STATEWIDE COORDINATED REGIONAL PERINATAL SYSTEM

(FY2009 Appropriation Bill - Public Act 246 of 2008)

April 1, 2009

Section 1116: The department shall convene appropriate stakeholders to determine the efficacy and impact of restoring a statewide coordinated regional perinatal system in Michigan. A report shall be produced that reflects best practices, expected potential impact on infant mortality, and recommendations for policy and funding of such a system in Michigan. The report shall be provided to the house and senate appropriations subcommittees on community health and standing committees on health policy, the house and senate fiscal agencies, and the state budget director by April 1, 2009.

Michigan Department of Community Health

MDCH

Jennifer M. Granholm, Governor
Janet Olszewski, Director

MICHIGAN DEPARTMENT OF COMMUNITY HEALTH
SECTION 1116 – Public Act 246 of 2008

Family, Maternal and Child Health Unit

Attachment - **Perinatal Regionalization: Implications for Michigan**

Perinatal Regionalization: Implications for Michigan

A report by the Michigan Department of Community Health (MDCH) in collaboration with Michigan neonatal, obstetric and pediatric stakeholders.

April 2009

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EXECUTIVE SUMMARY

Infant mortality is a major public health issue in the State of Michigan. For every 1,000 Michigan live births, approximately eight infants die before reaching their first birthday. Comparative data from the Centers for Disease Control and the Michigan Department of Community Health (MDCH, 2009) indicate Michigan's infant mortality rate consistently exceeds the national average. Although Michigan's population-based infant mortality rate has slightly decreased since 2000, alarming disparities continue to exist among various racial and ethnic groups, particularly between African Americans and Caucasians. To examine this issue, Michigan PA 246 of 2008 was signed into law, mandating the Michigan Department of Community Health to convene appropriate stakeholders to determine the efficacy and impact of restoring a statewide coordinated regional perinatal system in Michigan and report on practices, expected potential impact on infant mortality, and recommendations for policy and funding of such a system in Michigan. In response, MDCH convened work groups of clinical experts in neonatal, obstetrical, and pediatric specialties in early 2009 to produce this report.

Michigan was a national leader in regionalization of perinatal systems in the 1970s and 1980s. This system gradually de-regionalized over the subsequent two decades, and by 2005, formal perinatal regionalization no longer existed in the state. Studies conducted in and outside Michigan found that highly specialized NICU staff and sophisticated equipment are necessary to care for neonates requiring complex, intensive treatment. A 2005 study produced by MDCH and Grand Valley State University recommended rebuilding perinatal regionalization, developing detailed definitions and evidence-based practice guidelines for levels of care, and examining capacity and need to develop more well-defined and coordinated regions. To date, evaluations of the impact of perinatal regionalization have focused primarily on the quality and safety of maternal and perinatal care, rather than fiscal analyses or return on investment. However, published information does support that regionalized perinatal care is inherently cost effective, because care is organized and delivered according to the evidence base and patient need. This report provides an initial administrative cost estimate to implement perinatal regionalization in Michigan, understanding that further studies and analyses are necessary. The Perinatal Workgroups also stressed the need for ongoing participation in quality improvement initiatives such as the Vermont Oxford Network, which collects data from neonatal intensive care units (NICUs) around the world to study the impact of interventions on outcomes of perinatal care.

In order to implement perinatal regionalization, evidence-based guidelines for care are required that fully integrate applicable aspects of obstetric and neonatal clinical care. The Perinatal Workgroups were charged with modifying current, evidence-based obstetric and pediatric levels of care guidelines; as a result, Appendix A Michigan Perinatal Level of Care Guidelines was produced by consensus, which reflects Michigan-specific standards and will serve as the foundation for the State's coordinated perinatal system. These Michigan guidelines include strategies to improve access to service, identify risk early, provide linkage to the appropriate level of care and ensure compliance, continuity and comprehensiveness.

Recommendations

As discussed in this report, the Michigan Perinatal Care workgroups recommended that Michigan:

1. Adopt the Michigan Perinatal Level of Care Guidelines.
2. Develop a method of authoritative recognition of levels of NICU care and establish a statewide mechanism to oversee and enforce adherence to the Michigan guidelines to ensure that hospitals and NICUs care for only those mothers and neonates for which they are qualified

3. The Guidelines should be periodically reviewed and updated as new data occur and recommendations from national groups are made.
4. If the authoritative recognition of levels of care is through the Certificate of Need process, Create a provision to retrospectively change a hospital's perinatal level of care designation
5. All Level III NICUs should have a NICU Follow-up Clinic
6. Standards for the NICU Follow-up Clinics should be developed and the State should develop a mechanism for authoritative recognition of the NICU Follow-up Clinic
7. Ensure that NICU Follow-up Clinics have the capacity for complete evaluation, both medical and developmental
8. NICU follow-up care should be covered by insurance, including neurodevelopmental testing, to assure continued access to care and to reduce barriers to services.
9. The state should allocate funds so that all Level III babies receive home visits.
10. Educate medical providers about the needs of NICU graduates
11. Support the enrollment of all NICUs in Vermont Oxford Network
12. Develop a mechanism for follow-up of privately insured infants
13. Utilize available data (e.g., Public Health Surveillance system, Medicaid data warehouse, etc.) and track outcomes on key indicators, such as long-term effect of NICU care/treatment and infant mortality
14. Develop a system to follow-up on NICU graduates, including:

a. Create a mechanism to capture all child/family services in one record, with information from all providers coordinated and shared.
b. Connect to MDCH Health Information Technology Project to track outcomes, especially the long-term effects of NICU care/treatments and infant mortality.
c. An electronic record is ideal, or use of a database such as the Michigan Care Improvement Registry (MCIR).

