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Perinatal Regionalization in Georgia: How are we Performing?

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ABSTRACT

Perinatal Regionalization in Georgia: How are we Performing?
By Chloe M. Barrera

Background: Beginning in the 1970's, hospitals in Georgia began applying for perinatal level designation to support a regionalized system of perinatal care. Since their original designation, they have never been required to reaffirm their level. As a result, these designations no longer reflect the guidelines of the Perinatal Standards of Care by the American Academy of Pediatrics (AAP) and the American Congress of Obstetrics and Gynecology (ACOG). This has serious implications for service provision as well as infant mortality and morbidity.

Purpose: This study examines the current state of the regionalization of perinatal care in Georgia by examining which hospitals fail to meet their current level designation based on the current standards of perinatal levels of care. Additionally the study examines the percent of very low birth weight (VLBW <1500g) infants who are being born in the appropriate level of care (Level III or higher) and observes the patterns of maternal and neonatal transfers.

Methods: The Georgia Department of Public Health (DPH), along with a team of Emory students, developed a cross-sectional survey aimed at elucidating hospitals' level of care based on a series of indicators relating to each level. This survey was administered to all perinatal care hospitals in the state of Georgia (N=84 at the time of survey distribution). Data analysis was conducted using IBM's SPSS, version 19.0 and included descriptive statistics. An algorithm was applied to each survey to assign each hospital a level of care consistent with the AAP/ACOG Guidelines.

Results: The study sample included 57 (68%) hospitals. The survey revealed that 30 (52%) of the hospitals that completed the survey are practicing one level below their DPH designation. Additionally, it was found that only 15.8% of VLBW infants are being born in the appropriate level of care.

Conclusion: This study revealed that the majority of reporting hospitals in Georgia are not practicing at their designated level of perinatal care. In order to improve infant health outcomes across the state, hospitals need to be redesignated and a system of regionalization be fully implemented.

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CHAPTER 1: INTRODUCTION

Problem Definition

The American Academy of Pediatrics (AAP) and The American College of Obstetricians and Gynecologists (ACOG) have developed guidelines for designating levels of perinatal hospital care (perinatal refers to a hospital with both labor and delivery services) in order to create a standard of care and achieve optimum health outcomes. The guidelines address the full spectrum of perinatal medicine and recommend four levels of perinatal capacity designation for birthing hospitals. There is a gradation of risk in which a Level I hospital has the least capacity to care for high-risk women and infants and a Level IV hospital has the capacity to care for the highest risk women and infants (AAP/ACOG, 2012). In Georgia there were 84 perinatal care hospitals at the end of 2013, and, of these, six are Regional Perinatal Centers (RPCs) currently designated as Level III hospitals. Ideally, RPCs will be a Level IV hospital. While some Georgia perinatal hospitals may be practicing as a Level IV, none are designated as such. The remaining 78 are designated as Level I, II, or III. Under the RPC design, each RPC serves a defined geographic region and all other perinatal care hospitals fall under the purview of the RPC within their region.

Hospitals originally applied for their level designations in the 1970s, and since their original designation they have never been required to reaffirm their level. While some hospitals have gone through the redesignation process, others may no longer be the level they were initially designated due to changes in the guidelines and new technologies. A revision of the Perinatal Standards of Care was published in October 2012 (AAP/ACOG, 2012), and it is prudent that Georgia hospitals have updated hospital

level designations that comply with these guidelines.

Inappropriate level designation has significant impact on service provision. Many women give birth in hospitals that cannot provide the necessary services; the Georgia Department of Public Health (DPH) estimates that more than 30% of very low birth weight (VLBW, <1500g) infants in Georgia are not born in a hospital that is able to provide the appropriate level of care for them. This can result in significant adverse health outcomes for both mother and infant. It has been found that when VLBW infants are born in hospitals lower than a Level III, they are at greater odds of pre-discharge death and overall infant mortality compared to infants born at a Level III or Level IV hospital (Lasswell, Barfield, Rochat, & Blackmon, 2010). Moreover, post-birth transfer of neonates born at a Level I or II hospital has been found to increase the risk of neonatal mortality (Mori et al., 2007). Thus, it is essential to facilitate both appropriate level of care designations and cooperation between hospitals at the different levels.

Project Description

Realizing the issues surrounding inaccurate hospital perinatal level designation, the DPH, along with a team of Rollins School of Public Health, Maternal and Child Health Certificate students, created an extensive questionnaire that elucidated hospitals' current levels of care through meeting a set of indicators relating to each level. Indicators were based on the availability of specific technologies, services, outreach, education, and abilities each hospital has to provide perinatal care to achieve a certain level. Responses to the survey required input from a variety of hospital personnel. Survey results may serve as a baseline to identify the points of intervention and improvement needed at each hospital. It will also be used in the future to assess further

ways of effectively monitoring and evaluating levels of care.

Formal Statement of Problem

In Georgia, there are no systematic reviews of hospitals' level of care, and there has been no statewide assessment to date of levels of care. Many hospitals have operated at one level but the DPH has them classified at another level. This study seeks to identify the level of care at which hospitals are currently functioning and compare this to the recorded designation. Specifically, this study aims to evaluate Levels I, II, III & IV for hospital perinatal capacity in the perinatal care hospitals in Georgia by addressing the following questions:

- Which hospitals fail to meet their current designation level according to current standards of perinatal levels of care?
- What percentage of VLBW infants are delivered at the appropriate level of care? How does this compare to the national average?
- Are the patterns of maternal transfers and neonatal transports consistent with current designated level of care?

It is hypothesized that a majority of hospital perinatal level designations will not agree with recorded hospital perinatal level designations as determined by a quantitative cross-sectional survey.

CHAPTER II: BACKGROUND AND LITERATURE REVIEW

Origin of the Regionalization of Perinatal Care

During the late 1960s and early 1970s it was acknowledged that maternal, fetal, and neonatal mortality rates could be reduced if high-risk newborns were identified early and provided with optimum care and techniques of obstetrics and pediatrics (Ryan, 1975). This was at a time when new care techniques, such as better metabolic and nutritional care, refined neonatal ventilator capabilities, and more aggressive treatment of infections, were rapidly becoming available for compromised neonates (Hein, 2004). The increase in effort to improve care led to the proposal for the regionalization of perinatal care. The purpose of regionalization was to create an efficient, coordinated system of maternal and perinatal healthcare where hospitals' capabilities are clearly defined and hospitals mutually agree to cooperate and facilitate maximum utilization of health services through determining where, and by whom, the best care can be provided for each patient (Yu & Dunn, 2004). Guidelines for regionalization were first introduced and defined in the United States by the Committee on Perinatal Health, which was convened by the March of Dimes and included members of the American Academy of Family Physicians (AAFP), the American Academy of Pediatrics (AAP), the American Congress of Obstetrics and Gynecology (ACOG), and the American Medical Association (AMA) (Ryan, 1975). The committee advocated for a system of regionalized perinatal care in which hospitals would be given a designation of Level I, II or III based on technology and staff qualifications (Staebler, 2011). It was suggested that Level I hospitals offer obstetric care without specialized newborn care,

Level II hospitals provide care for sick newborns who do not require intensive care and Level III hospitals have full-service neonatal intensive care units (NICUs) with the capabilities to care for the smallest and sickest newborns (Ryan, 1975; Staebler, 2011). In 1976, the committee published "Toward Improving the Outcome of Pregnancy, Recommendations for the Regional Development of Maternal and Perinatal Health Services" (Also known as TIOP I) (Ryan, 1975). This document had an immediate impact on perinatal health care by providing a clear definition of each hospital level and interaction needed across the continuum of perinatal care (Hein, 2004; Little & Merenstein, 1993).

During the following decade, most states developed a regionalized system of care that included designation of regional centers that would provide the highest level of care and would serve smaller hospitals through education and transport services (Staebler, 2011).

Perinatal Regionalization Guidelines Today

In 2012, the AAP and ACOG published the 7th edition of "Guidelines for Perinatal Care" in which a fourth level of care was introduced: a level specifically defining what the capabilities of a Regional NICU should be. According to the updated guidelines, all hospitals within a given level should meet the following criteria:

Level I hospitals need to be able to provide neonatal resuscitation at every delivery as well as evaluate and provide postnatal care to stable term newborn infants. Additionally, they must be able to provide care for infants born 35-37 weeks of gestation who remain physiologically stable and stabilize newborn infants who are ill and those born at or before 35 weeks of gestation until transfer to a higher level of care.

A Level II hospital needs to be able to do all that a Level I does, in addition to providing care for infants born at 32 weeks of gestation or later and weighing 1500 grams or more who have physiologic immaturity or who are moderately ill with problems that are expected to resolve rapidly and are not anticipated to need subspecialty services on an urgent basis. A Level II hospital must also provide care for infants convalescing after intensive care and provide mechanical ventilation for brief duration (less than 24 hours) or continuous positive airway pressure or both. Lastly, a Level II must be able to stabilize infants born before 32 weeks of gestation and weighing less than 1500 grams until transfer to a neonatal intensive care facility.

A Level III hospital needs to be able to do all that Level I and II hospitals do, as well as provide sustained life support, provide comprehensive care for infants born before 32 weeks of gestation and weighing less than 1500 grams and infants born of all gestational ages and birth weights with critical illnesses. A Level III facility must provide prompt and readily available access to a full range of respiratory support, and perform advanced imaging, with interpretation on an urgent basis, including advanced tomography, magnetic resonance imaging, and echocardiography.

Finally, a Level IV hospital must be able to provide all of the services as a Level I, II, and III hospital in addition to being located within an institution with the capability to provide surgical repair of complex congenital or acquired conditions. Level IV hospitals must maintain a full range of pediatric medical subspecialists, pediatric surgical subspecialists, and pediatric anesthesiologists at the site, and facilitate transport and provide outreach education.

Overall, the AAP and ACOG have identified five aspects as being essential to the success of a regional perinatal system: 1) provide access to comprehensive perinatal healthcare services, 2) embrace a patient centered and family centered approach to health care, 3) deliver culturally and linguistically appropriate care, 4) educate the public about reproductive health, and 5) be accountable for all components of the healthcare delivery system (AAP/ACOG, 2012).

Benefits of Regionalization

Regionalization is designed to lower healthcare costs and improve patient outcomes (Richardson et al., 1995; Staebler, 2011). Potential benefits of a regionalized system of care include a decrease in service duplication, improved morbidity and mortality, decreased costs, and better utilization of limited workforce personnel (Staebler, 2011). It has been found that states with formalized regional programs achieve lower infant mortality rates (IMR, deaths before an infant's first birthday per 1,000 live births), better outcomes and resource utilization, and lower cost expenditures (Staebler, 2011).

Several studies and reviews looking at the relationship between service provision and adverse infant and neonatal outcomes have determined that appropriate level of care reduces preventable adverse health consequences, particularly for VLBW infants (Lasswell et al., 2010). While VLBW deliveries account for only 2% of births in the United States, they account for over 50% of neonatal mortality (Nowakowski et al., 2012). Well-functioning regional perinatal systems are necessary for the optimal survival of high-risk neonates (Wall, Handler, & Park, 2004). A review of 41 studies of neonatal outcomes and level of care concluded that VLBW infants born at lower levels

of care (less than Level III) were at greater odds of pre-discharge death and overall infant mortality compared to VLBW infants born at a Level III or Level IV hospital (Lasswell et al., 2010). In a study of 16,732 singleton low birth weight (LBW, <2500 g) infants born in California hospitals between 1992 and 1993, infants born in a hospital without a regional neonatal intensive care unit (NICU) had a higher adjusted risk ratio for neonatal death compared to infants born in the regional NICU hospital (Cifuentes et al., 2002).

Other studies have examined resource availability in relation to infant outcomes. In a study of 246 NICUs, Goodman et al., (2012) assessed the relationship between the ratio of neonatologist to neonatal intensive care beds and infant mortality. Greater availability of resources for neonatal intensive care was associated with lower IMR, particularly for those with LBW. A higher IMR for LBW infants born in low-resource settings could be due to LBW infants being born in hospitals with an inadequate supply of neonatologists or because of delays in initiating care due to the need to transfer the neonate to a higher-level hospital (Goodman et al., 2002).

