

1. Elevated blood glucose
2. Diabetic ketoacidosis

CONTRAINDICATION:

1. Avoid overcompensation of blood glucose level
    a. Ongoing monitoring needed to ensure controlled decrease in blood glucose level.

COMPLICATIONS/ADVERSE REACTIONS:

1. Hypoglycemia (can include S/S of tachycardia, diaphoresis, mental status changes, seizures)
2. Allergic Reaction

PRECAUTIONS:

1. Administration of excessive dose may induce hypoglycemia
2. Glucose should always be readily available. D10 infusion should be readily available to be started.
3. Typically Insulin is injected subcutaneously and is slower acting and longer lasting. An Insulin infusion is faster acting but still has the ability to cause hypoglycemia after the infusion has been stopped (IV Insulin ½ life is about 15 minutes).

Insulin

SIDE EFFECTS:

- Few in emergency situations

HOW SUPPLIED:

- 100 units/ 100 mL

DOSE:

- Initial dose of regular insulin IV may be given at the transferring facility.
- 0.1units/kg/hr maximum rate of infusion. Typical dose 3-8 units/hour.

STANDING ORDERS:

1. Blood sugar must be checked at time of transfer and every 30 minutes during transport. Contact **Medical Control** if blood sugar <250.
2. Verify infusion rate as well as total time at the transferring facility prior to departure.
    a. Enough medication to last **1.5 times the length of transfer** should be available.
    b. If concerns about enough medication a new infusion should be started prior to departure from the transferring facility to ensure adequate supply for the transport, handoff and any additional delays.
3. Monitor patient closely enroute for signs of hypoglycemia.
    a. If altered level of consciousness or other reason to suspect hypoglycemia, immediately check blood glucose level.
    b. If level less than 100
        i. Stop Insulin infusion. Note amount infused and time of suspension.
        ii. Begin D10 infusion if altered LOC and blood glucose is < 70 mg/dl.
        iii. Continue to monitor blood glucose every 10 minutes for remainder or transport.

Integrillin

Medication Names: Abciximab (Reopro), Eptifibatide (Integrillin), Tirofiban (Aggrastat)

CLASS:
- Glycoprotein IIb/IIIa Inhibitors

ACTION(S):
- Prevent platelet aggregation by blocking the Glycoprotein IIb/IIIa receptor

INDICATIONS:
1. Unstable Angina
2. Percutaneous Coronary Intervention

CONTRAINDICATIONS:
Absolute:
1. Hypersensitivity to Drug or ingredients
2. Abnormal Bleeding within last 30 days, Major surgery within 6 weeks
3. Stroke within last 30 days or any history of hemorrhagic stroke
4. Platelets <100,000
5. SBP>200 mmHg, DBP>100 mmHg
6. CRF on Dialysis

Relative:
1. Renal insufficiency, Elderly patients

COMPLICATIONS/ADVERSE REACTIONS:
1. Anaphylaxis
2. ICH, other severe bleeding
3. Thrombocytopenia

SIDE EFFECTS:
- Hypotension

HOW SUPPLIED:
- Eptifibatide (Integrillin)-100ml Vial (2mg/ml)
- Abciximab (Reopro)-250ml bag (40mcg/ml)
- Tirofiban (Aggrastat)-15 mL bolus vial (250mcg/ml); 100mL vial (50 mcg/ml); 250 ml bag (50mcg/ml)

DOSE:
- Eptifibatide (Integrillin)-0.15 mcg/kg/min
- Abciximab (Reopro)-0.125 mcg/kg/min (max 10 mcg/min)
- Tirofiban (Aggrastat)-0.15 mcg/kg/min

STANDING ORDERS:
- Must be on cardiac monitor
- Monitor for mental status

Labetalol

CLASS:

- Antihypertensive

ACTION(S):

- Beta Blocker

INDICATIONS:

1. Hypertensive Emergency
2. Post partum hypertension
3. Preeclampsia/eclampsia

CONTRAINDICATIONS:

Absolute:

1. Hypersensitivity
2. Severe Sinus Bradycardia
3. 2nd and 3rd degree heart block
4. Cardiogenic shock
5. Asthma/COPD exacerbation
6. Administration of diltiazem/verapamil immediately prior to initiation

COMPLICATIONS/ADVERSE REACTIONS:

1. Brady arrhythmias
2. Bronchospasm

Labetalol

PRECAUTIONS:

1. Avoid use in asthma/COPD patients as bronchospasm can be induced
2. Use with caution in patients with chest pain

SIDE EFFECTS:

- Dizziness
- Nausea
- Hypotension
- Dyspnea

HOW SUPPLIED:

- IV

DOSE:

- 0.5-5 mg/min
    - Discontinue if HR <60, SBP < 100 mmHg or SBP falls below the sending facility's stated SBP goal.

