

**Small for Gestational Age and Hypoglycemia Protocols**

Cidney Hinchman, Brandi Huson, and McKayla Norton

Lakeview College of Nursing

N443: Leadership and Management

Professor Brassard

04/03/2022

### **Small for Gestational Age and Hypoglycemia Protocols**

The birth of a child is an exciting yet scary time in any parents' life. Pregnancy, labor, and delivery can come with many challenges. Women with multifetal pregnancy, pregnancy-induced hypertension, and placental abnormalities are at risk of delivering a small gestational age (SGA) newborn (Liu et al., 2019). SGA babies have a birth weight below the tenth percentile of babies at the same gestational age or weigh less than 2500 grams or 5.5 pounds (Children's Hospital of Pediatrics, 2022). SGA newborns are at a higher risk of developing hypoglycemia and hyperbilirubinemia (Liu et al., 2019). Due to the increased risk of SGA neonates developing hypoglycemia, protocols have been put in place to check the glucose levels of SGA neonates to improve safety and ensure quality patient care (Wright et al., 2021).

Quality and safety education for nurses (QSEN) guidelines are put in place to ensure that new nurses have the knowledge, skills, and competencies necessary to improve quality and safety in the healthcare system for which they work (QSEN Institute, 2020). Quality improvement, safety, evidence-based practice, informatics, teamwork and collaboration, and patient-centered care are competencies nurses should demonstrate to improve patient outcomes and satisfaction (QSEN Institute, 2020). In this situation, the nurses need to express their concerns to the physician about all the complications that arise by not doing a simple blood sugar check and about other hospital protocols regarding SGA neonates (QSEN, 2019). By performing a glucose check on this neonate, the staff collaborates to ensure safety from developing hypoglycemia. Quality of care will improve by monitoring this infant, using interventions to prevent hypoglycemia, and reducing the risk of an extended hospital stay (QSEN Institute, 2020).

## **Literature Review**

### **Risk Factors and Complications of Small for Gestational Age**

Small for gestational age newborns is a prevalent condition worldwide (Liu et al., 2019). Many maternal risk factors put infants at risk of being small for gestational age, such as advanced maternal age, hypertension, smoking, prenatal nutrition, placental conditions, and obesity (Liu et al., 2019). SGA is one of the leading causes of perinatal death (Liu et al., 2019). SGA neonates are also at risk of developing physical and mental delays throughout childhood (Liu et al., 2019). This study found that hypoglycemia and hyperbilirubinemia are two common conditions affecting SGA neonates (Liu et al., 2019). Although hypoglycemia and growth can improve, it is critical to closely monitor glucose levels of SGA neonates to prevent long-term complications (Liu et al., 2019). Since SGA does not link to one particular risk factor during pregnancy, nurses must safely monitor SGA neonates following birth to prevent lifelong complications of hypoglycemia and improve patient care (Liu et al., 2019). The nurse can demonstrate safety by communicating concerns related to errors or hazards regarding patient care, such as testing for hypoglycemia in neonates (QSEN Institute, 2020).

### **Decreasing the Number of NICU Admissions Related to Hypoglycemia**

Hypoglycemia affects fifteen to thirty percent of newborns, and treatment is per hospital policy and guidelines (Youssef & Kleytman, 2021). Unfortunately, many newborns have glucose levels below the recommended value resulting in neonatal intensive care unit admissions (Youssef & Kleytman, 2021). Neonatal intensive care unit (NICU) admissions have increased maternal anxiety and difficulty with breastfeeding due to mother and baby not being together (Youssef & Kleytman, 2021). Several risk factors contribute to hypoglycemia, such as neonatal

### Small for Gestational Age and Hypoglycemia Protocols

hypothermia, delayed feeding, and maternal sepsis (Youssef & Kleytman, 2021). A nurse can do several safe interventions to help reduce neonatal hypoglycemia and NICU admissions (Youssef & Kleytman, 2021). The infant should be placed skin-to-skin with the mother immediately following birth, initiate early breastfeeding, and monitor the neonatal temperature every thirty minutes for the first two hours (Youssef & Kleytman, 2021). Patient outcomes such as maternal anxiety and NICU admissions decrease when nurses initiate early interventions following the delivery of newborns to prevent hypoglycemia (Youssef & Kleytman, 2021). In this study, monitoring the outcomes of nursing interventions such as skin to skin, early initiation of breastfeeding, and temperature checks to reduce the risk of hypoglycemia were shown to increase quality improvement (QSEN Institute, 2020).