Postnatal transport of neonates is an inferior option to delivery in an appropriate level of care. Mothers and infants who are at greatest risk for birth complications need optimal care; when complications can be foreseen, maternal transfer to subspecialty hospitals is preferred over high-risk neonate transport (Samuelson, Buehler, Norris, & Sadek, 2002). In a systematic review of global neonatal outcomes, it was found that increased neonatal transport distance increased the risk of neonatal mortality (death during the 28 days after birth per 1,000 live births). In particular, when neonates were transported for over an hour, risk of neonatal mortality

increased by 80% (Mori et al., 2007). Furthermore, the level of care at the birthing hospital is significantly more important for infant health outcomes than the level of care that is ultimately received (Cifuentes et al., 2002). Despite the prioritization of regionalized care on the national level, there is great variation from state to state in the administration and management of regionalized care systems (Blackmon, Barfield, & Stark, 2009).

"Deregionalization" Explained through Theoretical Framework

Theories of business behavior are appropriate to address issues in healthcare because healthcare provision is a structural issue that ultimately needs to be intervened at the corporate level. For example, between 1987 and 2008 the number of neonatal intensive care beds grew exponentially faster than the number of births (Berns, 2011). The number of beds increased as community based NICUs increased across the country as a result of an increase in neonatologists, acceptance of the neonatal nurse practitioner role, and technological advancements (Berns, 2011). The growth in NICUs occurred with no relationship to the percentage of high-risk infant births (Committee on Fetus and Newborn, 2012; Howell et al., 2002). The ability to add services enabled hospitals to begin competing for obstetrical and neonatal patients, effectively making the switch from a regionalized system of care to a more competitive model (Staebler, 2011).

This competitive model can be assessed using Michael E. Porter's theory of business behavior known as the Five Forces Framework (Porter, 1979). Michael Porter, a Harvard Economist, developed this framework to explain how industries develop a competitive advantage through the interaction of five forces. The Five Forces are 1)

competitive rivalry between suppliers, 2) threat of new market entrants, 3) bargaining power of buyers, 4) power of suppliers, and 5) threat of substitute products (including technology change) (Porter, 2008). All five forces act together to define an industry's structure and the degree of competition within an industry; the five forces differ in strength by industry, and the strongest force or forces is the most important in terms of profitability and strategy (Porter, 2008).

Pines (2006) utilized the Five Forces Framework to gain an understanding of the role of emergency medicine in the healthcare marketplace. Emergency medicine is comparable to perinatal care as both play a complex necessary role in the healthcare system and both have experienced similar changes such as an increase in specialists and an increase in technologies (Pines, 2006; Staebler, 2011).

When assessing the regionalization of perinatal care using this framework, rivalry between the suppliers -- in this case between the hospital perinatal centers -- is at the center of the current situation, with the other four components feeding into how competitive the system is (See Figure 1). Competitive Rivalry describes the strength and intensity of the competition and is mainly influenced by the number of rivals, balance between the rivals, level of differentiation between the rivals, brand identity, and procedural complexity (Sumpio, 2012).

Leading up to this situation, the threat of new market entrants was one of the strongest forces in moving perinatal care from a regionalized to a competitive model. In terms of regionalization, new market entrants posed threats as more NICU's were formed and existing perinatal centers upgraded their equipment and personnel. When the number of hospitals with NICUs began to increase, business was taken away from

regional centers and subsequently increased competition (Staebler, 2011). This is problematic as growth has primarily occurred among smaller than optimal NICUs rather than in the expansion of optimally sized NICUs (Sumpio, 2012). This has implications for infant health outcomes as infants born in higher-volume NICUs have better survival rates than those born in lower-volume NICUs (Sumpio, 2012).

Bargaining power of buyers is the impact that purchasers -- in this case pregnant women and large third-party intermediaries such as insurance companies, corporations or federal or state government -- have on the industry (Pines, 2006). Buyers have a lot of power if there are few of them, the products being purchased are standardized and if the buyer faces few costs in changing suppliers (Porter, 2008.). Pines (2006) argues that there is a monopoly in healthcare because there are so few buyers. Moreover, the large third-party intermediaries work with hospitals to form payment deals called bundled billing (Lally, 2013). Bundled billing combines all services provided during a defined period of care into one fixed rate, giving the buyer even more power and resulting in the hospital feeling the need to provide all aspects of care even when it may not be appropriate to do so (Lally, 2013).

The Power of Suppliers is the power that the industry itself has to raise prices, limit services, or shift costs away from themselves (Porter, 2008). If a supplier has the ability to alter the price of services and drive up prices, they have power (Sumpio, 2012). In regards to perinatal care, hospitals themselves have little power to alter prices and pricing and payment is often in the hands of the large third party intermediaries. In the case of perinatal regionalization, however, hospitals have an incentive to overstate their care, increasing their competitive advantage in that manner.

Threat of substitute products is the threat that occurs when substitute products or services take the place of existing products or services (Porter, 2008). Within the hospital system, the threat of substitution is high. For example, advancement in technology allowed more hospitals to claim to be able to care for high-risk infants and an increase in physician extenders, such as physician assistants, enabled hospitals to hire more staff at a low cost (Staebler, 2011). Ultimately, the advancement in technology and increase in trained medical practitioners allowed lower level hospitals to provide more advanced care, creating competition between the regional perinatal centers and other birthing hospitals and effectively deregionalizing perinatal care (Staebler, 2011). As previously mentioned, it is ultimately the volume of care that a hospital provides, rather than the level of care, that enables them to best care for infants, particularly high-risk infants (Howell et al., 2002). Therefore, the benefits of regionalization lie in the fact that a regionalized system of perinatal care organizes a coordinated system of perinatal services within a defined geographic region and concentrates rare cases and centralizes expensive technologies to a few locations where providers are able to develop expertise (Howell et al., 2002).

The demographics of where high-risk infants are born were altered when perinatal care shifted to a more competitive model and we now see significant variations in mortality based on birthing hospital, rather than level of care (Staebler, 2011). High-risk babies need to be born in hospitals that deliver a high volume of high-risk babies as well as in the highest level of care in order to achieve improved neonatal outcomes (Howell et al., 2002; Neogi, Malhotra, Zodpey, & Mohan, 2012).

As a result of "deregionalization," in 1993 The Committee on Perinatal Health

published Towards Improving the Outcome of Pregnancy II (TIOP II) in which the focus was to provide care before and during pregnancy, care during birth and beyond, data documentations, evaluation and financing (Little & Merenstein, 1993). In this document, the importance of regionalized care was emphasized, and the operational definition of perinatal care was expanded to include preconception through the post neo-natal period. Moreover, it was argued that perinatal care directly impacts life long after birth (Little & Merenstein, 1993). Regionalization is one proven system of facilitating birth in appropriate level facilities, and therefore it is crucial we begin the shift back to a regionalized system of care (DPH, 2013).

Barriers to Successful Regionalization

A number of barriers prevent successful regionalization of perinatal care including physical, financial, and political barriers. Bronstein et al. (2011) describes perinatal regionalization as the consequence of a primary obstetrics provider needing to interact with a pregnant woman who needs services for a high-risk infant. Thus, perinatal regionalization is a physician referral behavior that is based on the decision whether to refer a patient and to whom. Whether to refer a patient requires that the physician evaluate his or her own expertise. The problem is that obstetric providers do not consistently view high-risk pregnancies in the same way that neonatology providers do (Bronstein et al., 2011). As a result, it is not always clear to the obstetric provider when the delivery is beyond his or her expertise. The delivery may not be beyond the provider's expertise per se, but it may be beyond that of his or her institution. Yet, the provider may have difficulty distinguishing the quality signals as to which settings are truly equipped to care for the high-risk neonate (Bronstein et al., 2011).

Factors making perinatal regionalization difficult to implement stem not only from the complexities of physician referral behavior, but also from factors seen through the lens of the patient. Convenience in terms of time and distance traveled are essential determinants of hospital choice and referral completion. Hospital choice and referral completion can be difficult decisions for patients, particularly those with transportation and monetary limitations. While it is expected that women who realize they are at high-risk or are in preterm labor would comply with a provider referral, there are cases when this advice is not followed (Adams, Mahowald, & Gallagher, 2003; Oberman, 2000; Samuels, Minkoff, Feldman, Awonuga, & Wilson, 2007). The reasons as to why such obstetric advice is not followed may be associated with lack of understanding, disagreement between the provider and patient, feasibility, preferences or a sundry of other explanations. Identifying these reasons for not following through on a referral informs the process to eliminate the barriers to regionalization and subsequently reduce the number of sick infants who are delivered and cared for in smaller, often rural, nurseries (Hall, Hall-Barrow, & Garcia-Rill, 2010) Transportation and distance are important barriers to accessing the appropriate level of care, particularly for rural, low-income women (Hogue & Vasquez, 2002; Samuelson et al., 2002).

Another important barrier to the success of regionalization is the current system of healthcare reimbursement. There are often financial incentives for providers to deliver in lower levels of care and transport post-delivery (Hogue & Vasquez, 2002). The majority of births in the US (98.7%) take place in hospitals (Lally, 2013). There are two methods for service reimbursement: fee-for-service, in which the hospital is able to bill for each individual service, and bundled payment, in which a flat rate is charged for

all services provided. It has been thought that bundled payment is beneficial to delivery outcomes because, as Lally (2013) posits, it results in fewer unnecessary invasive services, such as caesarean sections, that are costly and can be harmful to both mother and baby. However, because bundled billing payment for obstetric care is generally tied to prenatal care, instead of a separate charge for prenatal care, there is an incentive for hospitals to deliver women regardless of whether they can provide an appropriate level of care for their risk status.

Lastly, the regionalization model in the United States is weakened by the differences in definitions of levels of care between and within states (Little, 2009). In an extensive review of all 50 states and the District of Columbia, only 33 states were found to have clear definitions and designations of levels of care while another 14 had only vague guidelines and for three states there were no designations at all (Blackmon et al., 2009). The number of levels varied greatly from state to state, ranging from 2 to 6 (Blackmon et al., 2009). Further, states use a variety of systems such as self-designation, peer-review, or volume-based measurement to classify hospitals at a specific level of care (Nowakowski et al., 2012).

Consequences of a Lack of Regionalization

A lack of consistent regionalization may explain why IMRs have remained consistently high in the United States, relative to similarly developed countries, despite advancements in knowledge and technology in perinatal and neonatal medicine (Thompson, Goodman, & Little, 2002). The United States currently ranks 55th in the world for IMR, just behind Lithuania and Serbia, at 6.17 deaths per 1000 live births (The World Factbook, 2014). The poor IMR in the US is occurring even though, when

compared to similarly developed countries, the US spends more on health care, has a more highly specialized neonatal workforce, and a growing number of neonatal intensive care units (Thompson et al., 2002).

One measure of assessing the success of a regionalized system is to measure the percentage of VLBW infants born in a Level III or higher designated hospital. Higher percentages of VLBW infants born in Level III or higher hospitals indicate greater success of the regionalized system (Nowakowski, 2012). One goal of Healthy People 2020 is to increase the proportion of VLBW infants born at Level III hospitals from 75% (2003-2006) to 83.7% (Healthy People 2020, 2013). California hospitals in the early 2000's had already approached this level; 80% of their VLBW deliveries occurred in Level III or IV hospitals (Rogowski, 2004).

One way to lower the IMR in the United States as a whole is to identify hotspots where infant mortality and rates of VLBW are highest and prioritize these locations (Yang & McManus, 2010). IMRs vary greatly from state to state and there is even greater variation within some states.