15. The State of Michigan should address the critical shortage of nurses in the state and conduct ongoing evaluations of staffing shortages and potential impact on the provision of care
16. Convene an annual conference or meeting with representatives from all Levels of Care to review and provide education regarding the guidelines and areas for improvement in the care to obstetric patients, neonatal and pediatric care.
17. Convene representatives from all entities involved in the delivery of optimal healthcare to women and children at regional and state levels to discuss barriers to optimal care and mechanisms to resolve those barriers
18. Work in collaboration with EMS/trauma system to thus assure that each perinatal patient "get to the right place in the right time." There is currently an internal collaborative effort at MDCH that will lead to a better understanding of the common venues for further coordination.

Conclusions

Creating a system for regionalized perinatal care is an approach consistent with evidence-based guidelines promulgated by the American Academy of Pediatrics and the American College of Obstetrics and Gynecology and successfully adopted by other states. This approach ensures that hospitals and NICUs operate within appropriate, clearly defined level of care designations and ensures collaboration among regional entities providing services to women, neonates/infants and families. Convening subject matter experts in OB, Neonatology, and Pediatrics was a unique opportunity to examine pediatric regionalization in Michigan. This collaborative approach also established a venue to develop comprehensive Michigan perinatal guidelines and obtain valuable recommendations for policy improvements in the area of perinatal care.

Introduction

Infant mortality is a major public health issue in the State of Michigan. For every 1,000 Michigan live births, approximately eight infants die before reaching their first birthday. Available comparative data from the Centers for Disease Control and the Michigan Department of Community Health (MDCH, 2009) indicate Michigan's infant mortality rate consistently exceeds the national average. Although Michigan's population-based infant mortality rate has slightly decreased since 2000, alarming disparities continue to exist among various racial and ethnic groups, particularly between African Americans and Caucasians. In 2007, Michigan's African American infant mortality rate (16.5) was 2.8 times higher than that of white infants (5.8) and 1.5 times higher than the rate for other races (10.7).

Low birth weight and preterm birth are predictors of infant mortality. Very low birth weight infants (VLBW, weighing less than 1,500 grams) and very preterm (born before 32 weeks gestation) are at high risk of death in the first year of life. In 2006, Michigan's VLBW rate was 1.2 per 100 live births for Caucasian babies and 3.5 for African American babies. The rate of births less than 32 weeks gestation was 1.6 per 100 live births for Caucasian babies and 3.7 for African American babies.

Perinatal Periods of Risk (PPOR) is another approach used to better understand the causes of infant mortality and to develop targeted strategies. Among PPOR groups (maternal health/prematurity, maternal care, neonatal care, and infant health), data suggest Maternal Health/Prematurity (fetal, neonatal, and post-neonatal of 500 – 1,499 grams) is a focal group for targeted intervention. Literature review and national experts indicate that states with a regionalized and coordinated perinatal system of care better assure that pregnant women and babies are more likely to deliver in an appropriate hospital setting and receive appropriate services to meet their needs. Michigan has not had a regionalized perinatal system since the early 1990s; since that time, health system changes have resulted in a non-regionalized approach to referrals and transfers, leading to decreases in the number of high-risk pregnancies delivered at hospitals with neonatal intensive care units (NICUs).

To examine this issue, Michigan PA 246 of 2008 was signed into law, mandating the Michigan Department of Community Health to "convene appropriate stakeholders to determine the efficacy and impact of restoring a statewide coordinated regional perinatal system in Michigan. A report shall be produced that reflects best practices, expected potential impact on infant mortality, and recommendations for policy and funding of such a system in Michigan. The report shall be provided to the house and senate appropriations subcommittees on community health and standing committees on health policy, the house and senate fiscal agencies, and the state budget director by April 1, 2009 (Section 1116)." In response, MDCH convened a group of subject matter experts and stakeholders comprised of obstetric, neonatal, and pediatric physicians and nurses; representatives the Early Childhood Investment Corporation (ECIC); managed care plans; the Michigan Public Health Institute; and others to meet and address these requirements and produce the report outlined in the Public Act.

Background

Historic Perspective of Perinatal Regionalization

Although regionalization of perinatal care can be traced to the development of premature infant centers in the United States during the 1930s and 1940s, the 1976 March of Dimes Foundation Committee on Perinatal Health report, *Toward Improving the Outcome of Pregnancy: Recommendations for the Regional Development of Maternal and Perinatal Health Services (TIOP I)* is recognized as the sentinel document stimulating acceptance and rapid diffusion of regionalization across the country.

From the mid-1970s and mid-1980s, improved perinatal risk identification, transport, and technology and the application of levels of care became accepted as national standards of care (American Academy of Pediatrics, American College of Obstetricians and Gynecologists, 2002). Butterfield (1980) also emphasized potential system improvements that were possible effects of regionalization (i.e., expanded role of nursing, inter-hospital care, shared services, and systems development). Subsequently, the number of neonatologists increased, as did the number of NICUs, often in low-volume units in small community hospitals. These phenomena led to increasing "deregionalization" of perinatal services. As a result, the March of Dimes Foundation Committee on Perinatal Health was reinstituted and published *Toward Improving the Outcome of Pregnancy: the Nineties and Beyond (TIOP II)* (1993). TIOP II included recommendations for expanding the TIOP I emphasis on hospital care around the time of birth to a more comprehensive spectrum of prenatal and preconception care, expanded use of data systems for quality improvement and increased accountability, and stronger roles for local/regional centers. The emphasis on perinatal health was further emphasized by Grayson and Guyer (1995), which indicated one of the top ten essential services to be performed by maternal child health agencies, is to "evaluate the effectiveness, accessibility, and quality of perinatal health and population-based maternal and child health services." In 2004, The American Academy of Pediatrics (AAP) published a policy statement, "Level of Neonatal Care" recommending regionalized systems of perinatal care.

