NITROPRUSSIDE - ICU

PURPOSE: To outline the management of the patient receiving sodium nitroprusside (Nipride) therapy.

SUPPORTIVE DATA: Nitroprusside is a potent, rapid acting, balanced arteriole and venous dilator. Nitroprusside increases venous capacitance (reduces preload) and decreases systemic vascular resistance (reduces afterload), resulting in an increased cardiac output, reduced left ventricular filling pressure and reduced myocardial O_2 consumption. In hypertensive crisis, nitroprusside is indicated for rapid control of blood pressure; in heart failure it is used for its effects on preload, afterload, and oxygen consumption.

Nitroprusside may cause cyanide toxicity in patients receiving high rates or prolonged infusions. It may cause thiocyanate toxicity in patients receiving prolonged infusions (may occur sooner in patients with renal insufficiency).

Nitroprusside should not be used for patients with signs/ symptoms of increased intracranial pressure. Nitroprusside should be used with caution in renal/ hepatic failure, coronary artery insufficiency, hypothyroidism, pneumonia/pulmonary and infiltrate. Due to risk of toxicity with long-term use (greater than 72 hours), alternative vasodilator/ antihypertensives should be initiated as soon as possible.

If blood pressure has not been adequately controlled at a rate that exceeds 10 mcg/kg/minute for more than 10 minutes, another medication should be considered.

ASSESSMENT:

1. Assess baseline vital signs and hemodynamic values as follows:
   - 2-5 minutes post initiation and dose change
   - Every 10 minutes until stable
   - Every hour when stable
2. Determine nitroprusside concentration and verify correct dosage upon initiation, within 1 hour of assuming care of the patient or earlier as clinically appropriate, and with each bag change. In addition, verify accurate dosage with each rate change.
3. Monitor for hypotension continuously (Note: patients with chronic hypertension require higher than normal mean arterial pressure)
4. Assess for the following adverse reactions/side effects every 4 hours (NICU, PICU - a minimum of every 2 hours):
   - Side effects:
     - Headache
     - Nausea and vomiting
     - Sweating
     - Palpitations
     - Tachycardia
   - Signs/symptoms of cyanide or thiocyanate toxicity:
     - CNS
       - « Tinnitus
       - « Headache
       - « Confusion
       - « Anxiety
       - « Muscle weakness
       - « Seizures
       - « Coma
       - « Hyperreflexia
     - Cardiovascular
       - « Hyper/hypotension
       - « Tachycardia, bradycardia
       - « Dysrhythmias

- Respiratory
  - « Tachypnea, apnea
  - « Increased oxygen saturation via pulse oximeter
  - « Brick-red skin
- Acid/Base
  - « Elevated lactate (evaluate as drawn)
  - « Metabolic acidosis (per blood gas as drawn)
- Gastrointestinal
  - « Nausea and vomiting

5. Monitor thiocyanate levels (as ordered). Normal thiocyanate is less than 10 mg/Dl.

ADMINISTRATION:

6. Wrap nitroprusside solution in foil to protect from light (tubing does not need to be covered).
7. Administer nitroprusside as ordered (order to include titration parameters, except NICU and PICU)
8. Administer via infusion pump with Guardrails, preferably through a central line (use port closest to patient). Nitroprusside is compatible with (may be piggybacked into) D_5W (preferred), Normal Saline or Lactated Ringers.
9. Change solution every 24 hours. (Normal color has a slight brownish tint; discard if solution is dark brown or any other color).
10. Administer **as ordered:**
    - Administer by continuous infusion. No loading dose is required.
    - Adult
      - Usual initial infusion: 0.3-0.5 mcg/kg/minute
      - Usual maximum infusion:
        - 10 mcg/kg/minute for no more than 10 minutes
        - 2 mcg/kg/minute to avoid toxicity
    - Pediatric:
      - Initial infusion: 0.3-0.5 mcg/kg/minute
      - Usual infusion: 3 - 4 mcg/kg/minute
      - Maximum: 10 mcg/kg/minute for no more than 10 minutes
    - Neonate and Pediatric: Each dose change requires a provider order.
    - Titrate to ordered parameters increasing/decreasing dosage in 0.2-0.5 mcg/kg/minute increments as ordered every 5 minutes while continuously monitoring vital signs and hemodynamic parameters (Adults only).
    - Rapid onset of effect seen within 2 minutes of starting the infusion or increasing the dose Effects may last up to 10 minutes after the infusion is discontinued.

SAFETY:

11. Maintain constant IV infusion rate (do not bolus or flush). Avoid bolusing or flushing I.V. line for 30 minutes post-discontinuation of nitroprusside
12. Do not infuse with any other IV medications.
13. Avoid positional changes that can lead to orthostatic changes in blood pressure and heart rate.
14. Ensure infusion pump with Guardrails is used for administration.

REPORTABLE CONDITIONS:

15. Notify the provider for:
    - Inability to achieve and maintain ordered BP parameters
    - If ordered BP parameter is not achieved at 10 mcg/kg/minute
    - If infusion rate is 10 mcg/kg/minute for greater than 10 minutes
    - Hypotension
    - Signs/symptoms of cyanide or thiocyanate toxicity
    - If there are existing orders for other vasodilator agents

PATIENT/ FAMILY TEACHING:

16. Instruct on the following:
    - Purpose and action of nitroprusside
    - Need for frequent monitoring
    - Signs/symptoms of adverse effects

ADDITIONAL STANDARDS:

17. Refer to the following as indicated:
    - Intravenous Therapy
    - Arterial Line - ICU
    - Central Venous Catheter
    - Pulmonary Artery Catheter – ICU

DOCUMENTATION: 18. Document in accordance with documentation standards.

Initial date approved:	Reviewed and approved by:	Revision Date:
11/94	Professional Practice Committee Pharmacy & Therapeutic Committee Nurse Executive Committee Attending Staff Association Executive Committee	11/00, 03/05, 12/13,10/15, 06/19