Georgia's Infant Health Outcomes

By the Healthy People 2020 goal – and assuming that hospital levels are accurately applied to Georgia's hospitals – Georgia is doing fairly well vis-à-vis delivery of VLBW infants in Level III or higher hospitals. In 2012, 79.2% of VLBW infants in Georgia were born in Level III hospital. (Data provided by the MCH Epidemiology Division, DPH). However, this overall rate masks issues in rural Georgia that drive up infant mortality there. Both site of delivery and delivery outcomes vary by geography: women living in or adjacent to a county which contains a Level III hospital are likely to

deliver at the appropriate level of care, whereas women living in rural counties without a hospital are less likely to deliver VLBW infants at a Level III or higher hospital (Hogue & Vasquez, 2002)

In 2013, Georgia's IMR overall was 6.7 per 1,000 live births (OASIS, 2014). These rates also vary dramatically across the state, with the highest rates occurring in rural counties, specifically in Central Georgia (Yang & McManus, 2010). For example, the IMR in the Albany Perinatal Region is 12.0 per 1000 live births while in the Atlanta Region it is 6.1 deaths per 1,000 live births (OASIS, 2014). Using upper level set scan hotspot detection, Yang & McManus (2010) found that among the 159 counties in Georgia, 52 counties experience both high infant mortality and a high rate of low infant birth weight. Targeting these areas to improve birth outcomes through regionalized perinatal care could improve IMR in not only Georgia but in the United States as a whole.

Regionalization in Georgia

Georgia is divided into six regions, including the cities and surrounding areas of Albany, Atlanta, Augusta, Columbus, Macon and Savannah. The DPH has designated one Level III hospital in each region to be the regional perinatal center (Figure 2). Designation of an RPC is based on regional need and available funding (DPH, 2013). Georgia is, however, a self-assessment state. That is, a hospital's level of care is designated based on its own assessment, and there are no systematic checks to ensure hospitals are accurately self-assessing (Strobino et al. 2000). Hospitals in Georgia are defined according to three levels of care: Basic, Specialty, and Subspecialty. The capabilities of basic hospitals are highly limited while specialty refers to hospitals with a specific neonatal component and subspecialty refers to hospitals with the capability to

provide services above and beyond special procedures (Strobino et al. 2000). These guidelines are not up to date with the Guidelines for Perinatal Care established by the AAP and ACOG in 2012.

Research Aim and Hypothesis

A thorough literature review has found no research correlating current level designation with guidelines to define levels in Georgia. This study aims to evaluate whether there is a discrepancy between recorded level of care and actual level of care in Georgia´s perinatal capacity hospitals in order to adequately address neonatal and infant mortality in the state. It is hypothesized that not all recorded hospital perinatal level designations will agree with reported hospital perinatal level designations as determined by a quantitative cross-sectional survey.

CHAPTER III: METHODS

Stakeholder Identification

The primary intended user of this project is the DPH. However, the DPH is limited without increased regulatory power. Policy and lawmakers, including the Office of the Governor and state legislators in the state of Georgia need accurate information on how they can and should facilitate perinatal care through regulating level designation. Currently, there is little oversight and no penalty for noncompliance with transfer guidelines. Regulatory power and adequate funding would allow the DPH to incentivize and oblige hospitals to comply with the guidelines as defined by the AAP and ACOG. This project will serve as a source of information for policymakers and lawmakers.

Another set of stakeholders is the 84 birthing hospitals in Georgia. A functioning regional system would impact hospitals financially, in quality of care and in hospital best practices and protocols. The literature has shown both reductions and increases in costs for hospitals in different studies of regionalized models, and clear definitions of designated levels may also impact hospital marketing.

The AAP, ACOG, and the Georgia Obstetrical and Gynecological Society are also important stakeholders as civil society groups. The AAP and ACOG set the guidelines for the highest standard of perinatal care and thus both advocate for and disseminate these guidelines to hospitals and professionals. The Georgia Obstetrical and Gynecological Society represents practicing obstetricians and gynecologists and will be an interested group in any regulation that will affect their workplaces and reimbursements.

Additionally, Medicaid and private insurers are important stakeholders in regionalization. Medicaid pays for 47.4% of births in Georgia (Curtin et al. 2013). As the current system of bundled reimbursement is an important barrier to a functioning regional system (Bronstein et al, 2011), Medicaid and private insurers have the power to change their system of reimbursement, reimbursing separately for prenatal care and delivery. They could also choose to refuse to reimburse for deliveries that are determined not to have been properly referred prior to delivery or not to have been transferred when complications arose for which the facility was not adequate to manage. Further, optimizing quality of care through a functioning regional model is likely to decrease overall costs to Medicaid and private insurers.

Finally, women in Georgia deserve quality perinatal care. Currently, urban women are far more likely to deliver in the appropriate level hospital than rural women. As discussed, this has dangerous health implications for rural-born infants. A functioning regionalized system would facilitate access for rural women through clear transfer guidelines and support.

Pilot Test

The DPH collaborated with a team of Maternal and Child Health Certificate MPH students from Emory University's Rollins School of Public Health, "The Perinatal Team," to redesign a survey aimed at evaluating hospital perinatal capacity levels for all 84 perinatal care hospitals in the State of Georgia in early 2014[1]. The original 13-page instrument was created in 2010 by the DPH and required input from various sources,

[1] Since the survey was planned, some of the 84 hospitals no longer offer delivery services.

including but not limited to: administrators, nurses and physicians in both the obstetrical and neonatal departments. The original questionnaire was pilot tested first at Northside Hospital and later at another hospital; however, further distribution was precluded by the facilities' difficulties in completing the survey. The Perinatal Team was asked to revise the original questionnaire to increase ease of administration as well as incorporate the revised perinatal levels of care guidelines that had been published in 2012.

Care was taken to create questions that were clear and easy to comprehend; hence "double-barreled" questions (questions which asked about two or more pieces of information at once) were eliminated and technical terms were defined. In addition, question order, transitions, and instructions were carefully constructed to facilitate responses. A "survey champion" component was added to the survey with the intent that this individual would be held accountable for making certain that the survey was completed and returned in a timely manner.

Due to the complexity and significance of this survey, it was necessary to pilot test the modified version. The survey was produced in paper form and distributed to four hospitals for piloting by the DPH. The four hospitals represented various levels of perinatal capacity (two Level III's, one Level II, and one Level I) to determine if the new tool would be feasible to complete across the facilities. Each pilot survey champion received one or more follow-up phone calls to remind and incentivize rapid survey completion. Each section was to be completed by the most knowledgeable staff member to ensure accuracy and reliability of reporting. A 50% response rate was achieved, and the survey was deemed feasible for further distribution.

Final Data Collection Instrument

The piloted instrument was modified to include an "other availability" category within the staffing questions and several questions were adapted to an online survey. Please see Appendix I for the final Georgia Perinatal Capacity Survey. The final document is extensive (25 pages) and was produced in both paper and online form, using Survey Monkey for the respondents who chose to complete the survey online. The survey consists of 83 multiple choice and open-ended questions divided into four sections. Topic areas covered are I: Designation of Level of Care, II: Admissions and Utilization, III: Staffing in the 2013 Calendar year, and IV: Transport.

The only difference between the paper and online survey versions is that with the online version, respondents were sometimes forced to give only one answer to a question and the online version utilized skip logic. A mix of questions were designed to distinguish Levels I, II, III, and IV. Hospitals were asked to provide data for the 2013 calendar year (or most recent calendar year with data available. If another year was used, the hospital was asked to state which year.). A cross-sectional survey design is appropriate for this study as the objective is to elucidate the hospitals' current level of care.

Survey Algorithm Development

An algorithm was developed alongside the survey to classify respondent hospitals with one of the four levels of care (Please refer to Appendix II). The specific requirements for each level of care were taken directly from the Guidelines for Perinatal Care (2012) Table 1-3, "Definitions, Capabilities, and Health Care Providers Types: Neonatal Levels of Care." It is possible not all hospitals will fall into one of the

four levels of care; therefore, a fifth level representing inadequate perinatal capacity, Level 0, was included as a means to classify hospitals who do not meet all of the criteria to be considered a Level I hospital.

Not all capabilities in Tables 1 – 3 were included in the survey and algorithm, and some narrative in the document led to questions that were included in the algorithm. These include:

Level I - Family physicians, nurse practitioners and advanced practice registered nurses were not included in the algorithm; to meet the minimum qualifications to be a Level I, hospitals need only have general pediatricians available by 24-hour on-call coverage or on-site coverage, and have registered nurses available in the neonatal unit.

Level II – To be considered a Level II, hospitals need pediatric hospitalists or neonatologists available by 24-hour on-call coverage or on-site coverage. Additionally, they need at least one type of the following nurses available by 24-hour on-call coverage or on-site coverage: advanced practice registered nurse, pediatric nurse, or neonatal nurse. Respiratory therapists were added based on the description on page 14 of the Guidelines for Perinatal Care (2012) description of Level II Neonatal care.

Level III – "Magnetic resonance imaging" was removed from the advanced imaging section, and pediatric medical subspecialist was removed from the list of required healthcare provider types.

Level IV – Data collection was added as regional hospitals are expected to do this.

Survey questions provided information on these specific indicators. In order to meet the requirements for a level of care, a hospital must meet all of the indicators for

that level and any lower levels. For example, to be considered a Level III hospital, a hospital must meet all of the indicators for a Level III, Level II and Level I hospital.

Survey Distribution

The DPH's Regional Perinatal Center (RPC) Coordinator sent an email to both the Neonatal Outreach Coordinator and the Maternal Outreach Coordinator at each of the 6 RPCs. This email described the purpose of the survey and asked them to send a letter to the hospitals in their region requesting participation in the survey. The RPCs were aware that the purpose of the survey was to compare designated level of perinatal care with true level of perinatal care; however, all other hospitals were blinded to the purpose of the survey. Surveys were distributed on June 23rd 2014 and were collected until and throughout the month of August 2014. After the RPCs sent out the survey to their regional hospitals, two people from the DPH followed up with the hospitals via phone and email to encourage response.

Study Sample

Surveys were distributed to all 84 hospitals believed or known to have perinatal capacity. Hospitals that indicated that they had ceased providing deliveries or did not indicate their self-designated level of care were excluded from the analysis.

Statistical Analysis

Level of Care

Paper and electronic surveys were collected and entered into an Excel file by the DPH and transmitted to Emory. The Emory principal investigator entered data into IBM's SPSS, version 19.0, to conduct data analyses including running descriptive statistics (i.e. frequencies and cross-tabulations) and for determining the number and

distribution of hospitals practicing at each level of care. The DPH provided their recorded care level, and the hospitals provided the level of care at which they believe they are currently functioning (survey-stated level). Cohen's weighted Kappa was run to determine if there was agreement between the level of care that the DPH has on record and the survey-stated level of care. For this analysis the levels compared were Level I, Level II, Level III, and Level III-R (regional).

To determine the hospital's functioning level of care according to the Georgia Perinatal Capacity Survey, descriptive statistics (i.e. frequencies) were run for each variable in the algorithm. This provided information regarding the occurrence of each indicator associated with each level of care. The algorithm was then applied to each hospital, and hospitals were given a survey-designated level of care that corresponds with the highest level of care for which they met all indicators.

Additional Cohen's weighted Kappa's were run to determine if there was agreement between the level of care that the DPH has on record and the survey-designated level of care and between the survey-stated level of care and the survey-designated level of care. For these analyses, the levels compared were Level 0, Level I, Level II, Level III, and Level IV (DPH's Level III and Level III-R were collapsed to all be considered Level III).

VLBW Deliveries

To assess the percentage of VLBW infants born at and within the appropriate level of care, descriptive statistics (i.e. frequencies and cross-tabulations) were run to determine the number of total deliveries at each hospital and the number of VLBW deliveries at each hospital. Hospitals were grouped by survey-designated level of care,

and the number of VLBW infants born at each level was determined. A standard 2 x 2 table was created to examine the percent of VLBW infants born at and within the appropriate level of care (Level III) for both the DPH-designated level of care and the survey-designated level of care.

Hospital Transfers

Descriptive statistics (i.e. frequencies) were run to determine the number and level of hospitals that accept high-risk antenatal and high-risk neonatal transfers for both the DPH-designated level of care and the survey-designated level of care.

