These guidelines were updated by Intermountain Healthcare’s Well Newborn Development Team and NICU Development Team under the guidance of Intermountain’s Women and Newborns Clinical Program. The guidelines are derived from analysis of the literature, clinical experience, and expert consensus.

THE PROBLEM

Hypoglycemia is diagnosed in 15% of newborns. Prolonged or recurrent low glucose levels may lead to long-term neurodevelopmental sequelae.

Unfortunately, the exact parameters of normal blood glucose in the neonate remain controversial. Although neonates have a lower “normal” blood glucose range than older infants, a level that requires intervention in every newborn has not been defined. However, the level appears to be dependent on birth weight, gestational age, feeding method, postnatal age in hours, and an underlying cause of hypoglycemia. Also uncertain are the level and duration of hypoglycemia that cause damage — and the vulnerability, or lack thereof, of the brains of infants of differing gestational ages.

Because of this lack of clear definition of safe neonatal blood glucose levels, knowing when and how to screen and intervene can be difficult. These guidelines promote a pragmatic approach with a wide safety margin.

GENERAL RECOMMENDATIONS

The following are generally recommended principles; detailed recommendations are given on pages 2 and 3.

1. Initiate feeding. Feeding should be initiated for all neonates as soon as the infant is ready, preferably within 1 hour of birth. Neonates who are not fed will have a physiologic drop in blood glucose, with a low at 1 to 1.5 hours of age. Feeding should be breast milk (colostrum) or infant formula, NOT dextrose-water. Colostrum, if available, is preferred to formula.

2. Assess risk factors and symptoms. All neonates with risk factors or major symptoms (see table 1 below) should have blood glucose checked.

3. Screen and manage based on initial feeding and assessment using the algorithms and notes on pages 2 and 3.

TABLE 1. Symptoms and risk factors

<table>
<thead>
<tr>
<th>Symptoms:</th>
<th>Risk Factors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seizures, coma, hypotonia, lethargy, tremors</td>
<td>Premature &lt; 37 wk or LBW &lt; 2.5 kg</td>
</tr>
<tr>
<td>Jitteriness, irritability, weak or high-pitched cry</td>
<td>SGA or IUGR (&lt; 10% for weight)</td>
</tr>
<tr>
<td>Apneic episodes, cyanosis, tachypnea, grunting</td>
<td>Smaller discordant twin (&gt; 10% weight difference)</td>
</tr>
<tr>
<td>Hypothermic, temperature instability, poor suck or refusal to feed, tachycardia</td>
<td>Microphallus (&lt; 1 cm) or midline defect</td>
</tr>
<tr>
<td>Infants of diabetic mother (IDM)</td>
<td>Infant of a diabetic mother (IDM)</td>
</tr>
<tr>
<td>LGA (&gt; 90% for weight)</td>
<td>Apgar score ≤ 5 at 5 min</td>
</tr>
<tr>
<td>Polycythemia (venous Hct &gt; 65)</td>
<td>erythroblastosis fetalis</td>
</tr>
</tbody>
</table>
| CPAP > 3 hours | Indicating an Intermountain measure

WHAT’S INSIDE?

ALGORITHM: Management of Neonatal Hypoglycemia 2017 update

BIBLIOGRAPHY

RESOURCES

What’s new in this update?

• Screening. For asymptomatic newborn with risk factors, delay initial blood glucose screen until 2 – 3 hours of age after 1st feeding and before 2nd feeding (after the physiologic fall and recovery in blood glucose level following birth).

• Treatment:
  – New threshold for treatment is < 40 mg/dL (lowered from < 45 mg/dL).
  – Treat with dextrose gel 40% dose (400 mg/mL) (~ 0.5 ml/kg) per buccal (inner cheek) mucosa with 30-second massage, and feed infant.

• LIP notification requirements. Notify for further orders while proceeding with algorithm if:
  – Infant has significant neurological findings, respiratory distress, blood glucose < 20 mg/dL
  – Blood glucose < 40 mg/dL AND did not increase by 10 mg/dL after treatment with feeding and dextrose gel
  – Need for 3rd dose of dextrose gel

MEASUREMENTS

• Number of neonates who are:
  – Checked for hypoglycemia at 2 – 3 hours of age
  – Given dextrose gel and fed if BG < 40 mg/dL

• Incidences in first 24 hours of life when:
  – An LIP was notified.
  – A recheck was performed.
  – If BG < 40 mg/dL at recheck.
ALGORITHM: MANAGEMENT OF NEONATAL HYPOGLYCEMIA

ALGORITHM NOTES

(a) Decision matrix 1

<table>
<thead>
<tr>
<th>GLUCOSE ≥40 mg/dL</th>
<th>GLUCOSE &lt;40 mg/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASYMPTOMATIC</strong></td>
<td><strong>SYMPTOMATIC</strong></td>
</tr>
<tr>
<td>INITIATE basic feeding and monitoring schedule (c)</td>
<td>NOTIFY LIP, and SEARCH for other symptom etiology</td>
</tr>
<tr>
<td>• INITIATE basic feeding and monitoring schedule (c)</td>
<td></td>
</tr>
<tr>
<td>• GIVE dextrose gel (d)</td>
<td></td>
</tr>
<tr>
<td>– Recheck glucose 30 minutes after gel dose</td>
<td></td>
</tr>
<tr>
<td>– Notify LIP if glucose still &lt;40 mg/dL and did not increase by 10 mg/dL</td>
<td></td>
</tr>
<tr>
<td><strong>INITIATE basic feeding and monitoring schedule (c)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>NOTIFY LIP, and SEARCH for other symptom etiology</strong></td>
<td></td>
</tr>
</tbody>
</table>

