Understanding the Implications of Birth Weight

Stephanie F. McGuire

Stephanie F. McGuire, MS, NP-BC, is a neonatal nurse practitioner at Connecticut Children’s Medical Center in Hartford, CT. The author reports no conflicts of interest or relevant financial relationships. Address correspondence to: sf.mcguire@connecticutchildrens.org.

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Abstract Neonatal growth parameters include birth weight, length, and head circumference. Weight, as it relates to gestational age, is monitored closely during pregnancy to assess the appropriate growth of the fetus. At birth, it becomes an important parameter to assess the health and well-being of the newborn. Birth weight carries implications for nursing care and monitoring of the newborn’s transition to extrauterine life. The importance of birth weight assessment and its interpretation will be reviewed, along with the implications for immediate neonatal care and potential long-term effects on an infant’s health outcomes.

Keywords birth weight | gestational age | neonatal outcomes | transition to extrauterine life
After months of anticipation, new parents are eager to find out the birth weight of their newborn. It is our responsibility as neonatal nursing care providers to understand the significance of a newborn’s birth weight as it relates to gestational age. This article includes a review of terms, implications for neonatal health, and evidence-based care practices that will guide nurses in supporting a newborn’s transition to extrauterine life.

**General Size Classifications**

Weight, head, and length measurements are classified as small for gestational age (SGA), average for gestational age (AGA), or large for gestational age (LGA). The New Ballard maturational assessment tool is used to assess gestational age on the basis of physical and neurological criteria (Ballard et al., 1991). Measurements are plotted on a growth curve to establish the relationship between size and age. A neonate is identified as SGA if under the 10th percentile for gestational age, AGA if between the 10th and 90th percentiles, or LGA if greater than the 90th percentile (Bowers, 2007).

**SGA Versus Intrauterine Growth Restriction**

Intrauterine growth restriction (IUGR) describes the failure of a fetus to grow at an expected rate in utero and to fall short of meeting his or her genetic size potential (Cetin, Mando, & Calabrese, 2013). Head circumference is the key determinant between *symmetric* IUGR versus *asymmetric* IUGR. Head, weight, and length measurements are equally SGA in a symmetric IUGR infant. Symmetric IUGR may represent an underlying pathologic condition, such as chromosomal disorder or congenital infection, that has affected the intrauterine growth rate since early in
gestation (Clark, Olsen, & Spitzer, 2014). Conversely, asymmetric IUGR occurs if the head circumference is AGA, compared with SGA weight and length. This paradigm typically occurs later in pregnancy and reflects compromised placental function and, thus, altered nutrient supply to the growing fetus (Cetin et al. 2013). Common contributors include maternal hypertension, substance abuse, autoimmune diseases, uterine malformations, and malnutrition. Placenta- or umbilical cord-related complications can contribute to IUGR, including twin-to-twin transfusion syndrome, chronic abruption, placenta previa, and multiple gestation (Bowers, 2007).

The terms SGA and IUGR are not interchangeable. Growth-restricted newborns have had their rate of growth affected in utero. This may result from placental dysfunction, often later in gestation, or it may be caused by an early gestational insult, such as a chromosomal abnormality or viral infection. Newborns who are SGA are constitutionally small, and their size does not affect their outcomes (Alberry & Soothill, 2007).

**LGA Newborns**

Another extreme growth parameter refers to newborns who are LGA. Macrosomia is a general term to describe a newborn who is larger than 4,000 g, often born after term (Trotter, 2015). Excessive maternal weight gain and gestational diabetes influence excessive fetal growth (Chiavaroli, Derraik, Hofman, & Cutfield, 2016). Increased glucose presence, shared from mother to fetus, causes increased insulin production by the fetus to occur. Excessive body growth occurs and increased fat deposits develop in that environment because insulin has a growth hormone effect on the fetus.
Antenatal Growth Surveillance

Although the focus is on postnatal nursing implications, it is important to have an understanding of the reliability of fetal assessments. The distance from the symphysis pubis to the top of the fundus is measured as the fundal height and is translated into weeks of gestation. It is valid after 24 weeks gestation. As the simplest obstetric measurement, it is commonly used to determine gestational age despite reports that have been unable to confirm its use in identifying growth restriction (Robert, Ho, Valliapan, & Sivasangari, 2015).