CHAPTER IV: RESULTS

Perinatal Level Designations

Fifty-eight (69%) of the 84 surveys were returned, including those collected in the pilot phase. Fourteen hospitals completed the paper version, and 44 used Survey Monkey. One hospital was removed from the data analysis for replying "unknown" to question 4, "Current Perinatal Care Designation," resulting in a total study sample of 57 (68%) facilities.

Of the 84 hospitals in the sample, the DPH has 32 (38.1%) on record as Level I hospitals, 25 (29.8%) as Level II hospitals, 21 (25.0%) as Level III hospitals and 6 (7.1%) as Level III-Regional perinatal centers. Survey responses were similar for state-designated Level I hospitals (22 or 38.6%), lower for Level II (14 or 24.6%), and higher for Levels III (15 or 26.3%) and Level III-Regional perinatal centers (all 6 reporting) (Table 1).

Hospitals' self-designated classifications included 21 (36.8%) Level I, 14 (24.6%) Level II, 14 (24.6%) Level III and 8 (14.0%) Level III-Regional perinatal center (Table 2). A weighted kappa revealed there was almost perfect agreement between DPH and self-designated hospital level designation $\kappa = .805$ (Table 3). Kappa scores range from 0 to 1, with 1 being perfect agreement and 0 being no agreement.

With respect to survey-designated levels, the frequency distribution of met perinatal level indicators by each level of care can be seen in Appendix III. The survey indicated that 4 (7.0%) hospitals are practicing at a Level 0, 28 (49.1%) hospitals are practicing at a Level I, 20 (35.8%) of hospitals are practicing at a Level II and 4 (8.8%) hospitals are practicing at a Level III (Table 4). Agreement between the level of care

that the DPH has on record and the survey-designated level of care is poor, weighted κ = .239 (Table 5). 30 (52.6%) are practicing one level below the DPH-designated perinatal care level, including 4 at an inadequate perinatal capacity (Level 0), 10 at Level I when DPH has Level II, and 16 at Level II when DPH indicates Level III (Table 6). Given the agreement between DPH designation and self-designation, unsurprisingly there was also very little agreement between the survey-stated and the survey-designated level (weighted κ = .197, Table 7).

VLBW Deliveries

Thirty-nine (68.4%) of the hospitals that completed the survey provided data for both their total number of deliveries and their total number of VLBW deliveries. When observing the DPH-designated level of care, the percent of VLBW infants delivered at the appropriate level of care (Level III) is 83.9%; however, the percent of births at a Level III hospital that are VLBW is 2.6% (Table 8). There is a dramatic difference in percentage of VLBW infants delivered in survey-designated Level III hospitals (15.8% compared with 83.9% for DPH-designated Level III hospitals). Among survey-designated Level III hospitals, 8.8 percent of births are VLBW (Table 9).

Antenatal and Neonatal Transfers

Fifty-four hospitals (94.7%) indicated whether they do, or do not, accept high-risk antenatal and high-risk neonatal transfers. Eighteen hospitals reported that they do accept high-risk antenatal transfers (Figure 3). According to the DPH-designated level of care three Level II and 15 Level III hospitals accept high-risk antenatal transfers. According to the survey-designated level of care, two Level I, 13 Level II, and 3 Level III hospitals accept high-risk antenatal transfers.

Nineteen hospitals reported that they accept high-risk neonatal transfers (Figure 4). According to the DPH-designated level of care two Level II and 17 Level III hospitals accept high-risk neonatal transfers. According to the survey-designated level of care, one Level I, 13 Level II and 5 Level III hospitals accept high-risk neonatal transfers.

CHAPTER V: DISCUSSION

Interpretation and Implications

The goal of the present study was to determine if hospitals in Georgia are functioning at their current perinatal level designation. This goal was addressed by assessing hospitals on the two dimensions mentioned in the AAP and ACOG guidelines: Capabilities and Staffing. Capabilities refer to the services the hospital provides and staffing refers to the personnel available to render those high quality services. As hypothesized, 30 (52%) of the hospitals that completed the Georgia Perinatal Capacity Survey are practicing below the DPH-designated level. All hospitals with inaccurate level designations were practicing at one level below their recorded level of care. This has serious implications for service provision as this indicates that the DPH believes that Georgia's hospitals are practicing at a higher-level than they actually are. This could result in deliveries taking place in hospitals that are not equipped to care for the newborn, an inappropriate antenatal transfer to hospitals incapable of caring for the mother and baby, an increase in neonatal transfers, and subsequent adverse health outcomes. This is of particular concern in a rural state such as Georgia where smaller than optimal NICUs can be designated as a higher-level hospital based on services or staff capabilities, yet they do not have the volume of deliveries needed to optimize care.

The DPH aims for every birth to take place in the appropriate level of care (DPH, 2013). According to the survey-designated level of care, Georgia is far from reaching the Healthy People 2020 goal to have 83.7% of VLBW infants born in a Level III or greater facility (Healthy People 2020, 2013). According to the survey, only 15.8% of VLBW deliveries are occurring in a Level III facility. However, when we look at the

percent of VLBW deliveries in Level III facilities, compared to other deliveries in Level III facilities, we see that 8.8% of the births within a Level III facility were VLBW while 1.8% of births in lower-level facilities were VLBW. There are a few potential explanations for this; one is that lower level hospitals are pushing for VLBW infant to be born in Level III facilities and are therefore referring mothers to those facilities to give birth. A more likely explanation, however, is deliveries of VLBW infants cluster in urban areas, such as metro Atlanta, where they are more likely to be born in a Level III facility (Hogue & Vasquez, 2010).

A successful regionalized system involves both transfers of high-risk mothers and transport of high-risk neonates. Health outcomes are dependent on the effectiveness of hospital transport systems as at-risk mothers and sick newborns need to be cared for in the highest-level facility (Lupton & Pendray, 2004). In a successful regionalized model, transfer happens from a lower level of care to a higher level of care when the mother or infant is at risk for health complications. According to the survey, lower-level hospitals are accepting high-risk antenatal and neonatal transfers, which may be contributing to Georgia having the highest maternal mortality rate and a higher than average infant mortality rate when compared to other states.

Hospital's Self-Assessment of Level Designation

Hospitals were asked to indicate their understanding for the basis of their current level of designation in an open-ended question. Typically, hospitals had an accurate response, often citing lack of higher-level providers, equipment, or capabilities as their reason for being their stated level. One hospital that said they are currently a Level II hospital cited as the reason that they "Meet requirements for Level II as

stipulated in the Georgia Perinatal Care Guidelines and Guidelines for Perinatal Care ACOG/ AAP." However, according to the survey, this hospital missed several Level II indicators and was therefore determined to be a Level I hospital. This hospital indicated that they do not have a neonatologist or pediatric hospitalist available regularly, nor did they have any higher-level neonatal nurses available regularly. While this could have been an error on the part of the individual completing the survey, it is indicative that hospitals do not have an accurate understanding of level designation or of the AAP/ACOG guidelines.

Limitations

This study is limited by the use of self-reported data that may be inaccurate and lead to bias associated with misclassification error. Also, it was assumed that all missing data are missing at random; however, it is likely that in some situations the data are missing because the provider filling it out did not collect or could not locate the information. Therefore, it is possible that hospitals may have actually met indicators that were left blank. Moreover, we were not able to verify the accuracy or validity of the given responses. Other potential threats to internal validity include recall bias and acquiescence (the tendency to provide affirmative answers). Additionally the numbers of deliveries, transfers and/or transports may be underestimated or overestimated because the respondents do not accurately recall the events in question.

Another limitation of the study is that selection bias may have occurred during data collection; there may be differences between the hospitals that did, and did not, complete the survey. Of the 27 hospitals that did not complete the study, the DPH designates 10 as Level I hospital, 11 as Level II, and 6 as Level III. The lower level

hospitals may not have completed the survey because they may not have had the available staff and resources to do so.

Lastly, the survey was lacking indicator questions for some of the indicators that the AAP/ACOG Guidelines for Perinatal Care (2012) included in their description of capabilities at each level. However, the algorithm captured data on equipment and staffing, which we believe accurately reflect the hospitals' current level of care.

Recommendations for the Georgia Department of Public Health

The results of this study demonstrate a need for further evaluation of Georgia's perinatal hospitals. According to the survey-designated level of care, there are only five hospitals in the state practicing with Level III capabilities; however, Georgia is divided into six Perinatal Regions. This indicates that it is highly probable that at least one region of the state does not have an adequate Level III hospital. The DPH should prioritize efforts to ensure that the supposed Level III Regional Perinatal Center in each region be fully functioning as a Level III hospital.

I recommend that a report be sent to each hospital giving them their survey-designated level and detailing what they would need with respect to equipment and staffing to move to the next level. In order for a system of regionalization to be successful it is critical that all hospitals know their level as well as the level of other hospitals in their region, and for each hospital to be fully functioning at their designated level of care. Additionally hospital perinatal designation information should be readily available to the public and other interested parties to ensure transparency and to assist families and providers in selecting the appropriate level of perinatal care. This transparency is consistent with a larger aim encompassing the education of all

stakeholders into the goals and process of regionalization. Outreach education needs also to be implemented between the regional perinatal centers and the other birthing hospitals within their region, and transport systems need to be established in order for deliveries to take place in the most appropriate hospitals.

To ensure accuracy of reporting of the hospitals, data collection must include annual reports and other sources of hospital statistics. The CDC-developed LOCATe tool, an online survey that the CoIIN Strategy has field tested in several states, including Oklahoma and North Carolina, may be a viable way to achieve this. Currently, Georgia is participating in CoIIN yet the LOCATe tool has not been field- tested in the state. Participation with the LOCATe tool would involve not only using the validated instrument but also receiving the support of the AAP. The AAP has entered into a partnership with CDC to implement the LOCATe tool and conduct onsite testing of hospitals that show discrepancies between self-designated level of care and survey-based level of care.

Because of the difficult nature in assessing hospital capabilities I recommend an onsite assessment of the individual hospitals by a well-trained interdisciplinary team, such as that of the AAP. This comprehensive assessment will act as a better judge of the value of certain services. And, it would facilitate the development of the sharing of best practices. Further I recommend periodic on site verification surveys/evaluations be put in place to continue, suspend or revoke the perinatal classification as well as the development of a mechanism by which to enforce adherence to the Georgia Perinatal Guidelines to ensure that hospitals care for those mothers and neonates for which they are qualified.

Furthermore, it would be beneficial to make collection of quality indicators a routine part of perinatal care by creating a tracking and monitoring system to record where VLBW infants are being born across the state and what their health outcomes are at each place of birth.

Reversing "Deregionalization"

Using Porter's Five Forces to identify the various inputs for competition into the system of regionalization helps us to understand the driving forces behind the deregionalization of care. Gaining a thorough understanding of what causes competition is an essential step in moving back to a regionalized model. Given the analysis of the Five Forces, one solution to the problem maybe to set policy in place prohibiting smaller, rural hospitals from developing NICUs. Since the initial introductions of Porter's Five Forces in 1978, several businessmen and researchers have proposed a "sixth force." This sixth force is typically described as the government's ability to create, or restrict, barriers to competition. In the case of perinatal regionalization, the government has the ability to enforce regionalization and create policy that would enable a strong system of regionalization be established and maintained.

Georgia's current state of deregionalization has been developing since the 1980s. Currently, many hospitals that lack expertise but are willing to provide care, deliver babies that need to be referred to higher levels of care. Importantly, the hospital that delivers the baby and the hospital the delivery should have been referred to often have the same level designation, complicating matters even more (Hein, 2004). Hein (2004) outlines several solutions to this problem including outreach education and

establishment of guidelines by the departments of public health that clearly label the accurate perinatal care level. Hein (2004) also suggests that third party payers be required to inform hospitals of the level of care of hospitals they are using for referrals. This last point, he suggests, will help to protect and preserve the system. Another potential solution to protect the system of regionalization would be for the Georgia legislature to direct Medicaid to examine its funding policy and make appropriate modifications to eliminate the disincentives for maternal transfer that are associated with payment. Currently, Medicaid utilizes bundled billing for reimbursement and thus hospitals are discouraged from transferring women even when it is appropriate to do so.