STANDING ORDERS:

1. Any other change in rate/dosage during interfacility transfer requires **Medical Control** order.

Esmolol (drip)

CLASS:

- Beta blocker

ACTION(S):

- Competitively blocks beta-1 receptors

INDICATIONS:

1. Acute aortic syndromes/acute aortic dissection (off-label)
2. Atrial fibrillation/flute, rate control
3. Hypertensive emergency (off-label)
4. Tachycardia

CONTRAINDICATIONS:

Absolute:

1. Hypersensitivity or allergy to esmolol
2. Second- or third-degree heart block
3. Sick sinus syndrome
4. Cardiogenic shock
5. Vasospastic angina

Relative:

1. Hypotension
2. Recent IV administration of calcium channel blockers
3. Pulmonary hypertension

COMPLICATIONS/ADVERSE REACTIONS:

1. Extravasation: Vesicant; ensure proper needle or catheter placement prior to and during infusion. Avoid extravasation. Extravasation can lead to skin necrosis and sloughing; avoid infusions into small veins or through a butterfly catheter.
2. Hyperkalemia: Esmolol has been associated with elevations in serum potassium and development of hyperkalemia especially in patients with risk factors (eg, kidney impairment)
3. Hypotension: Can commonly occur; patients need close blood pressure monitoring. If an unacceptable drop in blood pressure occurs, reduction in dose or discontinuation may reverse hypotension (usually within 30 minutes)

PRECAUTIONS:

Use with extreme caution in patients with following conditions:

1. Bronchospastic disease, conduction abnormalities, diabetes, heart failure, kidney impairment, myasthenia gravis, peripheral vascular disease, thyroid disease

SIDE EFFECTS:

- Hypotension
- Infusion site reaction
- Nausea

Esmolol (drip)

HOW SUPPLIED:

- Solution, intravenous, as hydrochloride:
  - 2000mg (100mL); 2500mg (250 mL); 100mg/10mL (10mL); 2500mg/250mL (250 mL); 2000mg/100mL (100 mL)

DOSE:

- Acute aortic syndromes/acute aortic dissection (off-label)
  - 500 mcg/kg loading dose over 1 minute, followed by a continuous infusion of 25 to 50 mcg/kg/minute. Titrate infusion by 25 to 50 mcg/kg/minute every 5 minutes as needed to achieve target heart rate and BP; for more rapid BP control, may consider a repeat loading dose (e.g. 500 mcg/kg) before every up titration; maximum continuous infusion dose: 300 mcg/kg/minute
- Atrial fibrillation/flute, rate control
  - Initial: 50 mcg/kg/minute; for inadequate response, may increase in increments of 50 mcg/kg/minute at ≥4-minute intervals up to a maximum of 300 mcg/kg/minute. To achieve a more rapid response, administer a repeat bolus before increasing the continuous infusion rate. In the absence of a bolus, the effects of continuous infusion rate changes may not be evident for up to 30 min
- Hypertensive emergency (off-label)
  - 250 to 500 mcg/kg loading dose over 1 minute, followed by a continuous infusion of 25 to 50 mcg/kg/minute. Titrate infusion by 25 to 50 mcg/kg/minute every 5 minutes as needed to achieve target blood pressure while maintaining adequate heart rate; for more rapid blood pressure control, may consider a repeat loading dose (e.g. 250 to 500 mcg/kg) before every up-titration; maximum continuous infusion dose: 300 mcg/kg/minute
- Tachycardia
  - Loading doses (optional): IV: 500 mcg/kg over 1 minute, followed by a continuous infusion; may administer repeat bolus doses of 500 mcg/kg prior to each increase in continuous infusion rate in order to achieve a more rapid response
  - Continuous infusion: IV: Initial: 50 mcg/kg/minute; for inadequate response, may increase in increments of 50 mcg/kg/minute at ≥4-minute intervals up to a maximum of 300 mcg/kg/minute. To achieve a more rapid response, administer a repeat bolus before increasing the continuous infusion rate. In the absence of a bolus, the effects of continuous infusion rate changes may not be evident for up to 30 minutes

STANDING ORDERS:

1. Any other change in rate/dosage of esmolol during interfacility transfer requires **Medical Control** order.

Pralidoxime Chloride

CLASS:

- Oxime

ACTION(S):

- Reactivates cholinesterase that had been inactivated by phosphorylation due to exposure to organophosphate pesticides and cholinesterase-inhibiting nerve agents (e.g. terrorism and chemical warfare agents such as sarin) by displacing the enzyme from its receptor sites; removes the phosphoryl group from the active site of the inactivated enzyme

INDICATIONS:

1. Anticholinesterase overdose
2. Organophosphate poisoning (used in conjunction with atropine)

CONTRAINDICATIONS:

Relative:

1. Hypersensitivity to pralidoxime

COMPLICATIONS/ADVERSE REACTIONS:

1. Cardiovascular: Cardiac arrest, hypertension, tachycardia
2. Central nervous system: Dizziness, drowsiness, headache, paralysis, seizure
3. Dermatologic: Maculopapular rash
4. Gastrointestinal: Nausea, vomiting
5. Hepatic: Increased serum ALT (transient), increased serum AST (transient)
6. Neuromuscular & skeletal: Fasciculations, increased creatine phosphokinase, laryngospasm, muscle rigidity, weakness
7. Ophthalmic: Abnormal accommodation, blurred vision, diplopia
8. Renal: Renal insufficiency
9. Respiratory: Apnea, hyperventilation

PRECAUTIONS:

1. Use caution in patients with myasthenia gravis.
2. Dosage modification suggested in patients with renal impairment.

SIDE EFFECTS:

- Pain at injection site

HOW SUPPLIED:

- 1 gram

Pralidoxime Chloride

DOSE:

- Anticholinesterase overdose
  - 1,000mg to 2,000mg IV; followed by increments of 250mg IV q5min prn
- Organophosphate poisoning
  - IV Loading dose: 30mg/kg (max 2,000mg)
  - IV Continuous infusion: 8 to 10 mg/kg/hr or 500mg/hr
  - Or
  - IM (mild) 600mg, repeat q15min to max total dose 1,800mg
  - IM (severe) 600mg, repeat twice in rapid succession to 1,800mg total
  - IM (persistent symptoms) repeat the entire series one hour after prior injections

STANDING ORDERS:

1. Any other change in rate/dosage of pralidoxime during interfacility transfer requires Medical Control order.