HEALTH HOLDING

HAFER ALBATIN HEALTH CLUSTER
MATERNITY AND CHILDREN HOSPITAL

Department:	Neonatal Intensive Care Unit (NICU)		
Document:	Departmental Policy and Procedure		
Title:	Management of Neonatal Hyperglycemia		
Applies To:	All NICU Staff		
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1. PURPOSE:

1.1 To rule out iatrogenic high glucose intake.
1.2 Hyperglycaemia may be a sign of serious illness such as infection and management of the underlying illness is much more important than just achieving a target glucose level.
1.3 To maintain blood glucose concentrations as close to normal as possible without evoking unacceptably rapid and large fluctuations in circulating glucose concentrations.

2. DEFINITIONS:

2.1 **Neonatal hyperglycemia** has been defined arbitrarily as a blood glucose concentration greater than 125 mg/dL (6.9 mmol/L) or a plasma or serum glucose concentration greater than 150 mg/dl (8.3 mmol/L), regardless of gestational or postnatal age. However, the defining value varies considerably among sources e.g. some define neonatal hyperglycemia as a plasma glucose concentration greater than 180 mg/dl (10 mmol/L). However, these levels are frequently observed during glucose infusions in newborn, especially in extremely preterm infants, and may not require intervention.
2.2 **Glycosuria**: Glucose excretion in the urine in hyperglycemic neonates is determined by the degree of hyperglycaemia and renal tubular re-absorptive capacity for glucose. Newborns have variable re-absorptive capacities for glucose, which may be particularly reduced in ill or preterm neonates. The net effect is that glycosuria alone is not a good marker for hyperglycaemia since it can occur at normal blood glucose concentrations. These variations presumably are related to immaturity of the proximal tubule.
2.3 **Neonatal Diabetes Mellitus**: It is defined as persistent hyperglycaemia occurring in the first months of life that lasts more than two weeks and requires insulin for management.

3. POLICY:

3.1 All LGA (greater than 4000 grams), SGA (less than 2500 grams), preterm infants (37 weeks or less), infants of diabetic mothers and unstable symptomatic infants, i.e., jittery or lethargic, will have blood glucose monitoring done to ensure stable blood glucose levels in infants at risk.

4. PROCEDURE:

4.1 Good physiologic control and improved enteral and parenteral nutrition (particularly with increased amino acid nutrition) are the foundations of reducing the incidence and associated complications of hyperglycaemia.
4.1.1 Reduce IV glucose intake to just the rate that produces normal glucose concentrations (Not less than 4-6 mg/kg/minute or 5% dextrose concentration).
4.1.2 Adjust protein intake: Higher parenteral amino acid infusion rates in young, preterm infants are associated with increased insulin concentrations. Higher plasma amino acid concentrations from IV amino acid infusions can counteract the catabolic conditions often associated with neonatal hyperglycemia.
4.1.3 Limit lipid infusions during hyperglycemia and monitor triglycerides. Free fatty acids limit glucose oxidation competitively by providing additional carbon substrates for oxidative metabolism.

4.1.4 Advance enteral feeding as promptly but as safely as possible.

4.2 **Insulin therapy**

4.2.1 Should be reserved as much as possible for severe hyperglycemia e.g. when even low glucose infusion rate (4-6 mg / kg/ minute) are ineffective at reducing blood glucose levels below approximately 200-250 mg/dl or hyperglycemia is associated with depressed central nervous system activity.

4.2.2 There is no evidence yet to support the use of insulin to produce "tight glucose control" in newborn.

4.2.3 Insulin infusion:

4.2.3.1 Aim for blood glucose (glucometer) 110-180 mg/dl (6-10 mmol/ L) with glycosuria < +1.

4.2.3.2 Glucose IV load should not be reduced below 6 mg/kg/minute before insulin is commenced.

4.2.3.3 PRN doses:

4.2.3.3.1 Use a dilution of 5 units' regular human insulin added to normal saline to make a total volume of 50 ml for a concentration of 0.l unit/ml.

4.2.3.3.2 Prior to starting the infusion, purge the IV tubing with a minimum of 2 times the volume of the connecting tubing using the insulin-containing solution to saturate the plastic binding sites.

4.2.3.3.3 Dose 0.05 to 0.1 unit/kg every 4 to 6 hours as needed (PRN)

4.2.3.3.4 Infuse over 15 minutes via syringe pump

4.2.3.3.5 Monitor glucose every 30 minutes to 1hour

4.2.3.4 Continuous insulin infusion:

4.2.3.4.1 Consider it if glucose remains more than 200-250 mg/dl after three insulin doses,

4.2.3.4.2 Begin infusion at a rate between0.01 to 0.05 units/kg per hour.

4.3.2.4.3 Check glucose levels every 30 - 60 minutes to adjust the infusion rate until stable.

4.2.3.4.4 Adjust the rate in small increments of 0.01 - 0.02 unit/kg/hour up to a maximum rate of 0.1 unit/kg/hour to maintain blood glucose levels between ll0 to 180 mg/dl. Use table 1 insulin sliding scale.

Table 1: insulin sliding scale

Blood glucose: glucometer (plasma glucose is 15%higher)	**Action**
>270mg/dl(15mmol/l)	**Increase** infusion by 0.02U/kg/hour
180-270 mg/dl(10-15mmol/l)	**Increase** infusion by 0.01U/kg/hour
145-180 mg/dl(8-10mmol/l)	**Keep** infusion **the same**
110-145mg/dl(6-8mmol/l)	**Reduce** infusion by 0.01U/kg/hour
<110mg/dl(6mmol/l)	**Stop infusion**

4.2.3.4.5 If hypoglycemia occurs, discontinue insulin infusion and administer IV bolus of D10% at 2 ml/kg x 1dose.

4.2.3.4.6 Monitor potassium level.

4.2.3.4.7 Monitor for rebound hyperglycaemia

4.2.3.5 For neonates with diabetes mellitus, give insulin in consultation with pediatric endocrinologist.

5. MATERIALS AND EQUIPMENT:

5.1 Glucometer

5.2 Insulin

5.3 Infusion pumps

6. RESPONSIBILITIES

6.1 Physician
6.2 All NICU Staffs

7. APPENDICES

N/A

8. REFERENCES:

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9. APPROVALS:

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