January 2020 E-Newsletter: Defining Neonatal Hypoglycemia

January 2020 E-Newsletter: Defining Neonatal Hypoglycemia.

Hypoglycemia in the first week of life is seen often in the neonate. Lower than normal values may even occur in up to 10% of healthy term newborns, especially in the first 24 to 48 hours. However, profoundly low values or prolong hypoglycemia are associated with poor neurological outcomes. Being able to identify babies at-risk and recognize hypoglycemia early are vital to the outcomes of these babies. Variations in the exact definition of hypoglycemia in the neonatal period and the fact that clinicians are faced with more than one set of recommendations can make valid decision making difficult. Both the American Academy of Pediatrics (AAP) and the Pediatric Endocrine Society (PES) have standardized guidelines for defining and treating neonatal

hypoglycemia that contain major differences. Understanding the differences as well as similarities in the two sets of recommendations will help the practitioner better care for neonates with hypoglycemia.

The definition and treatment of hypoglycemia in the neonate can be broken down into two categories: transitional hypoglycemia and persistent hypoglycemia. The latter may be an indicator of a more serious underlying pathological condition. The AAP guidelines focus more on the treatment of transitional hypoglycemia seen primarily in preterm, SGA, LGA, and stressed infants in the first 24 hours of life. The PES guidelines focus on the recognition and treatment of disorders that may cause persistent hypoglycemia specifically seen in infants with hypoglycemia that continues after 48 hours of life. Both professional societies agree that transitional hypoglycemia typically resolves within 48 hours and that hypoglycemia that persists beyond that period may be pathological in origin.

Timeline	0-24 hours	24-48 hours	>48 hours
AAP	In first 4 hours, maintain blood glucose > 50 mg/dl prior to feeding. Between 4-24, maintain blood glucose >45 mg/dl. If symptomatic – treat if blood glucose is < 40 mg/dl.		

PES	Maintain blood glucose > 50 mg/dl. Infants who are unable to maintain a blood glucose level > 50 mg/dl in the first 48 hours of life may be at risk for a disorder causing persistent hypoglycemia.	A blood glucose > 60 mg/dl is recommended by the PES after 48 hours of life. Infants at risk of having a persistent hypoglycemia syndrome are recommended by the PES to have a fast challenge of 6-8 hours with maintenance of blood glucose > 70 mg/dl.

Screening is currently based on known risks factors and/or the presence of symptoms in the infant. According to these guidelines, when the neonate has a blood glucose value less than 40 mg/dl and is symptomatic, intravenous glucose should be given. Symptomatology may include: irritability, hypotonia, tremor, jitteriness, seizures, apnea and/or respiratory distress. Neonates from birth until 4 hours of age who are asymptomatic should be fed within 1 hour and glucose should be screened 30 minutes after the first feeding. If screening is less than 25 mg/dl, the neonate should be fed again and glucose should be rescreened in 1 hour. At this screening, if the blood glucose remains < 25 mg/dl, intravenous glucose therapy should be initiated. If the value is between 25-40, the clinician may attempt to feed the neonate again. For neonates that are 4-24 hours of age, the clinician should continue to provide feedings every 2-3 hours and glucose should be screened before each feeding. If the blood glucose value is < 35 mg/dl, feed the infant and rescreen in 1 hour. When rescreened, if value remains < 35 mg/dl, initiate intravenous glucose therapy. If the value is 35-45 mg/dl, attempt feed and/or provide intravenous therapy as needed.

Low glucose values persisting beyond 48 hours of life, specifically blood glucose values < 60 mg/dl, may indicate the neonate has an underlying hypoglycemia syndrome and the neonate should be evaluated. Evaluation for a persistent hypoglycemia syndrome includes the measurement of the neonate's insulin, cortisol, and growth hormone levels. Other lab values may be obtained to rule out certain inborn errors of metabolism.

Causes of neonatal hypoglycemia:

Physiologic mechanism	**Disorder**
Inadequate glycogen stores	• Prematurity • Small for gestational age • Intrauterine growth restriction • Perinatal stress • Polycythemia
Hyperinsulinemia	• Infant of diabetic mother • Beckwith-Wiedemann syndrome • Soto syndrome • Congenital hyperinsulinism
Growth Hormone deficiency	• Turner mosaicism • Costello syndrome • Hypopituitarism
Cortisol deficiency	• Costello syndrome • Hypopituitarism • Congenital adrenal hyperplasia
Inborn errors of metabolism	

• Amino acid abnormalities	• Maple syrup urine disease
• Glycogen	• Hepatic glycogen storage diseases
• Glucose	• Hereditary fructose intolerance
• Fatty acids	• Galactosemia • Medium-chain acyl-coenzyme A dehydrogenase deficiency • Short-chain acyl-coenzyme A dehydrogenase deficiency • Carnitine palmitoyltransferase deficiency types I and II • Long-chain 3-hydroxy and very long-chain acyl-coenzyme A dehydrogenase deficiency

In summary, transitional hypoglycemia is prevalent during the first 24 hours of life and should be evaluated for and treated based on the AAP recommendations. The AAP guidelines focus on screening neonates who are at-risk and/or symptomatic. The PES guidelines address persistent hypoglycemia in the neonate which can be defined as hypoglycemia beyond 48 hours of life. Persistent hypoglycemia beyond 48 hours of life could be indicative of an underlying pathological condition. The neonate should be evaluated accordingly. Severe hypoglycemia and/or prolong hypoglycemia in the neonate is associated with negative neurological outcomes and should be prevented.