The concept of regionalized perinatal care has been shown to improve outcomes among high-risk infants. According to information published by the Robert Wood Johnson Foundation (2001), Nigel Paneth of Michigan State University found that mortality of low birth weight babies was significantly higher in Level I and Level II centers than in Level III centers; in some areas, mortality decreased by one third to one half when babies were cared for in tertiary centers. Despite this, regional perinatal networks began to dissolve; this dissolution was attributed to both competition between Level III and Level II hospitals and the effect of managed care's geographically constructed networks. However, that was not the finding of Dobrez (2006) who conducted an extensive retrospective study examining the perinatal regionalization experience in four states (California, Illinois, North Carolina and Washington). He concluded that managed care had no negative impact on the regionalization model or birth outcomes in those states.

Healthy People 2010 (U.S. Department of Health and Human Services) established goals of 90% for both very low birth weight infants being delivered in subspecialty hospitals and women obtaining early and adequate prenatal care. A retrospective cohort study conducted by Attar, Hanrahan, Lang, Gates, and Bratton (2006) found that mothers of VLBW infants who did not receive adequate prenatal care and did not live in the vicinity of a subspecialty center were at increased risk for delivery outside a center and appropriate place of birth for low-income may be influenced by proximity to a regional center. These findings strongly support a regional approach to perinatal care delivery.

Perinatal Regionalization: Experiences in Other States

A number of other states have well-established regional mechanisms for the delivery of perinatal care. This section briefly examines regionalization programs in other states and potential application to Michigan. It should be noted that although the structure, provision and funding of coordinated care for perinatal services at the local or regional levels differ among states, the goal is to ensure that pregnant women and newborns have access to appropriate levels of high quality, safe and effective care, in time, before, during and after delivery. In addition, state goals include meeting the needs of the infants at risk for neonatal complications and reducing the incidence of maternal death due to obstetric complications.

Table 1 – Perinatal Regionalization Structure by State

The following states were included in a 2006 report prepared for the Virginia Department of Health, Office of Family Health Services. Each of these states reported they were generally satisfied with their current system for perinatal regionalization. Specifically, these states reported that regional entities helped in understanding regional/local needs, assisted in providing high-risk populations with needed services, and assisted with the successful implementation of new perinatal health initiatives through relationships with local entities. The challenges or concerns cited centered on methods to ensure equitable resource distribution, and maintaining effective communication without adding administrative burden.

State	Regional Structure
Maryland	State structure includes local public health departments in 24 counties that work with communities. The program is funded by grant dollars from the State DOH to conduct fetal infant mortality review. All Medicaid recipients are enrolled in managed care which provides case management.
New York	The state has 15 perinatal networks and 11 regional forums (perinatal centers). The networks are separate non-profit organizations; all housed in community organizations. This system of regionalized perinatal services includes four levels of perinatal care provided by hospitals within a region (called affiliate hospitals). Each region has a Regional Perinatal Center (RPC), which provides the most sophisticated care and provides education, advice and support to their affiliate hospitals. The state has designated 145 hospitals as Perinatal Centers. State and federal funding support the perinatal networks (based on the number of births and hospitals). http://www.health.state.ny.us/community/pregnancy/health_care/perinatal/regionalization_descrip.htm
North Carolina	North Carolina's DOH contracts with four tertiary centers and 13 local health departments to coordinate care for high-risk populations. Case management services are provided by Medicaid on a statewide basis. The state also provides funding to sites with high levels of non-Medicaid populations.
New Jersey	The state's system includes six independent, non-profit regional perinatal maternal and child health consortia. Consortia include a mix of community-based providers, hospitals and consumers. The perinatal program is funded through a hospital assessment tax based on the number of births in each facility; the tax rate is established by the Consortia Board.

State	Regional Structure
Pennsylvania	Local public health departments in the state oversee perinatal care; however, only 7 of 67 counties have health departments and oversee health in their district (3 city health departments, with the remainder of the state covered by six health districts). Each district has a maternal-child health consultant. Nurse family partnerships are utilized to provide structured home visits from pregnancy through 24 months. The program is funded by a mix of federal, state and local funding.
South Carolina	The South Carolina DOH contracts with five perinatal centers in four regions. The program includes a systems developer for perinatal services in each region. In addition, each center has an OB outreach and neonatal outreach educator. The regional systems developers work with all perinatal providers and hospitals in their regions to develop and support a system of risk-appropriate care for all mothers and babies. Funding for the program is through DOH and hospitals with state support formula that includes a base plus number of births.
West Virginia	West Virginia's perinatal system includes eight regions, each with an administrative unit called a regional lead agency. These units are the perinatal infrastructure for statewide coordination of care. The regional agencies are contracted providers (e.g., local health departments) staffed with one nurse and administrative support. The program is funded through Medicaid match and state block grant dollars. Case management of high-risk infants is also funded by Medicaid and includes up to one year of services.

