## Content Category: Pediatrics

### Session Topic: Neonatal Hypoglycemia

<table>
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<tr>
<th>Educational Format</th>
<th>Faculty Expertise Required</th>
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<tr>
<td>REQUIRED</td>
<td>Interactive Lecture</td>
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<td>Expertise in the field of study. Experience teaching in the field of study is desired. Preferred experience with audience response systems (ARS). Utilizing polling questions and engaging the learners in Q&amp;A during the final 15 minutes of the session are required.</td>
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<tr>
<td>OPTIONAL</td>
<td>Problem-Based Learning (PBL)</td>
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<td>Expertise teaching highly interactive, small group learning environments. Case-based, with experience developing and teaching case scenarios for simulation labs preferred. Other workshop-oriented designs may be accommodated. A typical PBL room is set for 50-100 participants, with 7-8 each per round table. Please describe your interest and plan for teaching a PBL on your proposal form.</td>
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### Professional Practice Gap

- Debate remains over the definition of neonatal hypoglycemia and the optimal management, particularly in asymptomatic infants.
- Controversies exist regarding the management of NH, especially in asymptomatic patients.

### Learning Objective(s) that will close the gap and meet the need

1. Screen infants for neonatal hypoglycemia, in accordance to currently guidelines.
2. Assess the benefits and risks of bedside glucose analysis, versus laboratory enzymatic methods.
3. Tailor treatment to the specific clinical situation, while fostering optimal mother-infant contact and breastfeeding.

### Outcome Being Measured

Learners will submit written commitment to change statements on the session evaluation, indicating how they plan to implement presented practice recommendations.

### ACGME Core Competencies Addressed

- Medical Knowledge
- Patient Care
- Interpersonal and Communication Skills
- Practice-Based Learning and Improvement
- Professionalism
- Systems-Based Practice

### Faculty Instructional Goals

Faculty play a vital role in assisting the AAFP to achieve its mission by providing high-quality, innovative education for physicians, residents and medical students that will encompass the art, science, evidence and socio-economics of family medicine and to support the pursuit of lifelong learning. By achieving the instructional goals provided, faculty will facilitate the application of new knowledge and skills gained by learners to practice, so that they may optimize care provided to their patients.

- Provide up to 3 evidence-based recommended practice changes that can be immediately implemented, at the conclusion of the session; including SORT taxonomy & reference citations
- Facilitate learner engagement during the session
- Address related practice barriers to foster optimal patient management
• Provide recommended journal resources and tools, during the session, from the American Family Physician (AFP), Family Practice Management (FPM), and Familydoctor.org patient resources; those listed in the References section below are a good place to start
  o Visit http://www.aafp.org/journals for additional resources
  o Visit http://familydoctor.org for patient education and resources
• Provide updates on new treatment therapies, changes to therapies, or warnings associated with existing therapies. Provide recommendations regarding new FDA approved medications; including safety, efficacy, tolerance, and cost considerations relative to currently available options. Include relevant FDA REMS education for any applicable medications.
• Provide recommendations for screening infants for neonatal hypoglycemia, in accordance to currently guidelines.
• Provide an overview and recommendations for the benefits and risks of bedside glucose analysis, versus laboratory enzymatic methods.
• Provide recommendations for tailoring treatment to the specific clinical situation, while fostering optimal mother-infant contact and breastfeeding.

Needs Assessment
Neonatal hypoglycemia (NH) is common during neonatal transition, and may cause permanent neurological impairment. However, the diagnosis and management of NH is often challenging. While the association between brain injury due to prolonged symptomatic NH are well established, the effect of milder hypoglycemia on neurological development is uncertain. Especially challenging are asymptomatic, but at-risk, newborns. Additionally, a consensus definition of NH is lacking. Neonatal hypoglycemia affects between 15% and 30% of newborns, with approximately 10% requiring intensive care management. Normally NH is conceptualized as a blood glucose concentration or period of time below some minimal threshold. Faculty should be prepared to discuss current research, such as the CHYLD 2-year study, suggesting that the factor in the first 48 h after birth that was most predictive of outcome was glucose instability, defined as the proportion of measurements or duration of time outside a central range of 3 to 4 mM. A review of the literature reveals the following challenges:
• Management of neonatal hypoglycemia continues to be plagued by a lack of data to resolve controversies around the definition, the glucose concentration at which neurologic injury may be sustained, and the concentration at which treatment should be initiated.
• Infants at risk for asymptomatic hypoglycemia [late preterm, infants of diabetic mothers, small for gestational age, and large for gestational age] may have their first low glucose concentrations after three normal measurements and even after 24 hours of age; and all four of these groups have a similar incidence of low glucose concentrations.
• The diagnosis of hypoglycemia due to hyperinsulinism cannot be made by solely measuring insulin concentrations at the time of a hypoglycemic episode, serum ketone bodies and perhaps free fatty acids should be measured during the episode as well.
• Given the increased amounts of fluid and medications with fluid retention properties required to manage patients with congenital hyperinsulinism, performing an
echocardiogram to identify hypertrophic cardiomyopathy should be considered in these patients.

- While outcomes of patients with genetic causes of hypoglycemia due to hyperinsulinism remain concerning, a recent study did not confirm a previously identified association between repetitive low glucose concentrations and poor neurodevelopmental outcomes in a large group of preterm newborns.

Physicians may improve their care of neonates with hypoglycemia by engaging in continuing medical education that provides practical integration of current evidence-based guidelines and recommendations into their standards of care, including, but not limited to the following:2,6-13

- Screening for hypoglycemia should be performed in newborns who are large or small for gestational age, newborns of mothers with diabetes mellitus, and late preterm infants (34 to 36 6/7 weeks gestational age).
- Point-of-care capillary blood glucose measurements using a glucose meter as a rapid screening method for infants at risk for hypoglycemia, & those infants who exhibit signs or symptoms consistent with hypoglycemia. A low screening glucose value should always be confirmed by laboratory measurement. However, treatment is initiated after the blood sample is obtained while awaiting confirmatory results.
- A clinical diagnosis of NH should be based on the presence or absence of symptoms, the age of the newborn, and the plasma glucose levels
- Buccal dextrose gel should be considered as part of a strategy for managing asymptomatic neonates with low glucose concentrations.
- For asymptomatic neonates with low glucose concentrations requiring intravenous dextrose, bolus glucose infusions may be replaced by simply starting the patient on a continuous dextrose infusion.
- Continuous glucose monitoring should be considered in research protocols to assess the benefits and risks of different glycemic patterns for outcomes.
- Newborn screening programs allow for early detection and treatment of serious disorders, and can prevent harmful effects.
- Parents should be informed in person of positive newborn screening results and the need for retesting.
- Emergency care for infants with metabolic disorders should be directed by a metabolic subspecialist in collaboration with emergency personnel and the family physician.

These recommendations are provided only as assistance for physicians making clinical decisions regarding the care of their patients. As such, they cannot substitute for the individual judgment brought to each clinical situation by the patient’s family physician. As with all clinical reference resources, they reflect the best understanding of the science of medicine at the time of publication, but they should be used with the clear understanding that continued research may result in new knowledge and recommendations. These recommendations are only one element in the complex process of improving the health of America. To be effective, the recommendations must be implemented. As such, physicians require continuing medical education to assist them with making decisions about specific clinical considerations.
References