### **ABM Clinical Protocol #1: Guidelines for Glucose Monitoring and Treatment of Hypoglycemia in Term and Late Preterm Neonates, Revised 2021**

After years of research and studies, establishing protocols allows practitioners to follow safe, practical guidelines (Wright et al., 2021). Clinicians must be aware of the signs, risk factors, and coexisting conditions to make assessments and decisions to avoid the adverse effects of neonatal hypoglycemia (Wright et al., 2021). The Academy of Breastfeeding Medicine has adapted protocols for clinicians for neonates at risk of developing hypoglycemia (Wright et al., 2021). Infants at risk of developing low blood sugar include large or small for gestational age, prematurity, cold stress, and infants of poorly controlled diabetic mothers (Wright et al., 2021). This guideline suggests that at-risk infants and infants showing signs of hypoglycemia have glucose monitored based on the specific risk factors associated with the infant (Wright et al., 2021). Infants born to mothers with poorly controlled diabetes should be tested sixty minutes

### Small for Gestational Age and Hypoglycemia Protocols

after birth (Wright et al., 2021). LGA and SGA babies should have blood glucose checked after their second feeding or within two to four hours (Wright et al., 2021). SGA babies born with evidence of intrauterine restriction should have glucose levels monitored for twenty-four hours (Wright et al., 2021). Hypoglycemia monitoring should continue until there are three satisfactory glucose levels (Wright et al., 2021). Improving the guidelines for glucose testing for at-risk neonates has contributed to decreased NICU rates and improved the safety and quality of newborn care (Wright et al., 2021).

### **Prevention of Neonatal Hypoglycemia with Oral Glucose Gel for High-Risk Newborns**

Neonatal hypoglycemia is the most frequent metabolic issue (Herrmann et al., 2021). It is seen in five to fifteen percent of newborns in the first couple of days after birth and in over fifty percent of newborns with particular risk factors (Herrmann et al., 2021). Hypoglycemia in a newborn can be a normal bodily function resulting from birth (Herrmann et al., 2021). However, it can also be an initial warning sign that the newborn may have a more complicated metabolic issue (Herrmann et al., 2021). In addition, neonatal hypoglycemia can cause preventative short and long-term neurological impairment in newborns even when asymptomatic depending on the severity and duration (Herrmann et al., 2021). The glucose level that causes neonatal hypoglycemia is still questionable, but it seems to occur around a glucose level of below 47 mg/dL. Thus, the American Academy of Pediatrics committee 2011 issued screening guidance to assist hospitals in implementing a protocol to help detect newborns with asymptomatic hypoglycemia centered around specific risk factors (Herrmann et al., 2021). The specific risk factors consisted of newborns with mothers who had gestational diabetes mellitus, type one or two diabetes mellitus, newborns who were large for gestational age, small for gestational age,

### Small for Gestational Age and Hypoglycemia Protocols

preterm, late preterm, or required resuscitation at birth (Herrmann et al., 2021). Therefore, this study focused on the 2011 American Academy of Pediatrics screening guidance to identify high-risk newborns and provide them with earlier feedings and a glucose level check (Herrmann et al., 2021). If the newborn's glucose level was below 45 mg/dL, the newborn received 0.2 grams/kg of oral glucose gel (Herrmann et al., 2021). As a result, due to the asymptomatic hypoglycemia screening and oral glucose gel treatment, only seven out of 310 newborns tested for asymptomatic hypoglycemia needed to be administered intravenous dextrose or transferred to the neonatal intensive care unit during the first year of the study (Herrmann et al., 2021).

In contrast, out of 250 newborns tested for asymptomatic hypoglycemia, thirty-one needed oral glucose gel intervention (Herrmann et al., 2021). However, none of them had to be administered intravenous dextrose or transferred to the neonatal intensive care unit during the second year of the study (Herrmann et al., 2021). This study relates to the concern of neonatal hypoglycemic protocols needed in the hospital. By implementing asymptomatic hypoglycemic screenings based on particular risk factors and subsequent treatments of oral glucose gel for newborns, the hospital can reduce costs and utilization of aggressive interventions, such as peripheral intravenous line placement, intravenous dextrose infusions, and the transferring of newborns to a neonatal intensive care unit (Herrmann et al., 2021). Furthermore, quality improvement uses data to calculate the implementation of improvements and outcomes of care interventions to plan and examine changes that could improve the health care system (QSEN Institute, 2020). This article demonstrates quality improvement relating to the QSEN website. Implementing asymptomatic hypoglycemic screenings and oral glucose gel treatments will positively change hypoglycemic protocols for at-risk neonates reducing the utilization of aggressive interventions.

