

PROTOCOL FOR: Hyperglycemia and Insulin Infusion

- POLICY:
1. Glucose meter readings < 40 and > 150 are to be reported to the AP/MD unless other parameters are ordered.
 2. Glucose meters readings < 40 and > 150 are considered "critical values" for the glucose meter and are to be codes as such.
 3. All insulin infusions will be prepared by the pharmacy using a standard concentration of 0.1 units Insulin per ml D5W. The Insulin dosing chart will be delivered to the NICU with the Insulin and is also located in the Bedside Resource and Communication Book.
 4. The insulin infusion rate and concentration should be checked against the order every 8 hours and with any dose change.
 5. Insulin infusions should not be administered through umbilical artery catheters because of the interruption of the infusion and flushing after blood draws.
 6. Hypotonic IV solutions will not be administered in an effort to reduce glucose infusion rates.

SUPPORTIVE DATA: Hyperglycemia is defined as a whole blood glucose concentration greater than 120 to 125 mg/dl or a plasma glucose concentration greater than 150 mg/dl. Hyperglycemia may occur as a result of a stress response with secretion of adrenal cortical hormones and may be associated with sepsis, NEC, and stress associated with surgery. Medications such as exogenous steroids and Caffeine may produce hyperglycemia. In extremely premature and IUGR infants, glucose intolerance is common and may be due to multiple factors including immature enzyme systems, peripheral insulin resistance, inappropriate glucose production and administration of Intralipid®. Insulin infusion may be initiated when hyperglycemia persists and the glucose infusion rate is at the minimal level (3 to 4 mg/Kg/minute).

CLINICAL
ASSESSMENT
AND CARE:

1. When a glucose meter reading ≥ 150 is obtained, it should be repeated and reported. Glucose meter testing should continue at least every 30 minutes until stabilized and/or other treatment is initiated.
 - a. Serum glucose may be ordered at the discretion of the AP/MD. These specimens should be sent to the laboratory immediately for analysis. The specimens should not be sent on ice.
2. Check the IV infusion and solution to ensure that the solution and the rate match the written order.

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- a. It may be necessary to reconstitute IV fluids if a stock solution is not infusing.
3. Calculate and report if urine output is increased as compared to the usual pattern. Hyperglycemia with osmotic diuresis can cause glycosuria and contribute to intracranial hemorrhage.
4. Obtain specimens for macro urinalysis as ordered.
 - a. Report glycosuria of 3+ or greater
5. Assess for signs of dehydration related to osmotic diuresis, including poor skin turgor, sunken fontanel, dry mucous membranes, poor perfusion, urine output < 1 ml/kg/hr., metabolic acidosis.
6. Obtain daily weight if clinical condition permits. Consider use of in-bed scale.

INTERVENTIONS FOR
INSULIN INFUSION:

1. Infuse Insulin by IV syringe pump and use microbore tubing to decrease surface area for interaction between Insulin and IV tubing binding sites.
2. Prime the tubing with 10ml of Insulin solution prior to initiating the infusion. Prime the entire tubing including the t-connector. Priming the tubing improves insulin delivery to the infant by saturation of tubing binding site with Insulin.
3. DO NOT FILTER Insulin infusions.
4. Piggyback the infusion into the existing IV as close to the infant as possible. If infused separately and the dextrose infusion infiltrates, significant hypoglycemia may occur.
5. Perform bedside glucose testing.
 - a. At initiation of continuous Insulin infusion check every 30 minutes X 2 then q1 hour until glucose meter readings and Insulin infusion rate are stable.
 1. If glucose meter readings are unstable after 1 hour, discuss the frequency of needed monitoring with AP or MD in order to minimize painful sticks.
 - b. During maintenance Insulin infusion, check blood glucose every 2 hours.
 1. Less frequent testing may be done with MD/AP order if Insulin dose and glucose levels are stable.

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- c. After a change in IV rate or a change in Insulin concentration, check blood glucose every 60 minutes X2 then,
 - 1. Every 2 hours with stable blood glucose
 - d. After discontinuation, of Insulin infusion, check blood glucose q1 hour X 2, then q2 hours X 2, then q4 hours. More frequent testing is needed if the blood glucose is unstable or if hyperglycemia occurs.
 - e. If the delivery system is interrupted and restarted, refer to monitoring at initiation of Insulin infusion.
6. Assess IV insertion site hourly. Have alternative IV site available if possible.
- a. *Immediately report need for new IV site.*
7. Maintain IV patency with minimum rate which may require reconstitution of medication during titration.
8. Avoid flushing the IV- you may inadvertently administer a bolus of Insulin. When changing the IV infusion set-up, change down to the catheter hub. If the site is to be heparin or saline-locked, remove the infusion set-up with the T-connector. Attach a new T-connector to the IV catheter.
9. After making changes in the Insulin infusion, allow a minimum of 60 minutes to elapse before making another change.

ACTION IN
EVENT OF
HYPOGLYCEMIA:

- 1. Perform ongoing assessment for clinical signs of hypoglycemia (apnea, cyanosis, respiratory distress, irritability, jitteriness, lethargy, r/o seizure activity).
- 2. Check the IV solution and the rate to see that it matches the written order.
- 3. Be sure that there is NO FILTER on the Insulin infusion.
- 4. Turn off insulin infusion immediately if blood glucose is ≤ 80 mg/dl. Report to AP/MD

APPROVAL: Nursing Standards Committee

EFFECTIVE DATE: 5/03 incorporated protocol for Insulin Infusion (effective 3/95 and revised 5/97, 5/99, 10/01).

REVISION DATES: 12/05, 12/07

REVIEWED DATES: 12/08