To develop a strong transport system it may be beneficial for RPCs to investigate the current barriers to transportation in Georgia and develop and test approaches that may increase the ease of which a pregnant woman is transferred to the most appropriate hospital for delivery. Additionally, because antenatal triage will not always be perfect, it is essential to have a well functioning neonatal transport system to ensure high-risk infants receive the appropriate level of care. Lupton and Pendray (2004) outline the most useful principles for the best provision of transport including identifying problems early, optimizing communications, providing transport expertise, providing adequate newborn stabilization, ensuring the transport trip contains no surprises and is smooth and controlled.

Overall, regionalization in the United Stated could be improved by uniformly classifying facilities with clear definitions of requirements for equipment, staffing, capabilities, coordination of services and education.

Concluding Remarks

Since initially proposed in 1976, the importance of a well-defined system of regionalized perinatal care has been consistently shown in order for public health to improve neonatal outcomes (Committee on Fetus and Newborn, 2012). With a well-coordinated regionalized system of care, we expect to find reductions in the following indicators including a few from the Healthy People 2020 goals - VLBW infants born at Level I and II hospitals, infant mortality and maternal mortality. Well-coordinated regionalization also results in a reduction of variance in the process and outcomes of delivery. Further, it increases the understanding of regional and local needs. Such a system fosters transparency and aggregate data sharing to promote high quality care. Of equal importance is the expansion of health literacy for patients and their families within the short term, intermediate and long-term outcome and events.

These data provide a unique insight into Georgia's current perinatal health system, as there have been no prior studies assessing the level of care at which hospitals are currently practicing. If the given recommendations are implemented, the system of regionalization and infant health outcomes could be improved in Georgia. While the results of this study are not generalizable to other states, the methods of data collection are as this survey was developed from the Guidelines for Perinatal Care (2012), which apply to all states. Similar studies should be implemented in other states with the aim of strengthening regionalization and lowering IMRs across the United States.

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TABLES

Table 1. Hospitals Providing Delivery Services in Georgia, Early 2014, by DPH-Designated Perinatal Care Level and by Whether They Responded to the Perinatal Care Survey

Level	Total delivering Hospitals in Georgia, early 2014 (%)	Hospitals responding to the Perinatal Care Survey (%)
Level I – Basic Care	32 (38.1%)	22 (38.6%)
Level II – Specialty Care	25 (29.8%)	14 (24.6%)
Level III – Subspecialty Care-Neonatal Intensive Care Unit	21 (25%)	15 (26.3%)
Level III – Regional Perinatal Center	6 (7.1%)	6 (10.5%)
Total	84 (100%)	57 (100%)

Table 2. Hospital Self-Stated Perinatal Level

Level	N (%)
Level I – Basic Care	21 (36.8%)
Level II – Specialty Care	14 (24.6%)
Level III – Subspecialty Care- Neonatal Intensive Care Unit	14 (24.6%)
Level III – Regional Perinatal Center	8 (14.0%)
Total	57 (100%)

Table 3. Agreement Between DPH-Designated and Survey-Stated Perinatal Level Designation

	Level I	Level II	Level III	Level III - R	
Level I	19 (86.4%)	3 (14.3%)			
Level II	3 (13.6%)	11 (78.6%)			
Level III			13 (86.7%)		
Level III - R			2 (13.3%)	6 (100%)	
Total	22 (100%)	14 (100%)	15 (100%)	6 (100%)	57 (100%)

Columns: DPH Recorded hospital perinatal level designation
Rows: Survey-Stated hospital perinatal level designation
Kappa score: .805

Table 4. Survey-Designated Hospital Perinatal Level

	N (%)
Level 0 – inadequate perinatal capacity	4 (7.0%)
Level I – well newborn nursery	28 (49.1%)
Level II – special care nursery	20 (35.8%)
Level III – neonatal intensive care	5 (8.8%)
Level IV – regional neonatal intensive care	0 (0%)
	57 (100%)

Table 5. Agreement Between DPH-Designated and Survey-Designated Perinatal Level

	Level 0	Level I	Level II	Level III	Level IV	
Level 0		4 (18.2%)				
Level I		18 (81.8%)	10 (71.4%)			
Level II			4 (28.6%)	16 (76.2%)		
Level III				5 (23.8%)		
Level IV						
Total		22 (100%)	14 (100%)	21 (100%)		57 (100%)

Columns: DPH-Designated hospital perinatal level designation
Rows: Survey-Designated hospital perinatal level designation
Kappa score: .239

Table 6. Discrepancies Between DPH-Designated and Survey-Designated Perinatal Level

	Survey Level 0	Level I Agreement	Survey Level I	Level II Agreement	Survey Level II	Level III Agreement	Survey Level III	Total
Level I	4	18						22
Level II			10	4				4
Level III					16	5		21

Columns: Survey-Designated hospital perinatal level by agreement with DPH-Designated hospital perinatal level
Rows: DPH-Designated hospital perinatal level designation

Table 7. Agreement Between Self-Stated and Survey-Designated Perinatal Level Designation

	Level 0	Level I	Level II	Level III	Level IV	
Level 0		4 (19.0%)				
Level I		17 (81.0%)	11 (78.6%)			
Level II			3 (21.4%)	17 (77.3%)		
Level III				5 (22.7%)		
Level IV						
Total		21 (100%)	14 (100%)	22 (100%)		57 (100%)

Columns: Self-Stated hospital perinatal level designation
Rows: Survey-Designated hospital perinatal level
Kappa score: .197

Table 8. Percent of VLBW Infants Born in a Level III Hospital as per the DPH-Designated Level of Care

	VLBW Deliveries	Other Deliveries	Total Deliveries
Level III Hospital	1249 (83.9%) (2.6%)	46750 (67.2%) (97.4%)	47,999 (100%)
≤ Level II Hospital	240 (16.1%) (1.0%)	22822 (32.8%) (99.0%)	23062 (100%)
	1489 (100%)	69572 (100%)	71061 (100%)

Includes Data for Hospitals that Provided Data for Both Total Number of Deliveries and Number of VLBW Deliveries (N=39)

Table 9. Percent of VLBW Infants Born in a Level III Hospital as per the Survey-Designated Level of Care

	VLBW Deliveries	Other Deliveries	Total Deliveries
Level III Hospital	235 (15.8%)	2421 (3.5%)	2656 (100%)
	(8.8%)	(91.2%)	
≤ Level II Hospital	1254 (84.2%)	67151 (96.5%)	68405 (100%)
	(1.8%)	(98.2%)	
	1489 (100%)	69572 (100%)	71061 (100%)

Includes Data for Hospitals that Provided Data for Both Total Number of Deliveries and Number of VLBW Deliveries (N=39)