The following states were not included in the Virginia report; information was obtained from other publicly available sources:

State	Regional Structure
Georgia	The Georgia Regional Perinatal Care Network (GRPCN) Project is a state/Medicaid funded program charged with the annual distribution of funds to eight designated regional centers for the care of eligible high risk mothers and infants. Funds are for the payment of direct costs associated with the care of high risk mothers and infants at the regional centers, as well as administrative costs associated with outreach, education and transport services provided to hospitals within each center's region. Payments for direct costs of care are designed to fill the gap between the Medicaid reimbursement and the cost of high risk services, as well as support the care of uninsured or insured patients with incomes less than or equal to 250% of the federal poverty level. http://www.npic.org/Contracts/MedicaidFunding.php
Ohio	The State of Ohio's program provides funding to six agencies to support a regional perinatal system development including, coordination of resources for prenatal, delivery/birth, post-partum and newborn care. All maternity and newborn care hospitals, local health departments and other public health entities are assisted by the Regional Perinatal Centers Program. Grantees undertake activities in the areas of monitoring system performance, facilitating system development and resulting education. Perinatal Data Use Consortia have been formed to engage maternal and infant health professionals in a learning process to advance data knowledge and application to improve the quality of perinatal care across systems. http://www.odh.ohio.gov/odhPrograms/cfhs/rpc/rpc1.aspx

State	Regional Structure
Washington	Washington has four Perinatal Regional Network contractors. Each of the four regional programs provides a licensed healthcare professional with expertise in neonatal and/or perinatal nursing or medicine to facilitate, coordinate, and support perinatal quality improvement within their regions and the state. The Perinatal Regional Network is coordinated by the Department of Health, Office of Maternal and Child Health, and is a collaborative effort with the Health and Recovery Services Administration/Medicaid. The program uses state and federal funds to contract with geographically strategic healthcare institutions to coordinate and implement state and regional quality improvement projects to decrease poor pregnancy outcomes for which Medicaid clients are at disproportionately increased risk. A leadership team, comprised of members from the agency and Medicaid, is responsible for strategic planning, contract management, and technical assistance for Perinatal Regional Network coordinators.

Based on the above information, it appears that other states generally employ a collaborative approach to perinatal regionalization, coordinated or led by departments of health in partnership with Medicaid (and possibly other) state agencies. Several states have established consortia of professionals with expertise in perinatal care to promote evidence-based, risk-appropriate care. Unlike these states, Michigan currently has no formal system for perinatal regionalization, although this was not always the case.

Perinatal Regionalization: The Michigan Experience

Michigan was a leader in regionalization of perinatal systems in the 1970s and 1980s. During that period, Michigan led the nation in pioneering the concept of a regionalized perinatal system. As previously described, Dr. Nigel Paneth conducted research at Michigan State University and demonstrated decreases in mortality of low birth weight babies receiving care in tertiary care centers.

In 2005, the Michigan Department of Community Health initiated a collaborative effort with Grand Valley State University (GVSU) to conduct a regional perinatal survey. In the survey report (2007), MDCH and GVSU concluded that although Michigan once led the nation in the development of regionalized perinatal care, this was no longer the case, and no formal regional perinatal system existed in Michigan. At that time MDCH and GVSU concluded that high-technology NICU care made it possible to save the lives of low birthweight babies who previously might have died. The report also noted that highly sophisticated equipment and specialized staff are required to deliver care to these infants. The report recognized that regional perinatal networks were widely credited for a rapid decline in neonatal mortality over the previous 20 years and recommended organizing Michigan's perinatal care geographically, with each geographic region having three levels of care: a level III hospital (often an academic medical center) to treat newborns in need of the highest level of intensive care; pregnant women would be identified early and transferred to a Level III facility. A Level II hospital would care for mothers and/or newborns with moderate complications. Level I hospitals would treat mothers and newborns with minor or no complications. MDCH and GVSU recommended rebuilding perinatal regionalization and developing detailed definitions and practice guidelines for levels of care based on the American Academy of Pediatrics guidelines and examining capacity and need to develop more well-defined and coordinated regions.

Perinatal Regionalization: Fiscal Implications

Evaluations of the impact of perinatal regionalization have primarily focused on the quality and safety of maternal and perinatal care, rather than fiscal analyses or return on investment. However, an article published by Lowery, Bronstein, McGhee, Ott, Reece, & Mays (2007) describing Arkansas' process to improve perinatal regionalization cited studies demonstrating that regionalization is associated with decreased neonatal mortality and increased cost efficiency. Lowery, et. al intend to further study the Arkansas experience using a combined cost-effectiveness and cost-utility analysis and predicted decreased cost of maternal and fetal care. Similarly, the Brookings Institution (2009) indicates regionalized perinatal care is "inherently cost effective, utilizing graded levels of care according to need."

Formal study is necessary to fully understand the fiscal implications of a regional perinatal system in Michigan in the 21st century. However, some assumptions have been made about resource needs in an effort to estimate costs related to beginning the process of establishing a regional perinatal system in our state.

Michigan's regional perinatal system (MRPS) will serve as a guide for a quality improvement process and will work to supportively reinforce efforts for improving quality in neonatal, obstetric, and perinatal care. The Vermont Oxford Network (VON) is a recognized model to follow for a statewide quality improvement process. VON is a non-profit voluntary collaboration of health care professionals dedicated to the mission of improving the quality and safety of medical care for newborn infants and their families through a coordinated program of research, education and quality improvement projects. Established in 1988, the Network is today comprised of over 650 Neonatal Intensive Care Units around the world. Currently, Michigan has tertiary centers participating in VON, and the new leadership team has a state representative. This sets the stage for further collaborative efforts among hospitals, as well as between private and public sectors. Collaboration with this organization of committed professionals will occur by establishing a Michigan state section of the VON, including all tertiary centers in the state.