(b) Decision matrix 2

<table>
<thead>
<tr>
<th>GLUCOSE ≥40 mg/dL</th>
<th>GLUCOSE &lt;40 mg/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASYMPTOMATIC</strong></td>
<td><strong>SYMPTOMATIC</strong></td>
</tr>
<tr>
<td>INITIATE basic feeding and monitoring schedule (c)</td>
<td>NOTIFY LIP, and SEARCH for other symptom etiology</td>
</tr>
<tr>
<td>• Maintain basic feeding and monitoring schedule (c)</td>
<td></td>
</tr>
<tr>
<td>• Confirm low BG at bedside (e)</td>
<td></td>
</tr>
<tr>
<td>• Feed and give dextrose gel (d) (c)</td>
<td></td>
</tr>
<tr>
<td>• Notify LIP for further orders (standing orders no longer apply)</td>
<td></td>
</tr>
</tbody>
</table>

* Notify LIP if baby has (ANY):
  - Significant neurological findings
  - Respiratory distress
  - Glucose < 20 mg/dL

Whenever neonate becomes symptomatic or asymptomatic during either process, switch to the appropriate algorithm/guidance.

Indicates an Intermountain measure
(c) Basic feeding and monitoring schedule

- FEED baby per mother’s preference:
  - Breastfeed minimum of 5–10 minutes
  - Feed expressed breast milk or formula (=5ml/kg) by bottle or by Supplemental Nursing System (SNS), if breastfeeding
  - May gavage feed baby if mother doesn’t want baby to be bottle fed or use SNS or if unable to p.o. (if no signs of feeding intolerance present)
  - Continue feeding every 2–3 hours
- CHECK blood glucose prior to each feeding until 2 consecutive checks are ≥40 mg/dL
- RECHECK every 6 hours for the first 24 hours of life

(d) Dextrose gel 40% dosing (400 mg/mL) per buccal (inner cheek) mucosa with 30-second massage.*

<table>
<thead>
<tr>
<th>Birthweight (kg)</th>
<th>Dose (mg)</th>
<th>Amount (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.500–1.750</td>
<td>300</td>
<td>0.75</td>
</tr>
<tr>
<td>1.751–2.250</td>
<td>400</td>
<td>1.00</td>
</tr>
<tr>
<td>2.251–2.750</td>
<td>500</td>
<td>1.25</td>
</tr>
<tr>
<td>2.751–3.250</td>
<td>600</td>
<td>1.50</td>
</tr>
<tr>
<td>3.251–3.750</td>
<td>700</td>
<td>1.75</td>
</tr>
<tr>
<td>3.751–4.250</td>
<td>800</td>
<td>2.00</td>
</tr>
<tr>
<td>4.251–4.750</td>
<td>900</td>
<td>2.25</td>
</tr>
<tr>
<td>4.751–5.250</td>
<td>1000</td>
<td>2.50</td>
</tr>
</tbody>
</table>

*Repeat dose per standing order, and notify LIP when giving dose at 3rd instance of low blood sugar.

(e) Confirm low blood glucose at bedside

- To confirm, USE:
  - Nova StatStrip (venipuncture)
  OR
  - I-STAT (heel stick or venipuncture)
- SEND for STAT lab glucose only if bedside retesting cannot be done as described.
- If still asymptomatic, administer dextrose gel (d) and feed per mother’s preference (c).

BIBLIOGRAPHY


CPM DEVELOPMENT TEAM

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RESOURCES

Patient resources
Intermountain publishes a number of related patient education materials (see below). To access these materials:

- As the iCentra EMR system is implemented, search for Intermountain items in the patient education module.
- Log in to intermountainphysician.net. Search for the patient education library under A–Z. Then, search the item number and title in the appropriate area.
- Use the iprintstore.org. Intermountain’s Online Library and Print Store, for one-stop access and ordering for all Intermountain materials such as fact sheets, booklets, and trackers. If you need any assistance, email printservices@imail.org.

Patient Information:
Fact sheets and booklets to help, including:
- Hypoglycemia in the Newborn
- Newborn Screenings and Treatments
- A Guide to Breastfeeding (booklet)
- Breastfeeding: Benefits for your baby
- Breastfeeding: Tips for Before, During, and After Your Hospital Stay
- Breastfeeding and Potentially Harmful Substances

Provider resources
To find this CPM and its reference list, clinicians can go to intermountainphysician.org, and select Women & Newborns from the list of clinical programs on the right side of the screen. On the next screen, select the icon for Care Process Models and Clinical Guidelines indicated in the middle image below.

This CPM presents a model of best care based on the best available scientific evidence at the time of publication. It is not a prescription for every physician or every patient, nor does it replace clinical judgment. All statements, protocols, and recommendations herein are viewed as transitory and iterative. Although physicians are encouraged to follow the CPM to help focus on and measure quality, deviations are a means for discovering improvements in patient care and expanding the knowledge base. Send feedback to Jean Millar, Women & Newborn Clinical Program Director, Intermountain Healthcare (Jean.Millar@imail.org).