FIGURES

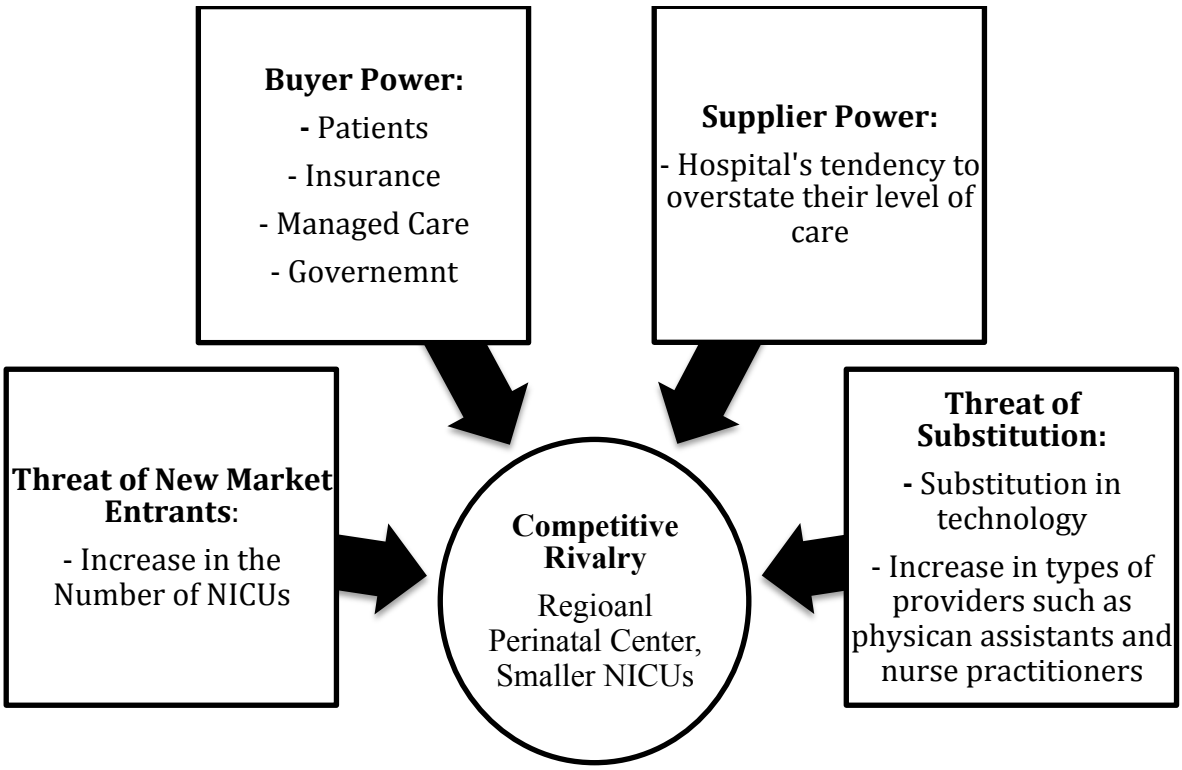

Figure 1: Porter's Five Forces Applied to Perinatal Regionalization

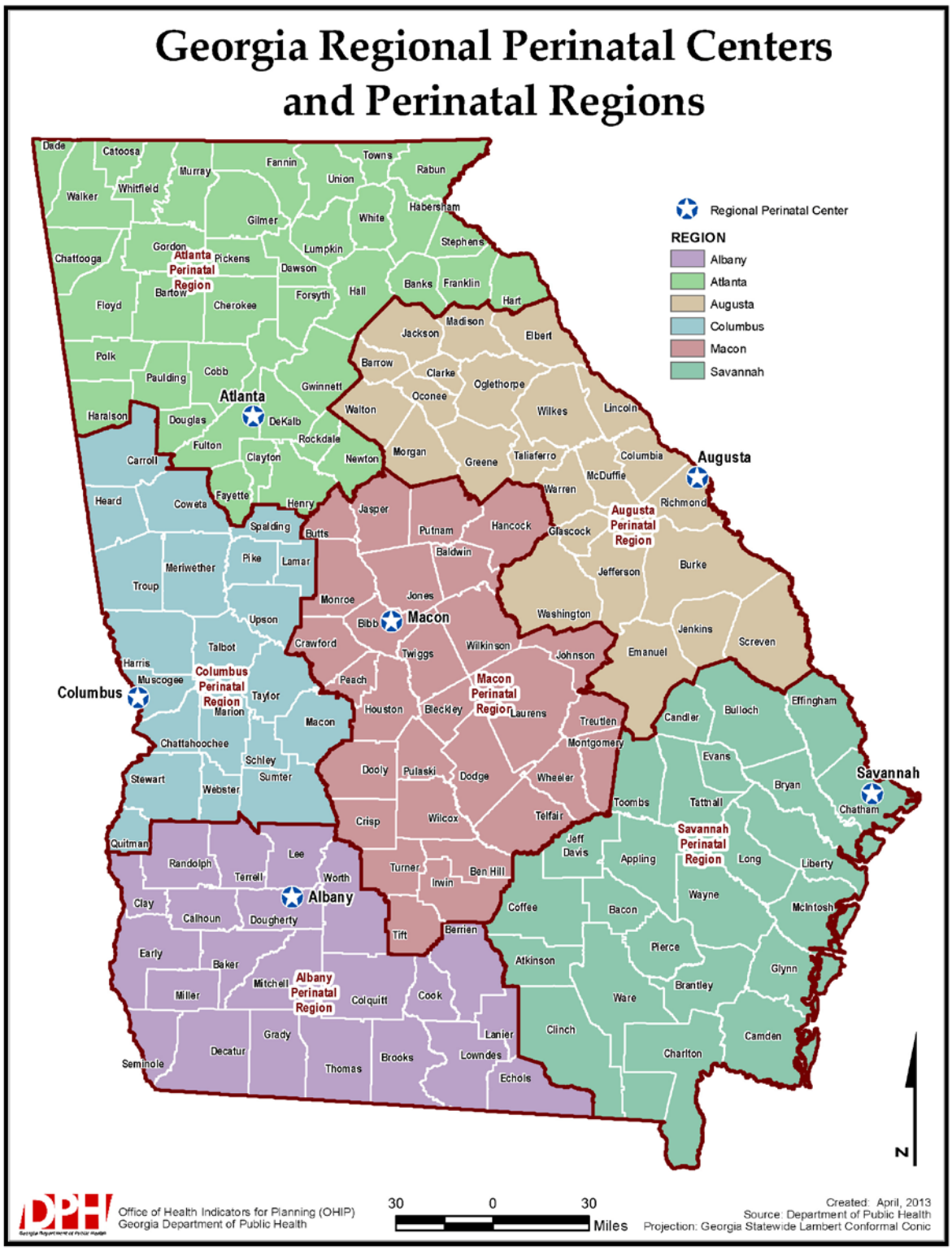

Figure 2. Georgia Regional Perinatal Centers and Perinatal Regions

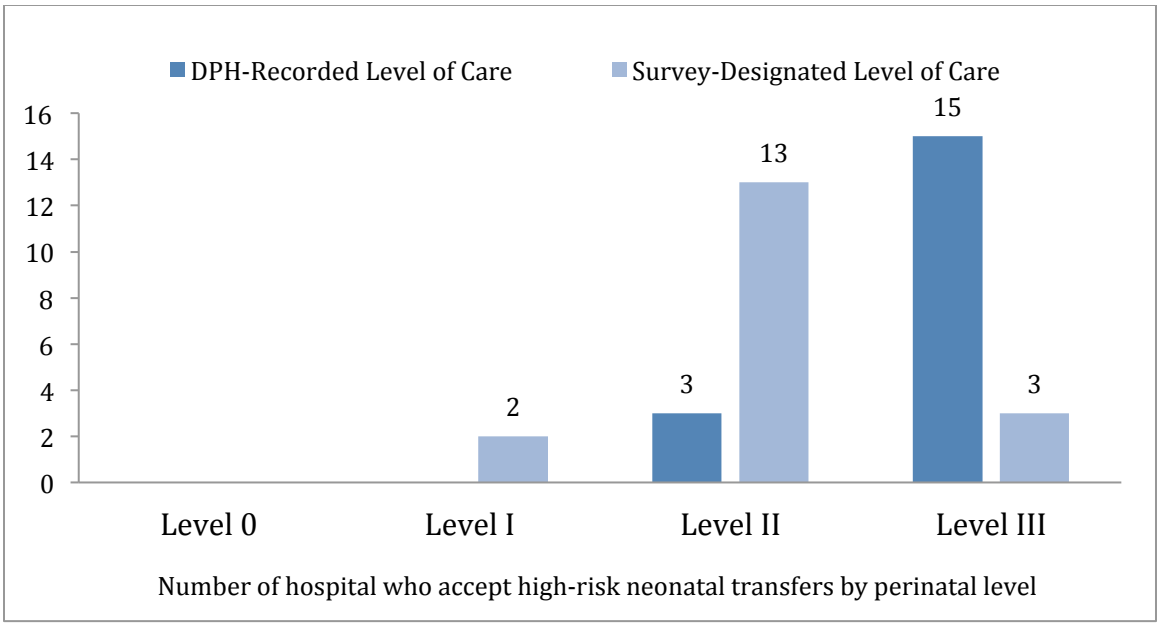

Figure 3. A comparison between DPH-designated level of care and survey-designated level of care for hospitals that report accepting high-risk antenatal transfers (N=18); 3 missing values

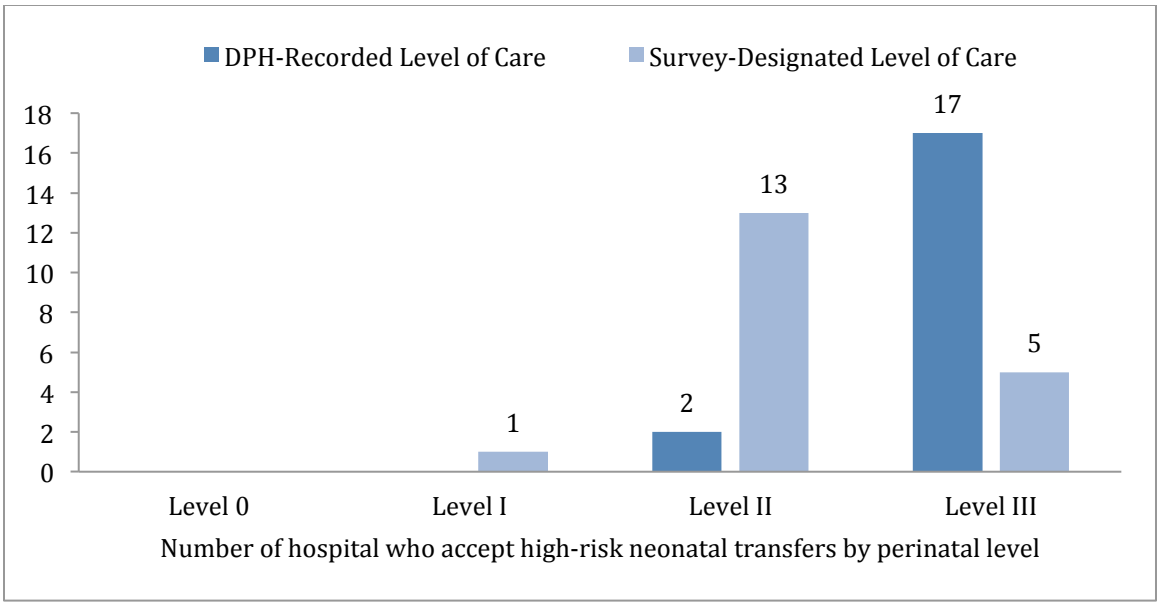

Figure 4. A comparison between DPH-designated level of care and survey-designated level of care for hospitals that report accepting high-risk neonatal transfers (N=19); 3 missing values

APPENDICES

Georgia Perinatal Capacity Survey

Each section of this survey should be completed by the most knowledgeable and appropriate personnel; which may be, but is not limited to, the survey champion, doctor, nurse, or an administrator. Please indicate at the top of each section the name and position of the individual completing the survey (if other than the survey champion); this will facilitate follow-up to responses as needed.

You may wish to work on this survey over a period of time, particularly if it will be completed by multiple personnel. Once you enter the contact information in Question 2 of this page, you will be able to view all pages in the survey. Please note that your responses will only be saved after you have clicked “Save and Continue” at the bottom of the page. To avoid reentering answers, ensure you have saved your responses by moving onto the next page before exiting the survey. Please answer each question. If the information is not available, please indicate “N/A” or “Unknown” where possible.

1. Date Completed

	MM	DD	YYYY
mm/dd/yyyy	/	/	

*2. Please provide the following information for the Survey/Hospital Champion

Name	
Title	
Email address	
Office phone number	
Fax number	
Pager	

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section I: Designation of Level of Care

This section regards your facility's perinatal care level designation and the bases for that designation.

3. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

4. Current perinatal care level designation:

- ○ Level 1- Basic Care
- ○ Level 2- Specialty Care
- ○ Level 3- Subspecialty Care- Neonatal Intensive Care
- ○ Level 3- Regional Perinatal Center
- ○ Unknown

5. Year this level of care was designated

6. Prior to that [year listed above], what was the designation?

- ○ Level 1- Basic Care
- ○ Level 2- Specialty Care
- ○ Level 3- Subspecialty Care- Neonatal Intensive Care
- ○ Level 3- Regional Perinatal Center
- ○ Unknown

7. Year this level of care was designated

8. To the best of your understanding, what is the basis for your current level of designation?

9. What services does this facility provide for other hospitals in the region (check all that apply)?

- [ ] Staff education in-service
- [ ] Technical support
- [ ] Develop and share protocols
- [ ] Data collection
- [ ] Research opportunities
- [ ] Coordination of transports
- [ ] None

Other (please specify)

10. Do documented policies (guidelines and protocols for services) exist on the neonatal unit(s)?

- ○ Yes
- ○ No

11. If you answered yes to Question 10, when were these policies last updated?

- ○ Prior to 2001
- ○ 2002-2005
- ○ 2006-2009
- ○ 2010-2013
- ○ Currently updating

12. Do documented policies (guidelines and protocols for services) exist on the obstetrical unit(s)?

- ○ Yes
- ○ No

Georgia Perinatal Capacity Survey

13. If you answered yes to Question 12, when were these policies last updated?

- Prior to 2001
- 2002-2005
- 2006-2009
- 2010-2013
- Currently updating

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section II: Admissions and Utilization

The following questions inquire regarding obstetrical admissions and outcome statistics in the 2013 calendar year (or most recent calendar year with data available). Please gather statistical information prior to completion.

14. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

15. If not 2013, please state the year of data that will be used to complete this section.

An admission refers to the number admissions, not the number of patients. If a patient was admitted to your facility more than one time, please include each admission. Obstetrical admissions refer to admissions of pregnant women who were not transported from other hospitals.

Each admission should be counted only once in Questions 16-21.

Please note that all transports should be included in these questions. You do not need to differentiate between transports that were conducted by your facility's transport team and those that were conducted by another facility's transport team.

16. Indicate the total number of unduplicated admissions for patients who were pregnant and released home for each gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

17. Indicate the total number of unduplicated admissions for patients who were pregnant and transported to another facility while pregnant for each gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

18. Indicate the total number of unduplicated admissions for patients who were delivered and released home for each gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

19. Indicate the total number of unduplicated admissions for patients who were delivered and transported to another facility after delivery for each gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

20. Indicate the number of accepted transports of mothers antepartum for each gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

21. Indicate the number of accepted transports of mothers postpartum (gestational age at delivery).

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

Georgia Perinatal Capacity Survey

Section II: Admissions and Utilization

The next series of question regards neonatal admissions.

22. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

23. If not 2013, please state the year of data that will be used to complete this section.

Questions 24-25 refer to unduplicated admissions. Each admission should only be included in either the inborn category or the out-born category.

24. Indicate the number of admissions of neonates by gestational age who were inborn by gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

25. Indicate the number of admissions of neonates by gestational age who were out-born by gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

Questions 26-27 refer to unduplicated admissions. Each admission should only be included in either the category of neonates released home or the category of neonates transported to another facility.

26. Indicate the number of neonatal admissions where the neonate was released home by gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

27. Indicate the number of neonatal admissions by gestational age where the neonate was transported to another facility by gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

28. Indicate the number of neonatal admissions by gestational age where the neonate was accepted from another facility by gestational age.

Below 24 weeks	
24-31 weeks	
32-34 weeks	
35-36 weeks	
37+ weeks	
Unknown gestational age	
Total	

Georgia Perinatal Capacity Survey

Section II: Admissions and Utilization

This section regards the utilization of obstetrical services in your facility.

29. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

30. If not 2013, please state the year of data that will be used to complete this section.

31. Indicate the number of each following obstetrical utilization measure:

Total live births	
Early fetal deaths (less than 20 weeks gestation)	
Late fetal deaths (greater than or equal to 20 weeks gestation)	
Cesarean sections	
Preterm (less than 37 weeks gestation) deliveries	
Very low birth weight (less than 1500 grams) infant deliveries	

32. Indicate the number of each following obstetrical capacity measure:

***A high risk pregnancy is one in which some condition (maternal or fetal) puts the mother, fetus or both at higher-than-normal risk for complications during pregnancy and birth or in the postpartum period; including, but not limited to, multiple gestation, hypertension, diabetes, obesity and previous cesarean delivery.**

High-risk OB beds	
High-risk OB patient days	
High-risk OB unduplicated admissions	

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section III: Staffing in the 2013 calendar year

The next series of questions regard neonatal hospital staffing in your facility.

33. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

34. Indicate the availability of neonatal physicians (Board Certified Physicians who work full- or part-time) at your facility.

	24-hour on-call coverage (At the hospital within 30 minutes and not simultaneously on call somewhere else)	24-hour on-site coverage	Other Availability	None Available
Neonatologist	○	○	○	○
General Pediatrician	○	○	○	○
Neonatal Fellow	○	○	○	○
Pediatric Hospitalist	○	○	○	○
Pediatric Fellow	○	○	○	○
Pediatric Resident	○	○	○	○
Other Residents	○	○	○	○
Pediatric Surgeon	○	○	○	○
Pediatric Anesthesiologist	○	○	○	○

Other(s). Please specify type of physician and availability

35. Indicate the availability of each physician specialty to provide consultation for infants in your hospital.

	Available on-site (but less than 24/7 coverage)	Available 24 hours/7 days per week	Other Availability	None available
Pediatric Cardiology	○	○	○	○
Pediatric Neurology	○	○	○	○
Pediatric Pulmonology	○	○	○	○
Pediatric Nephrology	○	○	○	○
Pediatric Hematology	○	○	○	○
Pediatric Endocrinology	○	○	○	○
Pediatric Gastroenterology	○	○	○	○
Pediatric Immunology	○	○	○	○
Pediatric Infectious Disease Specialty	○	○	○	○
Medical Genetics	○	○	○	○
Pediatric Pharmacology	○	○	○	○
Pediatric Ophthalmology	○	○	○	○
Pediatric Anesthesiology	○	○	○	○
Pediatric surgical subspecialty	○	○	○	○

Other(s). Please specify specialty and availability.

36. Indicate the availability of neonatal nurses at your facility.

	Other Availability	24-hour on-call coverage (Able to be at the hospital within 30 minutes and not simultaneously on-call elsewhere)	24-hour on-site coverage	None available
Advanced Practice Registered Nurse	○	○	○	○
Pediatric Nurse	○	○	○	○
Neonatal Nurse	○	○	○	○

37. Indicate any other nursing staff that are available in the Neonatal Unit.

- [ ] Registered Nurse (RN)
- [ ] Licensed Practical Nurse (LPN)
- [ ] Nurse Manager
- [ ] Nurse Supervisor
- [ ] Clinical Nurse Specialist (CNS)
- [ ] None

Other(s). Please specify type of nursing staff and availability

38. Are any members of your nursing staff required to have current certification in Neonatal Intensive Care Nursing by the National Certification Corporation (check one)?

- ○ Yes
- ○ No

39. If you answered yes to Question 38, who (check all that apply)?

- [ ] Nurse Manager
- [ ] Nurse Supervisor
- [ ] Charge nurses
- [ ] All staff nurses

Other[s] (please specify)

40. Are any of the following neonatal support staff available at your facility (check all that apply)?

- [ ] Patient Care Technician (PCT)
- [ ] Certified Nursing Assistant (CNA)
- [ ] Certified Medical Assistant (CMA)
- [ ] Respiratory Therapist
- [ ] None

Other[s] (please specify)

41. Does your hospital have a Perinatal Medical Director (PMD)? If you answer no, please skip to Question 43.

- ○ Yes
- ○ No

42. How is the PMD classified?

- ○ Neonatologist
- ○ Pediatrician
- ○ Maternal Fetal Medicine Specialist

Other (please specify)

43. Other staff available in the hospital with neonatal experience (check all that apply):

- ☐ Occupational Therapist
- ☐ Physical Therapist
- ☐ Speech Pathologist
- ☐ Licensed Social Worker/Master's degree in Social Work (MSW)
- ☐ Registered Dietitian
- ☐ Pharmacist (Pharm.D.) with neonatal expertise
- ☐ Pharmacist (Pharm.D.) with neonatal expertise available 24-hours/day
- ☐ None

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section III: Staffing in the 2013 Calendar Year

The next section regards your facilities obstetrical staffing.

44. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

45. Indicate the availability of Perinatal Medical Staff (Board Certified Practitioners who work full- or part-time).

	24-hour on-call coverage (Able to be at the hospital within 30 minutes and not simultaneously on-call somewhere else)	24-hour on-site coverage	Other Availability	None Available
Obstetrician	○	○	○	○
Maternal-Fetal Medicine/Perinatologist	○	○	○	○
Obstetric Anesthesiologist	○	○	○	○
Obstetrical Fellow	○	○	○	○
Obstetrical Resident	○	○	○	○
Family Practice Attending Physician	○	○	○	○
Family Practice Resident	○	○	○	○
Certified Nurse Midwife	○	○	○	○

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section III: Staffing in the 2013 Calendar Year

The next series of questions regard provider training programs that require periodic recertification.

46. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

47. Pediatric resuscitation training: Is it mandatory for any staff members to successfully complete (and recertify every two years) the "Neonatal Resuscitation Program" (NRP) course of the American Academy of Pediatrics?

- ○ Yes
- ○ No

48. If you answered yes to Question 47, who is required to complete the Neonatal Resuscitation Program (NRP) certification (check all that apply)?

- ☐ All physicians in neonatal unit (including residents)
- ☐ Some physicians in neonatal unit. Please specify below.
- ☐ All nursing staff in neonatal unit
- ☐ Some nursing staff in neonatal unit. Please specify below.
- ☐ Unlicensed staff in the neonatal unit (PCTs/CNAs/CMEs)

If some physicians, nursing staff, and/or other staff in the neonatal unit meet this requirement, please specify which:

49. If you answered no to Question 47, does any of your staff receive a different Neonatal Resuscitation Program "NRP" training course in neonatal resuscitation?

- ○ Yes (please specify below)
- ○ No

If yes, please provide the name of the course

50. Is it mandatory for any staff member to successfully complete (and recertify every 2 years) the "Pediatric Advanced Life Support (PALS)" course of the American Heart Association?

- ○ Yes
- ○ No

51. If you answered yes to Question 50, who is required to be Pediatric Advanced Life Support (PALS) certified (check all that apply)?

- [ ] All physicians in neonatal unit (including residents)
- [ ] Some physicians in neonatal unit. Please specify below.
- [ ] All nursing staff in neonatal unit
- [ ] Some nursing staff in neonatal unit. Please specify below.
- [ ] Unlicensed staff in the neonatal unit (PCTs/CNAs/CMEs)

If some physicians, nursing staff, and/or other staff in the neonatal unit meet this requirement, please specify which:

52. If you answered no to Question 50, does any of your staff receive a different Pediatric Advanced Life Support (PALS) training course in pediatric advanced life support?

- ○ Yes (please specify below)
- ○ No

If yes, please provide the name of the course

53. Is it mandatory for any staff member to successfully complete (and recertify every two years) the "Basic Life Support" (BLS) course of the American Heart Association?

- ○ Yes
- ○ No

54. If you answered yes to Question 53, who is required to be BLS certified (check all that apply)?

- [ ] All physicians in neonatal unit (including residents)
- [ ] Some physicians in neonatal unit. Please specify below.
- [ ] All nursing staff in neonatal unit
- [ ] Some nursing staff in neonatal unit. Please specify below.
- [ ] Unlicensed staff in the neonatal unit (PCTs/CNAs/CMEs)

If some physicians, nursing staff, and/or other staff in the neonatal unit meet this requirement, please specify which:

55. If you answered no to Question 53, does any of your staff receive a different BLS training course in basic life support?

- ○ Yes (please specify below)
- ○ No

If yes, please provide the name of the course

56. Is it mandatory for any staff members to successfully complete (and recertify every two years) the "Advanced Cardiac Life Support (ACLS)" course of the American Heart Association?

- ○ Yes
- ○ No

57. If you answered yes to Question 56, who is required to be ACLS certified? (Check all that apply)

- ☐ All physicians in neonatal unit (including residents)
- ☐ Some physicians in neonatal unit. Please specify below.
- ☐ All nursing staff in neonatal unit
- ☐ Some nursing staff in neonatal unit. Please specify below.
- ☐ Unlicensed staff in the neonatal unit (PCTs/CNAs/CMEs)

If some physicians, nursing staff, and/or other staff in the neonatal unit meet this requirement, please specify which

58. If you answered no to Question 56, does any of your staff receive a different ACLS training course in advanced cardiac life support?

- ○ Yes
- ○ No

If yes, please provide the name of the course

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section III: Staffing in the 2013 Calendar Year

The next series of questions regard various services available at your institution.

59. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

60. Does your facility have the following monitoring equipment or capacity to perform the following imaging services (check one per row)?

	Cannot perform	Less than 24 hours	24-48 hours	49-72 hours	73+ hours
High flow nasal cannula	○	○	○	○	○
Mechanical ventilation	○	○	○	○	○
Continuous positive airway pressure (CPAP)	○	○	○	○	○
High frequency ventilation	○	○	○	○	○
Inhaled nitric oxide	○	○	○	○	○
Extracorporeal membrane oxygenation	○	○	○	○	○

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section III: Staffing in the 2013 Calendar Year

The next portion regards diagnostics and laboratory services at your facility.

61. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

62. Indicate which of the following diagnostics and laboratory services your facility has (check all that apply).

- [ ] 24 hour laboratory available (for adults)
- [ ] 24 hour pediatric laboratory
- [ ] 24 hour blood bank services
- [ ] 24 hour ultrasonography and radiology
- [ ] 24 hour anesthesia
- [ ] Fetal diagnostic testing (e.g. biophysical profile, amniotic fluid analysis, basic ultrasound)
- [ ] Advanced fetal diagnosis (e.g. targeted ultrasonography, fetal echocardiography)
- [ ] Routine Computed tomography (CT)
- [ ] Urgent/STAT Computed tomography (CT)
- [ ] Computed tomography (CT) interpreted urgently by pediatric or neonatal expert
- [ ] None of the above

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section III: Staffing in the 2013 Calendar Year

This section regards the availability of obstetrical services at your facility.

63. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

64. Does your facility have an established triage system for identifying high risk patients* who should be transferred to a high level facility?

***A high risk pregnancy is one in which some condition (maternal or fetal) puts the mother, fetus or both at higher-than-normal risk for complications during pregnancy and birth including but not limited to multiple gestation, hypertension, diabetes, obesity and previous cesarean delivery.**

- Yes
- No

65. Does your facility have the ability to begin an emergency cesarean delivery within 30 minutes of the decision to do so?

- Yes
- No

66. Does your facility have the ability to perform cesarean section hysterectomy?

- Yes
- No

67. Does your facility have the ability to perform advanced fetal therapy (intrauterine fetal transfusion, treatment of cardiac arrhythmia, fetal surgery)?

- Yes
- No

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section III: Staffing in the 2013 Calendar Year

The next section regards various neonatal procedures that can be performed at your facility.

68. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

69. Indicate the following neonatal procedures and surgeries your facility has the capacity to perform (check all that apply).

- [ ] Percutaneous central venuous catheter placement (PCVC/PICC)
- [ ] Central venuous catheter placement
- [ ] Total Parenteral Nutrition (TPN) or hyperalimentation
- [ ] Minor surgery (e.g. Inguinal hernia repair, appendectomy)
- [ ] Major surgery (e.g. congenital and acquired conditions such as abdominal wall defect, patent ductus arteriosus (PDA) ligation, tracheoesophageal fistula, bowel perforation, retinopathy of immaturity)
- [ ] Neurosurgery (e.g. myelomeningocele, hydrocephalus related to intraventricular hemorrhage)
- [ ] Cardiac surgery (e.g. repair of complex congenital malformations that require cardio-pulmonary bypass and/or extracorporeal membrane oxygenation (ECMO))
- [ ] None of the above

To save your responses on this page, click "Save and Continue" before exiting the survey.