Michigan has 24 hospitals with neonatal intensive care beds or tertiary centers. These hospitals will be provided a match for the cost of membership in the Vermont-Oxford Network (low birth weight and expanded databases) or comparable Quality Improvement entity and will be required to collect defined data fields for review and analysis. Using recommendations from leading Michigan professionals in the field of perinatal care, a core set of hospitals will be designated perinatal centers. These will serve as regional training and consultation sites for the state to assure the standard of care is being followed by all professionals providing perinatal care for women and infants. These sites will also support efforts for quality improvement within the state's perinatal care system. Regular reports will be generated describing the picture of Michigan's perinatal care and sharing data. State support will be provided to the MRPS.

The AAP/ACOG Level of Care Guidelines modified to reflect Michigan's standard of perinatal care have been recommended for adoption. These guidelines will require regular review to assure they continue to represent the current, evidence based approach for perinatal care. A consortium of Michigan's professional perinatal experts will convene to conduct the recommended review at designated intervals to be determined.

Estimated Cost: Michigan

The following is a preliminary estimate of resources needed to initially implement a state regionalized perinatal system. Ongoing program sustainability and care costs are not included in

this estimate. Resources to support the recommended state authorization component will be required. The cost of this will need to be determined. It is clear that ongoing review and study will be required to have a more defined picture of the cost, return on investment, and total fiscal implication of this recommended change.

Resource	Estimated Cost
Regional System Support 24 NICU hosp. x $8K 93 birthing hosp x $4K Neonatal/Pediatric/Obstetric	$564,000
Training	150,000
Supplies	50,000
MDCH Staffing Nurse Consultant 13, with special cert. (Lead Worker) 1.0 FTE Data Analyst 12 0.5 FTE	108,000 32,000
Data Support	96,000
TOTAL	**$1,000,000**

Guidelines for Perinatal Levels of Care

To fulfill the requirements specified in Section 116 of PA 246, 2008 and consistent with recommendations from MDCH and GVSU (2007), MDCH convened work groups of clinical experts in neonatal, obstetrical, and pediatric specialties in early 2009. These work groups were charged with modifying the current, evidence-based levels of care guidelines published by ACOG and AAP to reflect Michigan specific standards of perinatal care as a foundation for the State's coordinated perinatal system. There are specific advantages to developing Michigan levels of care guidelines:

- Standard definitions will permit comparisons for health outcomes, resource utilization, and costs among institutions.
- Standardized nomenclature will be informative to the public, especially high-risk maternity patients who may seek an active role in selecting a delivery service.
- Uniformity in definitions of levels of care published by a professional organization will minimize the perceived need for businesses that purchase health insurance for their employees to develop their own standards.
- Uniform definitions will facilitate the development and implementation of consistent standards of service provided for each level of care.

These Michigan guidelines include strategies to improve access to service, identify risk early, provide linkage to the appropriate level of care and ensure compliance, continuity and comprehensiveness.

Proposed Guidelines and Discussion

The following is a summary of the discussion and recommendations for Michigan's evidence-based perinatal levels of care guidelines from each specialty workgroup.

Obstetrics

The Obstetric Workgroup was asked to "Michiganize" the level of care guidelines for obstetric units as a foundation for a state coordinated perinatal system. These levels are based on the concepts put forth by the AAP/ACOG in their jointly published book Guidelines for Perinatal Care (*Blue Book, 2007*), with details based on what the subject matter experts agreed are appropriate to Michigan.

It was noted that regionalization affords better access, appropriate levels of care (i.e., higher level of care when needed) and improves outcomes. Michigan's unique geographic challenges must be considered, which differ from many states with a regional system. The 1982 guidelines developed by the Michigan State Medical Society are now 25 years old, and hospital competition is present factor.

The literature describes trends seen in the State of Michigan. Gould, et. al (2002) described the California experience, where live births at hospitals with community NICUs (Level 2+) increased from 11.7% to 37.4%. Births and very low birth weight (VLBW) births at regional NICUs decreased. No significant difference was seen in neonatal mortality of VLBW infants at community or regional NICU hospitals, but increased mortality was noted for VLBW infants delivered at institutions with lower levels of care. There was a difference between self-designated NICU services and care designation by a team of public health workers and neonatologists.

There is a range of conclusions, but optimal delivery of a high risk neonate (750 – 1250 grams birth weight) is in a tertiary care center. In utero transfers are optimal (due to lower morbidity & mortality). This extends to birth weight less than 2000 grams, where mortality was higher if delivered in hospital with no NICU (odds ratio (OR) 2.38), intermediate NICU (OR 1.92), or community NICU (OR 1.42) (Cifuentes, et. al, 2002). Other factors contributing to mortality and morbidity include maternal socio-behavioral risk which accounted for 73 percent of the variation in hospital fetal death rates and 38 percent of hospital neonatal mortality rates. Inborn VLBW and neonatal transport had significant, independent effects on both hospital fetal death rate and hospital neonatal mortality rate.

The workgroup agreed that the State must designate level of care for hospitals. Hospitals cannot self-designate, and hospitals should be required to go through a state established process.

Rural issues were noted, including consideration of the availability of competent ultrasound, decision challenges, American Institute for Ultrasound and Medicine (AIUM) Guidelines, and obstetric-experienced radiology. The workgroup recommended examining the quality of prenatal care as a next step. The workgroup also stressed that inter-connectivity within regions is needed, including electronic medical records to share and discuss patient care.