**Neonatal Hypoglycemia: Continuous Glucose Monitoring**

Children and adults with diabetes mellitus are beginning to use continuous glucose monitoring more frequently to help control hypoglycemia and hyperglycemia (Shah et al., 2018). However, little study has happened on continuous glucose monitoring in neonates (Shah et al., 2018). The QSEN website involves information regarding quality and safety education for nurses to help improve the health care system (QSEN Institute, 2020). Therefore, this article is vital for neonatal hypoglycemia because it gives the healthcare industry a better understanding of continuous glucose monitoring advantages and limitations in neonates. Continuous glucose monitoring has proven that abnormal glucose levels often go unnoticed in neonates despite periodic blood glucose testing (Shah et al., 2018). Therefore, continuous glucose monitoring in neonates could help increase neonatal hypoglycemia and hyperglycemia's early detection and regulation (Shah et al., 2018). In addition, decreasing the demand for blood sampling ultimately decreases the number of heel pricks the neonate encounters (Shah et al., 2018). Although unfortunately, no continuous glucose monitoring machine has the authorization for neonatal use yet (Shah et al., 2018). The latest continuous glucose monitoring machines are not made for neonatal use but are small enough that even very preterm infant use is practical (Shah et al., 2018). A recent study determined that using a continuous glucose monitoring machine decreased the number of blood tests and the length of hypoglycemic episodes by fifty-one minutes. Continuous glucose monitoring machines can detect episodes almost an hour earlier than blood sampling (Shah et al., 2018).

Furthermore, studies found that infants and deficient birth weight infants tolerated continuous glucose monitoring considerably well with no local complications such as infection,

### Small for Gestational Age and Hypoglycemia Protocols

edema, bleeding, or bruising (Shah et al., 2018). However, the detachment of devices in some very preterm infants seemed to be an issue (Shah et al., 2018). In conclusion, continuous glucose monitoring seems practical and unlikely to harm neonates, but there are still many unknowns about the aftermath of using these devices on neonates (Shah et al., 2018). There is also much uncertainty about the interpretation, dependability, and regulation of continuous glucose monitoring in neonates. However, continuous glucose monitoring could demonstrate quality improvement relating to the QSEN website by reducing the number of blood tests by at least 25%, decreasing the amount of pain-related stress a neonate encounters. The increase in early detection and regulation, which improves overall glycemic status within neonates, can also demonstrate quality improvement relating to the QSEN website. Thus, hopefully, in the future, more studies can be completed on continuous glucose monitoring in neonates so these devices can be implemented into routine neonatal care (Shah et al., 2018).

### **Case Study**

One day at The Birthing Center at OSF, during clinical, a woman gave birth to a little boy that was thirty-eight weeks gestation and weighed only five pounds three ounces. The nurse and lactation consultant discussed if this newborn would need glucose checks as he was so small. The nurse informed the lactation consultant, a nurse, that the doctor had not ordered glucose checks for this infant. The lactation consultant informed the nurse that the baby fell in the small category for gestational age and needed glucose checks. The lactation consultant looked for a hospital protocol for SGA babies and could not find a glucose check protocol for the facility, so she did not perform a glucose check on this infant.

## Small for Gestational Age and Hypoglycemia Protocols

A study from January 1st, 2018, to December 31st, 2018, showed that 342 babies were born with risk factors for hypoglycemia (Mazari et al., 2020). Screenings for hypoglycemia were done prior to feeds at the two, six, twelve, twenty-four, and forty-eight-hour mark of life extrauterine. Out of the 342 newborns, 109 babies had hypoglycemia, and of the 109 newborns, sixty-two babies were considered small for gestational age (Mazari et al., 2020). Fifty-two of the sixty-two newborns had developed a hypoglycemic episode within the first two hours of life (Mazari et al., 2020). Because of this hypoglycemic protocol, early detection of the episodes had been identified and allowed for treatment.

## Synthesis

### Practice:

Studies have shown that being proactive and screening newborns at hours two, six, twelve, twenty-four, forty-eight, and seventy-two can decrease the risk of hypoglycemia in tiny gestational age newborns (Kumar et al., 2021). Early screening in SGA babies allows corrective actions like increased feedings to increase the newborn's glucose level (Kumar et al., 2021). In a study of sixty-five newborns, 55.4% of SGA babies had severe, mild, or moderate hypoglycemia where interventions were needed (Kumar et al., 2021). Frequent feedings should be done slowly for both formula and breastfeeding newborns. The calculation for formula-fed feedings should go by the newborn's size and gestational age to ensure the administration of the appropriate amount to improve the glucose level (Narvey & Marks, 2019).

### Education:

Nationwide, nurses obtain education about the need for early hypoglycemia screening of newborns. Many hospitals screen the newborns for hypoglycemia if the mother has diabetes, the

### Small for Gestational Age and Hypoglycemia Protocols

newborn is large for gestational age, or the newborn is tiny for gestational age (Dani & Corsini, 2020). Although this practice is widely used, many newborns are missed due to not being labeled as high risk (Dani & Corsini, 2020). Some congenital disorders, like hyperinsulinism, can be undiagnosed and lead to persistent hypoglycemia in a newborn (Dani & Corsini, 2020).