Georgia Perinatal Capacity Survey

Section IV: Transport

This section inquires about patient transport protocols. Please note that all transports should be included in these questions. You do not need to differentiate between transports that were conducted by your facility's transport team and those that were conducted by another facility's transport team.

70. This portion may be completed by someone other than the survey champion. If so, please identify the name and title of the person completing this section:

71. Does your facility have written agreements with other perinatal facilities for antenatal transfer of patients?

- Yes (please specify below)
- No

If yes, please list the facilities with which you have documented transfer agreements

72. Does your facility have written agreements with other perinatal facilities for post-delivery transfer of mothers?

- Yes (please specify below)
- No

If yes, please list the facilities with which you have documented transfer agreements

73. Does your facility have written agreements with other perinatal facilities for post-delivery transfer of neonates?

- Yes (please specify below)
- No

If yes, please list the facilities with which you have documented transfer agreements

74. What percent (%) of pregnant high-risk patients does your facility transfer?

- 0
- 1-25
- 26-50
- 51-75
- 76-100

75. What percent (%) of high-risk postpartum patients does your facility transfer?

- 0
- 1-25
- 26-50
- 51-75
- 76-100

76. What percent (%) of high-risk neonates does your facility transfer?

- 0
- 1-25
- 26-50
- 51-75
- 76-100

77. Does your facility accept high-risk antepartum transfers from other hospitals?

- Yes
- No

78. Does your facility accept high-risk postpartum transfers from other hospitals?

- Yes
- No

79. Does your facility accept high-risk neonate transfers from other hospitals?

- Yes
- No

80. How does your facility transfer stable and improving, recovering neonates to nurseries with lower levels of care (back-transfer)?

- More than 12 times per year
- At least 12 times per year
- Less than 12 times per year
- Never

81. Does your facility have an obstetrical transfer coordinator?

- Yes (please specify below)
- No

If yes, please specify name and job title

82. Does your facility have a neonatal transfer coordinator?

- Yes (please specify below)
- No

If yes, please specify name and job title

83. How often would you say you are unable to accept transfers of high-risk patients because your Specialty Care Nursery is full (check one):

- All of the time
- Some of the time (50% or more of requested transfers are turned down)
- Rarely (Less than 50% of requested transfers are turned down)
- Never
- Not applicable

If you are not ready to submit, click "Previous" to save your answers before exiting the survey.

Appendix II Algorithm

Algorithm for Classification: Georgia Perinatal Levels

This algorithm includes questions that are important to defining which hospitals meet the guidelines for levels of care. Survey questions that are not included in this algorithm collect key data for measuring quality of care. Format of question designation: Section#Question#

Level Designation	Capabilities	Survey Indicator
Level I well newborn nursery	Provide neonatal resuscitation at every delivery	S3Q47 S3Q48 (C or D)
	Evaluate and provide postnatal care to stable term newborn infants	
	Stabilize and provide care for infants born at 35-37 weeks of gestation who remain physiologically stable	
	Stabilize newborn infants who are ill and those born before 35 weeks of gestation until transfer to a higher level of care	
	Health care provider types: general pediatrician and registered nurse	S3Q34 (B, 1 or 2) S3Q37 (A)
Level Designation	Indicator	Survey Indicator
Level II special care nursery	Provide care for infants born at 32 weeks of gestation or later and weigh 1,500 g or more or who have physiologic immaturity or who are moderately ill with problems that are expected to resolve rapidly and are not anticipated to need subspecialty services on an urgent basis	
	Provide care for infants convalescing after intensive care	
	Provide mechanical ventilation for brief duration (less than 24 hours) OR continuous positive airway pressure or both	S3Q60 (B, 2) OR S3Q60 (C, 2)
	Stabilize infants born before 32 weeks gestation and weigh less than 1500 g until transfer to a neonatal intensive care facility	
	Health care provider types: Physicians: pediatric hospitalists OR neonatologists Nurses: Advanced Practice Registered	S3Q34 (A, 1 or 2) OR S3Q34 (D, 1or 2) S3Q36 (A, 2 or 3)

	Nurse OR Pediatric Nurse OR Neonatal Nurse Other: respiratory therapists	OR S3Q36 (A, 2 or 3) OR S3Q36 (A, 2 or 3) S3Q40 (D)
Level Designation	Capabilities	Survey Indicator
Level III neonatal intensive care unit	Provide sustained life support	
	Provide comprehensive care for infants born before 32 of weeks gestation and weigh less than 1,500 g and infants born at all gestational ages and birth weights with critical illness	
	Provide a full range of respiratory support that may include conventional ventilation and/or high frequency ventilation and inhaled nitric oxide	S3Q60 (C, 3, 4 or 5) OR S3Q60 (D, 3, 4 or 5) OR S3Q30 (E, 3, 4 or 5)
	Perform advanced imaging, with interpretation on an urgent basis, including computed tomography and echocardiography	S3Q62 (G) S3 Q62 (J)
	Health care provider types: (prompt and readily available access to a full range of) pediatric surgical specialists, pediatric anesthesiologists, and pediatric ophthalmologists	S3Q34 (H, 1 or 2) S3Q34 (I, 1 or 2) S3Q35 (L, 1 or 2)
Level Designation	Capabilities	Survey Indicator
Level IV regional neonatal intensive care unit	Located within an institution with the capability to provide surgical repair of complex congenital or acquired conditions	S3Q69 (E) S3Q69 (F) S3Q69 (G)
	Health care provider types: Pediatric surgical subspecialists (24 hours per day)	S3Q35 (N, 2)
	Provide outreach education	S1Q9 (A)
	Data collection	S1Q9 (D)
	Facilitate transport	S1Q9 (F)

Appendix III
Frequency Distribution of Met Perinatal Level Indicators

Indicator	Frequency N (%)
Level I well newborn nursery	
Q47 Pediatric resuscitation training: Is it mandatory for any staff members to successfully complete (and recertify every two years) the "Neonatal Resuscitation Program" (NRP) course of the American Academy of Pediatrics? (Check box)	**Yes: 57 (100%)**
Q48 If you answered yes to Question 47, who is required to complete the Neonatal Resuscitation Program (NRP) certification	**All nursing staff in neonatal unit: 55 (96.5%)** **OR** **Some nursing staff in neonatal unit: 2 (3.5%)** **Total = 100%**
Q34 (B) General Pediatrician	**24-hour on call coverage: 45 (78.9%)** **24-hour on site coverage: 3 (5.3%)** Other availability: 4 (7.0%) None: 3 (5.3%) No answer: 2 (3.5%)
Q37 (A) Registered Nurse (RN) (Check box)	**Yes: 54 (94.7%)** No answer: 3 (5.3%)
Level II special care nursery	
Q60 (B) Mechanical ventilation	**24-48 hours: 3 (5.3%)** **49-72 hours: 2 (3.5%)** **73+hours: 24 (42.1%)** Cannot perform: 1 (1.8%) **Less than 24 hours: 25 (43.9%)** No answer: 2 (3.5%)
Q60 (C) Continuous positive airway pressure (CPAP)	**24-48 hours: 5 (8.8%)** **49-72 hours: 1 (1.8%)** **73+hours: 31 (54.4%)** Cannot perform: 3 (5.3%) **Less than 24 hours: 15 (26.3%)** No answer: 2 (3.5%)
Q34 (A) Neonatologist	**24-hour on call coverage: 20 (35.1%)**

	24-hour on site coverage: 7 (12.3%) Other availability: 9 (15.8%) None: 19 (33.3%) No answer: 2 (3.5%)
Q34 (D) Pediatric Hospitalist	**24-hour on call coverage: 6 (10.5%)** **24-hour on site coverage: 2 (3.5%)** Other availability: 5 (8.8%) None: 40 (70.2%) No answer: 4 (7.0%)
Q36 (A) Advanced practice registered nurse	**24-hour on call coverage: 4 (7.0%)** **24-hour on site coverage: 13 (22.8%)** Other availability: 9 (15.8%) None: 25 (43.9%) No answer: 6 (10.5%)
Q36 (B) Pediatric nurse	**24-hour on call coverage: 2 (3.5%)** **24-hour on site coverage: 15 (26.3%)** Other availability: 5 (8.8%) None: 30 (52.6%) No answer: 5 (8.8%)
Q36 (C) Neonatal nurse	**24-hour on call coverage: 1 (1.8%)** **24-hour on site coverage: 39 (68.4%)** Other availability: 5 (8.8%) None: 11 (19.3%) No answer: 1 (1.8%)
Q40 (D) Respiratory Therapist	**Yes: 52 (91.2%)** No answer: 5 (8.8%)
Level III neonatal intensive care unit	
Q60 (C) Continuous positive airway pressure (CPAP) (more than 24 hours)	**24-48 hours: 5 (8.8%)** **49-72 hours: 1 (1.8%)** **73+hours: 31 (54.4%)** Cannot perform: 3 (5.3%) Less than 24 hours: 15 (26.3%) No answer: 2 (3.5%)
Q60 (D) High frequency ventilation (more than 24 hours)	**24-48 hours: 0 (0%)** **49-72 hours: 0 (0%)**

	73+hours: 25 (43.9%) Cannot perform: 21 (36.8%) Less than 24 hours: 8 (14.0%) No answer: 3 (5.3%)
Q60 (E) Inhaled nitric oxide	**24-48 hours: 1 (1.8%)** **49-72 hours: 0 (0%)** **73+hours: 13 (22.8%)** Cannot perform: 36 (63.2%) Less than 24 hours: 2 (3.5%) No answer: 5 (8.8%)
Q62 (G) Advanced fetal diagnosis (check box)	**Yes: 22 (38.6%)** No: 35 (61.4%)
Q62 (J) Computed tomography (check box)	**Yes: 19 (33.3%)** No: 38 (66.7%)
Q34 (H) Pediatric Surgeon	**24-hour on call coverage: 3 (5.3%)** **24-hour on site coverage: 0 (0 %)** Other availability: 13 (22.8%) None: 36 (63.2%) No answer: 5 (8.8%)
Q34 (I) Pediatric Anesthesiologist	**24-hour on call coverage: 5 (8.8%)** **24-hour on site coverage: 3 (5.3 %)** Other availability: 4 (7.0%) None: 39 (68.4%) No answer: 6 (10.5%)
Q35 (L) Pediatric Ophthalmologist	**On-site (less than 24/7): 7 (12.3%)** **24 hours/7 days per week: 5 (8.8%)** Other: 12 (21.1%) None: 28 (49.1%) No answer: 5 (8.8%)
Level IV regional neonatal intensive care	
Q69 (E) Major surgery (e.g. congenital and acquired conditions such as abdominal wall defect, patent ductus arteriosus (PDA) ligation, tracheoesophageal fistula, bowel perforation, retinopathy of immaturity) (check box)	**Yes: 5 (8.8%)** No: 52 (91.2%)
Q69 (F) Neurosurgery (e.g. myelomeningocele, hydrocephalus related to intraventricular hemorrhage) (check box)	**Yes: 5 (8.8%)** No: 52 (91.2%)

Q69 (G) Cardiac surgery (e.g. repair of complex congenital malformations that require cardio-pulmonary bypass and/or extracorporeal membrane oxygenation (ECMO))	**Yes: 1 (1.8%)** No: 56 (98.2%)
Q35 (N) Pediatric surgical subspecialty	**On-site (less than 24/7): 5 (8.8%)** **24 hours/7 days per week: 4 (7.0%)** Other: 12 (21.1%) None: 31 (54.4%) No answer: 5 (8.8%)
Q9 Staff Education in-service (check box)	**Yes: 28 (49.1%)** No: 29 (50.9%)
Q9 Data collection (check box)	**Yes: 15 (26.3%)** No: 42 (73.7%)
Q9 Coordination of transport (check box)	**Yes: 19 (33.3%)** No: 38 (66.7%)

Bolded responses indicate required answer to meet level indicator