Quality performance measures for monitoring outcomes should incorporate the knowledge that the largest impact on maternal and fetal outcomes may relate to access to prenatal care, preterm birth rates, and delivery of preterm infants in a facility able to provide appropriate intensive neonatal care. Specific indices to consider are:

- Delivery volumes
- Gestational age and birthweight range at delivery (and number outside the defined level)
- B-methasone administration prior to delivery in <34 weeks intact membranes and <32 weeks ruptured membranes

- Group beta strep (GBS) prophylaxis
- Unexpected transfers of neonate to higher level facility after delivery
- Use of 17-OH progesterone prophylaxis in patients with history of prior non-iatrogenic (spontaneous) preterm singleton birth
- Fetal trauma/birth trauma
- Elective delivery via induction or cesarean section prior to 39 weeks gestation
- Prenatal care (gestational age at onset)

The Obstetrics Workgroup also stressed that maternal mortality and morbidity are important indicators of health status in Michigan. A 1998 report from the CDC's National Center for Health Statistics indicated that in the U.S., the annual maternal mortality ratio remained approximately 7.5 maternal deaths per 100,000 live births during 1982-1996. Maternal mortality ratios (MMR) were also higher for black women (18 to 22 per 100,000 births) than for white women (5 to 6 per 100,000 live births); this disparity remains, with the Black/White MMR ratio consistently greater than two across all characteristics analyzed. Surveillance data from 2004 (MDCH, 2006) indicate Michigan's Black/White ratio was 4.5 (White MMR 38.4 compared to Black MMR of 182.5). According to the December 2006 MMMS report, primary causes of maternal death in Michigan include obstetric embolism (15.2%), hypertension during pregnancy (13.1%), cardiomyopathy in puerperium (13.1%), and hemorrhage (7.1%). Maternal death as a result of accidents (57.4%), assaults (27.7%), and intentional self-harm (11%) were also identified as significantly contributing to maternal death. Data suggest that maternal deaths could be prevented through changes in the health and behavior of women before, during and after delivery through early diagnosis and appropriate medical care.

Women's health must be optimized prior to conception, planned or not. Doing so means promoting women's health over the lifespan and across the entire spectrum of public health programs. For instance, preconception health of women became a key public health strategy in the United States to decrease morbidity and mortality associated with adverse maternal and infant outcomes. In 2006, the Centers for Disease Control and Prevention published ten recommendations for improving the health of women before pregnancy that are being used by state public health agencies, including the Michigan Department of Community Health, in developing policies and programs to address preconception health. Evaluation plans of these policies and program efforts will be developed and implemented along with the continued assessment of preconception health among women.

Due to the scope of this report, these issues are not reflected in Attachment A, Michigan Perinatal Level of Care Guidelines but must be considered in future activities around clinical guidelines addressing maternal and child health.

Obstetric guidelines are included in Attachment A, Michigan Perinatal Level of Care Guidelines.

Neonatal/NICU

The neonatal/NICU workgroup based its guideline recommendations on those outlined by the American Academy of Pediatrics (AAP) in "Levels of Neonatal Care" (2004) and in the Sixth Edition of *Guidelines for Perinatal Care* by the AAP and the American College of Obstetrics and Gynecology. Michigan guidelines developed by the Neonatal/NICU workgroup are delineated in Attachment A, Michigan Perinatal Level of Care Guidelines. These Michigan modified guidelines divide neonatal care into the following six categories based on level of care provided:

I, IIA, IIB, IIIA, IIIB, and IIIC, with level I units able to care for normal newborns and level IIIC units caring for newborns with the most severe or complex illnesses.

The Neonatal/NICU subgroup reported that some NICUs in Michigan care for babies outside the scope of the new guideline definitions and may need to adjust the acuity of babies cared for in their units. Specifically, several level IIIA NICU's (so categorized because they do not have pediatric surgeons or multiple pediatric subspecialists) care for babies of less than 29 weeks gestation, even though the AAP Committee on the Fetus and Newborn guidelines require such premature babies to be cared for in level IIIB or IIIC NICUs. The workgroup endorsed the AAP recommendation for Michigan.

One of the intents of this document and the Michigan Perinatal Level of Care Guidelines is to provide a framework to define and evaluate the level of perinatal care delivered by hospitals and to ensure that care meets specific level of care criteria. The Neonatal/NICU subgroup stressed the need for the State to have a mechanism to oversee and enforce these categories. Currently, the State certifies neonatal intensive care units (NICUs) through the Certificate of Need (CON) process and designates some hospitals for a certain number of NICU beds. However, the designation and CON make no mention of the level of care that can be provided by the NICU. The subgroup also recommended that any revised CON process should be able to retrospectively change a hospital's NICU designation. That is, even if a new mechanism to issue CONs designating NICU levels is developed, a hospital issued a CON under the previous system using NICU beds could not maintain its NICU designation without conforming to new standards.

