Time to first blood glucose determination and administration of intravenous glucose at birth in Extremely Low Birth Weight Infants

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**Background**

- Pre-term infants are at risk of hypoglycemia and therefore require timely feedings and monitoring of serum glucose levels.
- Infants diagnosed with hypoglycemia are associated with an increased risk for adverse neurodevelopmental outcomes.
- Interventions within the golden hour have been shown to reduce adverse neonatal outcomes.

**Purpose of Study**

- Study the incidence of hypoglycemia at admission in ELBW (birth weight ≤1000 g) infants.
- Study the percentage of infants who had blood glucose determination and received IV glucose within the golden hour.
- Assess clinical outcomes at discharge between hypoglycemic vs euglycemic infants.

**Methods Used**

Data were collected and analyzed from 244 ELBW infants born between 2017-2020 at the Regional One Health NICU. Hypoglycemia is defined as glucose level of <47 mg/dL. Severe hypoglycemia is defined 40 mg/dL.

Data Collected:

- Time to first blood glucose determination
- Time of first IV glucose administration (bolus and/or IV dextrose infusion)
- Demographic characteristics
- Maternal history
- Birth history
- Outcomes at discharge

Statistical significance was determined with chi-squared analysis and t-tests.

**Results**

- 244 infants enrolled birth weight ≤1000g
- Mean ± SD GA: 26.2 ± 2.4 weeks
- Mean ± SD birth weight: 739 ± 161g

- Time to first blood glucose determination
  - Median (IQR): 56 (45-73) minutes
  - 145 (59%) of all infants tested within first hour of life
  - 190/244 infants had glucose determination before IV glucose initiation

- Time to administration of IV fluids or given bolus dextrose
  - Median (IQR): 88 (60-120) minutes
  - 59 (24%) given within an hour of life
  - 123 (51%) had hypoglycemia (<47mg/dL)
  - 91 (37%) had severe hypoglycemia (<40mg/dL)

- Significant risk factors for severe hypoglycemia: C-section, IUGR, and β-Blocker use, (all had p<0.005).
- The composite mortality and/or major morbidity (BPD, ROP, NEC, HAI and neurological symptoms which included seizures, jitters, tremors adverse neurological sequelae), did not significantly differ between severely hypoglycemic and euglycemic infants.
- Euglycemic and hypoglycemic infants showed no difference in incidence of maternal diabetes, hypothermia on admission, Apgar scores, and use of antenatal cortical steroids
- Maternal Chorioamnionitis decreases the risk of severe hypoglycemia.

**Clinical Data for Infants with Severe Hypoglycemia**

<table>
<thead>
<tr>
<th>Initial Blood Glucose Level</th>
<th>&lt;40mg/dL</th>
<th>≥40mg/dL</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=91</td>
<td>n=153</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gestational age (weeks) *</td>
<td>27±2</td>
<td>26±2</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Birth Weight (grams) *</td>
<td>721±172</td>
<td>745±147</td>
<td></td>
</tr>
<tr>
<td>IUGR</td>
<td>44 (48%)</td>
<td>33 (22%)</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Race</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>82 (90%)</td>
<td>123 (80%)</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>9 (10%)</td>
<td>29 (19%)</td>
<td></td>
</tr>
<tr>
<td>Mode of Delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal Delivery</td>
<td>14 (15%)</td>
<td>48 (31%)</td>
<td></td>
</tr>
<tr>
<td>C-section</td>
<td>77 (85%)</td>
<td>105 (69%)</td>
<td></td>
</tr>
<tr>
<td>Beta Blocker therapy</td>
<td>18 (21%)</td>
<td>8 (5%)</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>17 (19%)</td>
<td>72 (47%)</td>
<td>&lt;0.005</td>
</tr>
</tbody>
</table>

* Mean ±SD

**Conclusions**

- Incidence of hypoglycemia on admission is high among ELBW infants, and administration of IV glucose is often delayed beyond an hour of life.
- All ELBW infants need to be screened for hypoglycemia and provided IV glucose within an hour after birth.
- We have started a QI initiative to improve glucose monitoring and IV glucose administration during the golden hour.