Considering multiple fetal measurements by ultrasonography is useful to establish gestational age dating in the second trimester. Accurate estimated fetal weight, gestational age, and population-based growth data help clinicians make accurate conclusions about fetal growth (Clark, Olsen, and Spitzer, 2014). Neonatal outcomes may be affected if obstetric decisions are based on imprecise growth assessments. The risk is reflected by SGA newborns experiencing NICU admission rates more than twice that of appropriately sized neonates (Callec, Lamy, Perdriolle-Galet, Patte, Heude, & Morel, 2015).

Implications of Aberrant Antenatal Growth Indexes

Additional surveillance is required when diminished growth trends are identified. Abnormal Doppler flow studies have predictive value to identify increased risks of perinatal morbidity and mortality, likely related to uteroplacental insufficiency (Alberry & Soothill, 2007). Nonstress testing and biophysical profile monitoring are included as fetal risk increases (Bowers, 2007). By contrast, cesarean birth and induction of labor rates are reduced when Doppler studies offer reassurance that a fetus is tolerating pregnancy (Gruslin and Lemyre, 2011).
**Clinical Practice Implications**

Large or small fetal size alerts clinicians to potential complications of labor and birth. A macrosomic fetus signals risks for childbirth complications such as shoulder dystocia, brachial plexus injury, fractures, or birth asphyxia. Women with a macrosomic fetus are at increased risk for prolonged labor, vacuum assistance, birth canal laceration, cephalopelvic disproportion, postpartum hemorrhage, or a surgical birth (Fuchs, Bouyer, Rozenberg, & Senat, 2013). A growth-restricted fetus is at increased labor risk if placental insufficiency compromises blood flow during contractions. Increased need for cesarean birth and related risks may be the result.

Irrespective of size, each newborn’s response to labor and birth will set the stage for transition to extrauterine life. Mounting evidence supports early skin-to-skin contact to optimize physiologic stability and enhance transition (Moore, Anderson, Bergman, & Dowswell, 2012). However, weight aberrations and associated birth complications increase the risk to successful transition. Simchen et al. (2013) reported more complications, including hypoglycemia and lower Apgar scores at 5 minutes, in male, term, SGA neonates than in their female counterparts. This reflects that sex may even affect successful transition. Poor temperature regulation, glucose instability, and respiratory distress may be challenges to these neonates and may require additional nursing care considerations.

An SGA neonate is challenged to balance preventing heat loss with production of heat. Decreased subcutaneous body tissue is a risk factor for increasing losses and a setup for temperature instability. Inadequate brown adipose tissue resources are tapped to replace heat
losses, potentially compromising a neonate’s ability to maintain euglycemia. Complications are compounded, such as hypoxia and acidosis, as the metabolic demand is increased. Hypothermia can be avoided by providing a warm, dry environment; avoiding drafts; using a cap to the head; and providing an external heat source if necessary (Mance, 2008).

Simple measures to avoid hypoglycemia are reported by McInerney and Gupta (2015). They report a 50% reduction in hypoglycemia in high-risk newborns when the first bath was delayed to more than 12 hours of life. Glucose monitoring protocols, initiated in the birthing room, are designed to identify at-risk newborns, avoid hypoglycemia, and intervene appropriately when needed. Interventions range from initiating early feedings to the need for intravenous glucose administration (Hawdon, 2015). An LGA newborn with a mother with diabetes may struggle related to an increased insulin response to maternal hyperglycemia, whereas an SGA newborn may have hypoglycemia due to decreased glycogen stores. Montassir et al. (2009) reported on a group of neonates in whom prolonged hypoglycemia was the most important factor associated with hypoglycemic brain injury. Those newborns with moderate to severe hypoglycemia who required large amounts of glucose were almost all SGA, highlighting the need for vigilance.

Respiratory symptoms may be observed more frequently in large or small infants. More complications affect SGA preterm newborns, including respiratory distress syndrome, possibly requiring respiratory support, than their AGA preterm counterparts (Regev et al., 2003). Respiratory distress syndrome can pose complications for an LGA newborn of a mother with diabetes when surfactant is inactivated by exposure to neonatal hyperinsulinemia. Meconium aspiration is a real risk for both SGA and LGA newborns, because their tolerance of labor may
be poor. Lastly, associated needs for cesarean birth increase the likelihood of retained fetal lung fluid causing respiratory symptoms.

**Conclusion**

Fetal weight is monitored extensively during pregnancy and is used to reflect the well-being of a fetus. Prenatal complications, including preterm birth, and birth weight become the indicators to determine ongoing monitoring of a neonate after birth. Nurses can have a direct role in limiting or preventing morbidities such as hypoglycemia and hypothermia with ongoing assessment and timely intervention. When these are minimized or prevented, neonatal transition to extrauterine life is optimized.

**References**