The following are recommendations for state oversight and regulation of the perinatal care system:

- The State of Michigan should establish a Perinatal Guidelines Advisory Committee to continually review and update the Michigan Perinatal Level of Care Guidelines and provide recommendations for hospital level of care designation.
- The State of Michigan should designate an oversight body to review and make determinations regarding a hospital's perinatal level of care certification.
- Hospitals participating in the regionalized system of perinatal care shall comply with the guidelines approved by the advisory committee for perinatal guidelines for the level of care selected by the hospital.
- The statewide perinatal health care program oversight body should perform periodic on-site verification surveys of perinatal service programs to verify the hospital continues to meet level of care criteria.
- Results of each survey shall be submitted to MDCH, along with a recommendation to continue, suspend, or revoke the hospital's perinatal certification.
- Hospital perinatal certification information should be made available to the public to ensure transparency and to assist consumers in selecting appropriate perinatal hospital.
- Work in collaboration with EMS/trauma system to assure that each perinatal patient "get to the right place in the right time".

The following are recommended requirements for a hospital to be reviewed for a new perinatal level of care designation:

- Submit the following information to a Perinatal Guidelines Advisory Committee:
    - Description of the geographic area to be served
    - Identification of the target population to be served
    - Identification of Level I hospitals to be served
    - Identification of any overlap with existing higher level hospitals and/or centers

- Identification of unmet needs of the area to be served
- Demonstration of the ability to meet the most recent perinatal guidelines

In summary, the Neonatal/NICU workgroup concluded that the State of Michigan should develop a method of authoritative recognition of different levels of NICU care, as well as a mechanism to insure that hospitals and NICUs care for only those neonates for which they are qualified. This would optimize care, potentially contributing to improved neonatal mortality rates, and provide health care consumers with reliable information when selecting a hospital.

Neonatal guidelines are included in Attachment A, Michigan Perinatal Level of Care Guidelines.

Pediatrics/Infancy

The Pediatrics/Infancy workgroup focused much of its attention on discharge/transition to home and follow-up for NICU graduates, noting that the transition from the NICU to home can be challenging and stressful, and with few exceptions, families require assistance in adjusting to the reality of caring for their infant(s) at home. They stressed the availability of social support as an essential component for the success of every parent's adaptation to the home care of a high-risk infant. By suggesting support services or parental support groups, providers may assist parents in coping with the stresses of uncertainty regarding their individual situation and their child's anticipated outcome. Because of the emotional turmoil that having an infant in a NICU can cause, parents and caregivers often find benefit in joining support groups. Programs for social services, developmental disabilities, home nursing, respite, spiritual services and economic assistance are often needed, as well. A NICU discharge conference should be held with hospital representatives and appropriate community resource representatives such as Early On, CSHCS, MIHP and the medical home provider. Although connections to such resources (both public and private) should be made prior to discharge, post-discharge support is needed to assure continued access to service and to reduce barriers to services that the families may encounter. This should be an integral part of pre/post discharge home visits, as well as the NICU Follow-up Clinic visits.

Transition to Home

The Pediatrics/Infancy workgroup recommended that the following activities occur prior to discharge/transition:

1. Create necessary relationships between NICUs and community agencies/entities

- Establish a relationship between NICUs and early intervention.
- Identify a core team (may be comprised of members from the hospital and/or community setting; a combination allows for better linking of the patient and family in both settings)

2. Define and communicate roles of hospital personnel, NICU Follow-up Clinic and community providers, including programs and services like early intervention (or similar early intervention programs). Mechanisms to create these relationships will vary by community but may include formal memoranda of agreement.

3. *Create a follow-up core team, to include*:
    - Parent
    - Physician (ideally a developmental pediatrician)
    - Physical Therapist and Occupational Therapist
    - Speech/language pathologist to evaluate language development and feeding
    - Psychologist for neurodevelopmental testing and interpretation

- Nutritionist (or WIC Registered Dietitian)
- Social Worker
- Registered Nurse (care coordinator)
- Audiologist or staff trained to do objective hearing assessment

4. Create a system to ensure that follow-up NICU care is available to all patients who meet criteria

- Review existing guidelines/best practices, including the follow up core team composition
- A NICU neonatal follow-up clinic should be attached to the highest level of infant care based on the guidelines
    - All level 3 NICU's should have a Neonatal Follow-Up Clinic
    - Level 1 and 2 NICU's should have a referral arrangement with a Neonatal Follow-Up Clinic
- Ensure the availability of regional neonatal follow-up clinics and satellites (as determined by regional clinic)
- Establish standards for neonatal follow-up clinics; determine process for approval and oversight
- Ensure NICU follow-up clinics have the capacity for complete evaluation (medical and developmental)
- Evaluate the need to license or certify follow-up neonatal clinics and determine process(es)

5. Develop a comprehensive discharge plan prior to NICU discharge, based on the following considerations

- Refer all NICU graduates to a neonatal follow-up clinic at discharge
    - Level I Nursery
        - Transition plan to home
        - Assessment if home visit is needed
        - Referral to a regional neonatal follow-up clinic if a back transfer and meets follow-up criteria
    - Level II Nursery
        - Transition plan to home
        - Assessment if home visit is needed.
        - Referral to a regional neonatal follow-up clinic if a back transfer and/or meets follow-up criteria
    - Level III Nursery
        - Transition to home plan
        - Coordinate with public health and other community resources the provision of home visitation prior to discharge and one to two weeks after discharge for all Level III babies.
        - Must have a neonatal follow-up clinic with appropriate staffing, linked with early intervention system.
- The discharge planning team should include:
    - Parents
    - Case Manager
    - Social Worker
    - Hospital Nurse
    - Home Nurse
    - Neonatologist/Pediatrician
    - Other professional staff as needed.
- Prior to discharge, discuss the follow up care plan, including the designation of a primary care physician, and make appointments with appropriate pediatric subspecialists (e.g.

pediatric pulmonologist for infant with chronic lung disease, cardiologist for cardiac anomaly, etc.). This is particularly important for infants that will not be followed and managed for a subspecialty condition in a neonatal follow-up clinic.

