Management of Serum Glucose Levels in Neonates

Venkata Sasidhar Magija, MD, Bonana Parvez, MD

One of the first measurements of blood glucose in new born was reported by Hartman and Jaurdon in 1937. They reported 286 children and infants studied over a 1-year period with varying degrees of hypoglycemia. Srinivasan et al in 1986 published measured plasma glucose levels in term appropriate for gestational age infants. They reported lowest glucose levels between 1 to 2 hours of age and the 5th percentile for glucose levels were more than 45 mg/dl after 3 hours of age.1 Heck and Erenberg in their article in 1987 reported 5th percentile for plasma glucose levels more than 33 mg/dl from birth to 20 hours and after 20 hours it was more than 45 mg/dl3. The mean plasma glucose level in healthy term new born is more than 45 mg/dl after first 3 hours of life.1

Incidence of hypoglycemia has widely varied in literature from 0.4 to 20% in term appropriate for gestational age (AGA), 25% in term small for gestational age (SGA), preterm AGA 15 to 38% (64% in preterm SGA). This wide variation in incidence of hypoglycemia is due to different factors affecting blood glucose measurements.

Plasma glucose level is the gold standard for glucose measurement. One of the enzymatic methods is used normally to measure glucose levels of most of the gluconometers (Wernizone, glucose oxidase or glucose dehydrogenase). Too much blood on reagent strip and a low hematocrit value (< 25%) can cause inaccurately high glucose values. Too little blood on reagent strip, high hematocrit (> 65%), poor peripheral circulation and dehydration can give inaccurately low values. Alcohol swab can cause low glucose levels if enough time is not allowed for it to evaporate.

Establishing a critical cut off value for glucose has been difficult, as the studies so far have used different lab techniques of glucose measurement, feeding practices and different cut off values used in reporting adverse effects on brain and long-term followup. Concomitant risk factors like hypoxemia, sepsis, dehydration can give inaccurately low values. Alcohol swab can cause low glucose levels if enough time is not allowed for it to evaporate.

We are interested in providing you with a newsletter that is relevant and of interest to you. Please contact us with perinatal topics you would like to see addressed.

For a copy of our newsletter or to be placed on our mailing list, contact us by phone or e-mail. Please visit http://www.worldclassmedicine.com/PERG for information about the Regional Perinatal Center at the Maria Fareri Children’s Hospital at Westchester Medical Center and to locate other issues of The Perinatal Gazette.

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New York Network Creates Unified Voice for Prematurity Challenges

In an average week, 4,738 babies are born in the state of New York. Five hundred seventy-five of those babies (12%) are born premature. 1 New York currently ranks 19th in the United States for the number of premature births each year.2 Premature infants face a number of challenges including increased risk of developmental problems, nutrition challenges, infection risk, vision and hearing impairment and chronic respiratory diseases. In addition, it is equally important to raise awareness of the sometimes life-long consequences for children born prematurely and the challenges their parents face trying to secure and afford essential health and support services for their newborns.

New York families are fortunate to live in a state that has historically been committed to the health and education of its children. Unlike many other states, New York has valuable statewide programs available for families to help ensure our children’s safety, growth and development. Members of the New York State Legislature have played a vital role in keeping our precious children a priority, in particular the most vulnerable at-risk infants.

"Prematurity is a problem that can affect everyone, people living in suburban and/or urban regions. As it continues to rise, so do the consequences of prematurity – increased cost-of-care, increased infant mortality, and increased disability, both physical and mental," stated Sergio G. Golombek, MD, Chairman of the Department of Obstetrics & Gynecology.1,3

The Regional Perinatal Center Maria Fareri Children’s Hospital 95 Grasslands Road Valhalla, New York 10595

The Perinatal Gazette Newsletter of the Regional Perinatal Center Maria Fareri Children’s Hospital at Westchester Medical Center

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At low glucose levels, counter regulatory hormones are released (epinephrine, glucagon, cortisol and growth hormones). Pyrdz et al in 1990 demonstrated that counter regulatory mechanism like increased cerebral blood flow and increased epinephrine levels were evident when blood glucose level is below 45 mg/dl. With hypoglycemia the primary sources of alternative energy for the brain are ketone bodies and lactate. Term infants have ketogenic ability, whereas preterm infants have a very low ketone body concentration even at low glucose levels. Breastfed have significantly lower glucose concentration, but a higher ketone body production than formula-fed infants.

Koh et al in 1988 demonstrated that abnormal sensory evoked potential when blood glucose concentration fell below 47 mg/dl. Series of case reports have been published with blood glucose levels ranging from profound hypoglycemia to levels less than 47 mg/dl, showing association of hypoglycemia and occipital brain injury. Also, the duration and recurrent episodes of hypoglycemia varied significantly in these case reports. Luc et al in their study of 661 preterms found that recurrent episodes of blood glucose levels less than 47 mg/dl were associated with significant decrease in Bayley infant mental development scores.4 These reports also noted that glucose levels less than 47 mg/dl on 5 or more consecutive days were associated with 3.5 fold increased risk of cerebral palsy or developmental delay. Duvanel et al in their study of 304 SGA less than 25 weeks gestational age, found that recurrent episodes of blood glucose levels less than 47 mg/dl strongly correlated with persistent developmental and physical deficits until 5 years of age.5

