'Clearer road map' Algorithm is key resource on screening, management of neonatal hypoglycemia in at-risk infants

Ruben J. Rucoba

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When treating neonatal hypoglycemia (NH), pediatricians often have felt like they were “flying blind.” The lack of evidence-based guidelines or even a standard definition of NH left many doctors and hospitals scrambling to develop a reasonable protocol for treatment.

But with the publication of a new AAP clinical report, *Postnatal Glucose Homeostasis in Late Preterm and Term Infants* (Pediatrics. 2011;127:575-579), there now is a clearer road map for the evaluation and treatment of NH in these newborns.

Billed as a “practical guide for the screening and subsequent management of neonatal hypoglycemia (NH) in at-risk late-preterm (34 to 36+6 weeks’ gestational age) and term infants,” the report recognizes that there are no evidence-based guidelines on defining the exact level of hypoglycemia that may result in brain injury.

**Controversial topic area**

The report’s lead author is David H. Adamkin, M.D., FAAP, of the AAP Committee on Fetus and Newborn. “This was an area that was very controversial,” Dr. Adamkin said, and the committee is “trying to provide guidance where evidence is lacking.”

Dr. Adamkin, professor of pediatrics and director of neonatal medicine at the University of Louisville, remarked that without any evidence, academicians have been reluctant to provide recommendations on how to treat NH. He noted that there is no information on NH in the widely used AAP manual *Guidelines for Perinatal Care* because of the lack of published data.

The committee, according to Dr. Adamkin, was faced with a challenge: “Do you want to be a purist and say, ‘We don’t know’ and therefore can’t make any recommendation? Or do you want to be practical and admit we don’t know but give some help (to pediatricians)?”

**Flexible protocols offered**

The report specifically addresses the evaluation and treatment of late-preterm infants and term infants considered “at-risk”: those who are small for gestational age, large for gestational age and infants of diabetic mothers. “We’re only addressing the at-risk infants,” Dr. Adamkin said, “not the healthy term babies.”

The report emphasizes that instead of a single level of hypoglycemia that can be applied for all babies, there actually is a continuum of blood glucose levels that may be considered too low, depending on various factors.

For example, in most newborns, a blood glucose concentration of 30 milligrams/deciliter (mg/dL) can be normal in the first hour or two after birth. But after the first few hours, a level of 30 mg/dL would be considered too low.

Therefore, management of these at-risk infants is divided into two protocols: one for infants from birth to 4 hours old and one from 4 to 24 hours of age. Each protocol describes in detail how to screen for NH, the best way to screen, the levels at which to intervene and possible interventions to consider. The management protocols are summarized in an easy-to-read, multicolored algorithm (next page) at the end of the report.

The protocol states that any infant who is symptomatic with a blood glucose of less than 40 mg/dL should be treated immediately with IV glucose. For the asymptomatic infants with low blood glucose, treatment options include refeeding or IV glucose, depending on...
the postnatal age of the child and the degree of hypoglycemia.

The protocol provides “direction for the pediatrician and is flexible,” according to Dr. Adamkin, which allows pediatricians to make decisions on an individual basis.

Dr. Adamkin likens the algorithm in the report to the commonly used bilirubin nomogram. “I don’t know at what level kernicterus occurs in an individual baby, but I have a nomogram to help me guide treatment so that I can avoid the levels that might lead to kernicterus,” he said. Likewise, although there is no evidence about what level of blood glucose causes brain injury, this algorithm may help pediatricians make clinical decisions to avoid brain injury from NH.

Dr. Adamkin said he hopes the algorithm will be posted in nurseries and used just like the bilirubin nomogram is used.

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### Screening and Management of Postnatal Glucose Homeostasis in Late Preterm and Term SGA, IDM/LGA Infants

<table>
<thead>
<tr>
<th>(LPT) Infants 34 – 36th weeks and SGA (screen 0-24 hrs); IDM and LGA ≥34 weeks (screen 0-12 hrs)</th>
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</table>

#### Symptomatic and <40 mg/dL → IV glucose

<table>
<thead>
<tr>
<th><strong>Birth to 4 hours of age</strong></th>
<th><strong>4 to 24 hours of age</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL FEED WITHIN 1 hour</strong></td>
<td><strong>Continue feeds q 2-3 hours</strong></td>
</tr>
<tr>
<td>Screen glucose 30 minutes after 1st feed</td>
<td>Screen glucose prior to each feed</td>
</tr>
<tr>
<td>Initial screen &lt;25 mg/dL</td>
<td>Screen &lt;35 mg/dL</td>
</tr>
<tr>
<td>Feed and check in 1 hour</td>
<td>Feed and check in 1 hour</td>
</tr>
</tbody>
</table>

- **<25 mg/dL** → IV glucose
- **25–40 mg/dL** → Refeed/IV glucose as needed
- **<35 mg/dL** → IV glucose
- **35 – 45 mg/dL** → Refeed/IV glucose as needed

### Target glucose screen ≥45 mg/dL prior to routine feeds

- Glucose dose = 200 mg/kg (dextrose 10% at 2 mL/kg) and/or IV infusion at 5–8 mg/kg per min (80–100 mL/kg per d). Achieve plasma glucose level of 40-50 mg/dL.

### Symptoms of hypoglycemia include:
- Irritability, tremors, jitteriness, exaggerated Moro reflex, high-pitched cry, seizures, lethargy, floppiness, cyanosis, apnea, poor feeding.

This algorithm from the clinical report addresses late preterm (LPT) and term infants, including those born to mothers with diabetes (IDM), and infants small (SGA) or large (LGA) for gestational age.
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