

**PURPOSE:** The purpose of this policy is to authorize paramedics to monitor and adjust intravenous nitroglycerin infusions in adult patients during interfacility transport.

**AUTHORITY:** Health and Safety Code, Division 2.5, Sections 1797.220 & 1798.

**POLICY:**

- I. ALS Ambulance providers must apply to and be approved by the San Joaquin County EMS Agency (SJCEMSA) prior monitoring nitroglycerin infusions during interfacility transports.
- II. The monitoring of nitroglycerin infusions is restricted to San Joaquin County accredited paramedics that have successfully completed a training program approved by the SJCEMSA for monitoring nitroglycerin and the use of infusion pumps.
- III. Patients that are candidates for paramedic transport are limited to those with preexisting nitroglycerin infusions. Prehospital personnel may not initiate nitroglycerin infusions.
- IV. Paramedics may restart nitroglycerin infusions if the nitroglycerin infusion is interrupted due to infiltration, accidental disconnection of the IV line, malfunctioning pump, etc. All lines must be restarted in accordance with the transferring physician's orders. Paramedics will ensure new IV line is patent prior to restarting the infusion.
- V. Nitroglycerin Infusions  
The following parameters shall apply in all cases where paramedics transport patients with preexisting nitroglycerin drips:
  - A. Patient shall be placed on cardiac, blood pressure and pulse oximetry monitors and monitored continuously during transport.
  - B. A completed Interfacility Transfer form signed by the transferring physician must be obtained prior to transport. The transferring physician must provide orders for maintaining the nitroglycerin infusion during transport and certify that the patient is stable for transfer or that the benefits of transport outweigh the risks of transport.
  - C. Nitroglycerin infusions must be regulated by a mechanical intravenous infusion pump. If pump failure occurs and cannot be corrected, the

paramedic will stop the nitroglycerin infusion and notify the transferring hospital.

- D. Infusion fluid shall be D5W or NS.
- E. Nitroglycerin infusion concentration shall be 25 mg/250 ml or 50 mg/250 ml.
- F. Regulation of the drip rate will be within parameters as defined by the transferring physician, but in no case will changes be in greater than 5 mcg/minute increments every 10 minutes.
- G. In cases of hypotension (SBP < 90), the medication drip will be discontinued and the transferring hospital and base hospital will be notified.
- H. Infusion rates shall be maintained as ordered by the transferring physician.
- I. Vital signs shall be monitored and documented every 10 minutes during transport or every 5 minutes if an increase in the drip rate is ordered by the base physician.

VI. Continuous Quality Improvement

All calls involving the transfer of patients with preexisting nitroglycerin infusions shall be reviewed through the ambulance provider's CQI program to determine compliance with policy and transferring physician orders. Findings and data will be submitted to the SJCEMSA quarterly.

VII. General Information on Nitroglycerin

- A. Nitroglycerin is a vasodilating agent that belongs to a group of drugs referred to as nitrates. Nitroglycerin acts to: relax vascular smooth muscle; vasodilate both arteries and veins (especially veins); increase venous pooling; decrease venous return to the heart; increase arterial relaxation; decrease systemic vascular resistance; decrease cardiac workload; decrease cardiac oxygen consumption; dilate the large epicardial arteries; and lower diastolic more than systolic blood pressure.
- B. Pharmacokinetics:
  - 1. SL: Onset 1-3 minutes; duration 30 minutes;
  - 2. Transdermal (patch): Onset 0.5 - 1 hour; duration 12-24 hours;
  - 3. Transdermal (ointment): Onset 0.5-1 hour; duration 2-12 hours;
  - 4. PO (sustained release): Onset 20-40 minutes; duration 3-8 hours;

5. IV: Onset usually immediate; duration is variable;
  6. Metabolized by the liver;
  7. Excreted in urine;
  8. Half-life of 1-4 minutes.
- C. Indications for the use of Nitroglycerin:
1. Sublingual:
    - a. Relief of acute anginal pain or related ischemic symptoms;
    - b. Congestive Heart Failure (CHF) to decrease myocardial workload.
  2. Intravenous:
    - a. Diagnosed MI or unstable angina pectoris, even in the absence of chest pain, to decrease myocardial workload;
    - b. Relief of persistent ischemic chest pain that does not respond to other medications;
    - c. Hypertension when associated with diagnosed MI or unstable angina pectoris (not used solely for blood pressure control).
- D. Contraindications:
1. Allergy to nitrates;
  2. Increased intracerebral pressure such as in cases of stroke, head trauma or intracerebral bleeding;
  3. Hypotension;
  4. Hypovolemia;
  5. Treatment of hypertension without progressively worsening signs of organ damage, ischemia or neurologic deficit.
- E. Precautions:
1. Pregnancy (class C);
  2. Glaucoma patients (can increase intraocular pressure);
  3. Lactation (fetal effects in animal studies);
  4. May require decreased dosing in patients with liver disease.
- F. Adverse Effects:
1. Hypotension;
  2. Headache (from vasodilation);
  3. Dizziness and syncope (from hypotension);
  4. Nausea/Vomiting;
  5. Tachycardia (in response to hypotension);

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Medical Director

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EMS Administrator

6. Paradoxical bradycardia (in rare instances);
  7. Pallor, sweating (from hypotension);
  8. Flushing, sweating (from vasodilation);
  9. Rash, if allergic to nitrates.
- G. Interactions:
1. Alcohol - combined with nitroglycerin can worsen hypotension;
  2. Aspirin - can increase serum nitrate concentrations;
  3. Calcium channel blockers - combined with nitroglycerin can worsen orthostatic hypotension;
  4.  $\beta$ -blockers, diuretics, anti-hypertensives - can increase actions of nitroglycerin.
- H. Standard Dosages for Nitroglycerin drips:
1. For diagnosed patients with ischemic symptoms:
    - a. Continuous IV Infusion: starting at 10-20 mcg/min and increased by 5 or 10 mcg/min every 5 to 10 minutes until the desired hemodynamic or clinical response is achieved. Most patients respond to 50 to 200 mcg/minute and the lowest possible dose should be used. When indicated, rates should be decreased in 10 minute intervals.
- I. Special Considerations:
1. Glass infusion bottles and non-polyvinyl tubing must be used as plastics will absorb nitroglycerin and alter the dose administered.
  2. Do not use in-line filters.
  3. Attach drip to port closest to catheter insertion.