Continuous education for signs and symptoms in high-risk and non-high-risk newborns should be given to nurses to help prevent or intervene with hypoglycemic newborns.

### **Research:**

Small gestational age is one of the leading causes of perinatal death; therefore, it is pertinent for the nurse to assess and monitor the neonate for conditions like hypoglycemia (Liu et al., 2019). Research has shown that many interventions, such as skin-to-skin and early breastfeeding, help reduce the risk of the SGA newborn developing hypoglycemia (Youssef & Kleytman, 2021). This research is pertinent in developing protocols to ensure nurses monitor and treat SGA babies for hypoglycemia (Wright et al., 2021). Medical facilities now have protocols for testing SGA babies for hypoglycemia, which has increased maternal and newborn safety and improved the quality of care (Wright et al., 2021).

### **Conclusion**

Small gestational age newborns are at higher risk for hypoglycemic episodes. Early detection of neonates' blood glucose levels can lead to early intervention and decrease temporary and long-term neurological impairments. QSEN competencies include safety and education, allowing nurses to have the proper education and training to safely care for neonates who may

### Small for Gestational Age and Hypoglycemia Protocols

suffer hypoglycemic episodes. Implementation of proper protocols ensures that SGA babies screened early on are to improve their glucose levels and prevent further complications.

**References**

Children's Hospital of Philadelphia. (2022). *Small for gestational age*.

<https://www.chop.edu/conditions-diseases/small-gestational-age>

Dani, C., & Corsini, I. (2020). Guidelines for management of neonatal hypoglycemia. *JAMA Pediatrics*, 174(7), 638. <https://doi.org/10.1001/jamapediatrics.2020.0632>

Herrmann, S., Deyo-Svendsen, M., Andrist, C., Phillips, M., Svendsen, M., & Svendsen, R. (2021). Prevention of neonatal hypoglycemia with oral glucose gel for high-risk newborns. *Wisconsin Medical Journal*, 120(1), 51-53.

Kumar, P., Singh, S., Tripathi, S., & Kumar, M. (2021). Incidence, predictors, and outcomes of hypoglycemia among at-risk neonates. *Perinatology*, 22(3), 171–177.

Liu, Q., Yang, H., Sun, X., & Li, G. (2019). Risk factors and complications of small for gestational age. *Pakistan Journal of Medical Sciences*, 35(5).

<https://doi.org/10.12669/pjms.35.5.253>

Mazari, M. E., Rehman, F. ur, & Zafar, M. A. (2020). Hypoglycemia in newborns with risk factors of hypoglycemia. *The Professional Medical Journal*, 27(01), 84–88. <https://doi.org/10.29309/tpmj/2019.27.01.3333>

Narvey, M. R., & Marks, S. D. (2019). The screening and management of newborns at risk for low blood glucose. *Paediatrics & Child Health*, 24(8), 536–544.

<https://doi.org/10.1093/pch/pxz134>

Small for Gestational Age and Hypoglycemia Protocols

QSEN Institute. (2020, October 29). *QSEN Competencies*. [https://qsen.org/competencies/pre-licensure-ksas/#patient-centered\\_care](https://qsen.org/competencies/pre-licensure-ksas/#patient-centered_care)

Shah, R., McKinlay, C. J. D., & Harding, J. E. (2018). Neonatal hypoglycemia: continuous glucose monitoring. *Current Opinion in Pediatrics*, 30(2), 204–208.  
<https://doi.org/10.1097/mop.0000000000000592>

Son, H., So, W.-Y., & Kim, M. (2019). Effects of aromatherapy combined with music therapy on anxiety, stress, and fundamental nursing skills in nursing students: A randomized controlled trial. *International Journal of Environmental Research and Public Health*, 16(21), 4185. <https://doi.org/10.3390/ijerph16214185>

Wight, N. E., Stehel, E., Noble, L., Bartick, M., Calhoun, S., Kair, L., Lappin, S., Larson, I., LeFort, Y., Marshall, N., Mitchell, K., Rothenberg, S., Seo, T., Weissman, G., Winter, L., Wonodi, A., Young, M., & Zimmerman, D. (2021). ABM clinical protocol #1: Guidelines for glucose monitoring and treatment of hypoglycemia in term and late preterm neonates. *Breastfeeding Medicine*, 16(5), 353–365. <https://doi.org/10.1089/bfm.2021.29178.new>

Youssef, M., & Kleytman, I. (2021). Decreasing the number of NICU admissions related to hypoglycemia. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 50(5).  
<https://doi.org/10.1016/j.jogn.2021.08.080>