Cornblath in 2000 has proposed an operational threshold of glucose level less than 36 mg/dl to intervene and a therapeutic objective to raise glucose to more than 45 mg/dl. He also suggested keeping glucose levels more than 60 mg/dl in recurrent and profound hypoglycemia, sick and symptomatic neonates.6 Sperling in his article in Pediatric Clinics of North America in 2004 suggested a compromised definition for hypoglycemia (less than 50 mg/dl).7 Volpe text book of neurology is difficult, intramuscular glucagon 0.3 mg/kg should be given immediately. Any infant symptomatic with glucose level between 30 to 40 mg/dl, and symptomatic with glucose level between 20 to 30 mg/dl and 2 g/kg of 10% dextrose given intravenously. This should be followed by continuous intravenous infusion with 10% dextrose to give 8 mg/kg/min or 8 to 10 g/kg/day, with aim of maintaining glucose levels more than 45 mg/dl. If venous access is not possible, intramuscular glucose 0.3 mg/kg should be given immediately. Umbilical venous line should be placed as soon as possible for persistent hypoglycemia and those requiring more than 12.5% dextrose.

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WANTED!
Perinatal Clinical Nurse Specialist

Westchester Medical Center Perinatal service is seeking a highly motivated Registered Nurse to fill the position of Perinatal Clinical Nurse Specialist.

This position offers an exciting opportunity to join a dynamic, rapidly expanding high-risk obstetrical offering world-class obstetrical, medical and surgical care.

Responsibilities include:

Serving as a clinical resource for L&D and Mother/baby staff focused on high-risk perinatal nursing, fetal monitoring and well baby care.

Developing & implementing educational programs on high-risk obstetrical and well baby nursing.

Maintaining & improving communication between the Regional Perinatal Center (RPC) and its affiliate obstetrical services within our 7 county region.

Working collaboratively with perinatal personnel and the Regional Perinatal Center team relating to maternal transport quality improvement issues.

Qualifications:

Master’s degrees prepared with minimum 5 years recent acute care obstetric experience, Certification in Inpatient Obstetrical nursing preferred. Preference will be given to candidates with outreach experience.

Please contact: Rose Codella at (914) 493-7808

SAVE THE DATE
Annual Regional Perinatal Forum Conference
GOING GREEN: MAKING HEALTHY CHOICES FOR A SANE PREGNANCY AND FAMILY

Wednesday, November 4, 2009
Marriott Westchester
(Tarrytown, NY)

Watch for upcoming save the date card with further details.

Continued from page 1 - Unified Voice for Prematurity Challenges

“Prematurity is something that needs to pull resources and efforts from everyone in the community. Not only is this an issue for physicians, nurses and healthcare workers, but it also requires attention from politicians and families. Together we need to address some of the few areas that can cause preterm birth, such as poor prenatal care and substance abuse.”

The New York Premature Infant Health Network was established to help create a statewide unified voice to articulate the many unique challenges premature infants face once they leave the hospital and care begins at home. The Network also seeks to advocate for access to essential services for all babies and their families no matter where they reside in the state. The Network membership includes representatives from nearly 60 community and health organizations, hospitals, healthcare providers and parents from across the state.

“One of the biggest challenges caregivers and families face in New York is the continuum of care from the NICU to the community. The Network will dedicate efforts to increase communication and education of state legislators, policy makers and communities of available services and programs for families affected by prematurity. Additionally we hope to centralize expertise to create a statewide advocate for the tiniest of New Yorkers who require our help.”

It is all too common to hear New Yorkers say Maureen Doolan Boyle, Executive Director, Mothers of Supertwins (MOST) and Chair of PreemieCare.

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“New York, like the rest of the nation, strives to address current fiscal issues, it is important that we are not short-sighted in cutting programs and services, especially those for our most vulnerable infants and children, that will place a greater burden on families and NYS in the long run,” commented Sharon Chesna, Director, Mothers & Babies Perinatal Network.

The New York Premature Infant Health Network holds regular meetings in Albany and New York City and schedules additional member communication through periodic statewide conference calls. If you would like more information on the New York Premature Infant Health Network, contact Annette Eyer, New York Coordinator at 1-800-4-BABIES (1-800-422-2437) or (717) 433-7109. The New York Premature Infant Health Network is supported and funded by Medimmune, LLC, which provides administrative and operational direction through its consultant, Cullani Communications Group.

Several members of the New York Premature Infant Health Network include: Blythedale Children’s Hospital; BirthNet; Central Harlem Healthy Start Program; Centro Cívico de Amsterdam, Inc; Long Island University/ Brooklyn Campus; Lower Hudson Valley Perinatal Network; Mothers & Babies Perinatal Network of SCNY, Inc; MOST; New York State Academy of Family Physicians; New York City Association of Neonatal Nurses; New York City Department of Health and Mental Hygiene/Brooklyn HealthStart Project. North Country Prenatal Perinatal Project; The Regional Neonatal Center-Maria Fareri Children’s Hospital; Northern Manhattan Perinatal Partnership, and PreemieCare.


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