- It is prudent that a subspecialist see the patient in the NICU prior to discharge so that continuity may be maintained between neonatal care and pediatric subspecialty care.
- If a patient's subspecialty condition (e.g. chronic lung disease) is managed by neonatologists in a NICU follow up clinic, every attempt should be made to systematically transition the care of that infant's condition to a subspecialist through direct communication between providers and, ideally, joint clinic visits at a time in the patient's clinical course, deemed appropriate by the neonatal provider.
- Obtain parental permission for release of information to early intervention and other appropriate services.
- Early intervention services should be in place before discharge; refer to early intervention prior to discharge
- Coordinate care and arrange for any needed services, including transportation (which should be free to the parent)
- If distance to or lack of a neonatal follow-up clinic is an issue, consider telemedicine options for follow-up
- Conduct necessary screening (e.g., hearing and vision)
- Enter hearing and vision screening results into a database (such as the Michigan Care Improvement Registry, MCIR)

Follow-up

1. Criteria for infant to be referred to Neonatal Intensive Care Follow-up clinic:

Preterm:

- VLBW ≤ 1500 grams or less than 32 weeks gestation
- Infants with cranial ultrasound abnormalities, including periventricular, leukomalacia/ intraventricular hemorrhage and linear hyperechogenicity
- Other neurologic problems (seizures, hydrocephalus)
- Necrotizing enterocolitis
- Chronic lung disease
- Complex medical problems
- Hyperbilirubinemia requiring exchange transfusion
- Failure to grow in the NICU
- Culture proven sepsis, meningitis and nosocomial infections
- Abnormal neurologic exam at discharge

Term:

- Encephalopathy persisting at discharge
- Other neurologic problems/seizures and hydrocephalus
- Complex medical problems
- Twin-twin transfusion
- Complex congenital anomalies
- Meningitis
- Hyperbilirubinemia requiring exchange transfusion
- Abnormal neurologic exam at discharge
- Extracorporeal Membrane Oxygenation

Other infants or preterm infants where there are significant concerns from the medical team should be referred for follow-up.

Ideally all infants with level III acuity would be referred to early intervention for ongoing follow-up between the time of discharge and their visit in the follow-up clinic.

2. The following is a recommended schedule for comprehensive visits in the NICU follow-up clinic:
   - 6-8 months
   - 12-14 months
   - 18-24 months
   - 3 years
   - After 3 years (if there are persisting concerns) refer to another center (depending on the specific concern(s), e.g., cerebral palsy, autism, etc.)

Pediatrics guidelines are included in Attachment A, Michigan Perinatal Level of Care Guidelines.

Recommendations

As discussed in the previous pages of this document, in summary, the Michigan Perinatal Care workgroups recommend that Michigan:

1. Adopt the Michigan Perinatal Level of Care Guidelines.
2. Develop a method of authoritative recognition of levels of NICU care and establish a statewide mechanism to oversee and enforce adherence to the Michigan guidelines to ensure that hospitals and NICUs care for only those mothers and neonates for which they are qualified
3. The Guidelines should be periodically reviewed and updated as new data occur and recommendations from national groups are made.
4. If the authoritative recognition of levels of care is through the Certificate of Need process, Create a provision to retrospectively change a hospital's perinatal level of care designation
5. All Level III NICUs should have a NICU Follow-up Clinic
6. Standards for the NICU Follow-up Clinics should be developed and the State should develop a mechanism for authoritative recognition of the NICU Follow-up Clinic
7. Ensure that NICU Follow-up Clinics have the capacity for complete evaluation, both medical and developmental
8. NICU follow-up care should be covered by insurance, including neurodevelopmental testing, to assure continued access to care and to reduce barriers to services.
9. The state should allocate funds so that all Level III babies receive home visits.
10. Educate medical providers about the needs of NICU graduates
11. Support the enrollment of all NICUs in Vermont Oxford Network
12. Develop a mechanism for follow-up of privately insured infants
13. Utilize available data (e.g., Public Health Surveillance system, Medicaid data warehouse, etc.) and track outcomes on key indicators, such as long-term effect of NICU care/treatment and infant mortality
14. Develop a system to follow-up on NICU graduates, including:
    a. Create a mechanism to capture all child/family services in one record, with information from all providers coordinated and shared.
    b. Connect to MDCH Health Information Technology Project to track outcomes, especially the long-term effects of NICU care/treatments and infant mortality.

    c. An electronic record is ideal, or use a database such as the Michigan Care Improvement Registry (MCIR).
15. The State of Michigan should address the critical shortage of nurses in the state and conduct ongoing evaluations of staffing shortages and potential impact on the provision of care.
16. Convene an annual conference or meeting with representatives from all Levels of Care to review and provide education regarding the guidelines and areas for improvement in the care to obstetric patients, neonatal and pediatric care.
17. Convene representatives from all entities involved in the delivery of optimal healthcare to women and children at regional and state levels to discuss barriers to optimal care and mechanisms to resolve those barriers
18. Work in collaboration with EMS/trauma system to thus assure that each perinatal patient "get to the right place in the right time." There is currently an internal collaborative effort at MDCH that will lead to a better understanding of the common venues for further coordination.

Conclusions

Creating a system for regionalized perinatal care is an approach consistent with evidence-based guidelines promulgated by the American Academy of Pediatrics and the American College of Obstetrics and Gynecology and successfully adopted by other states. This approach ensures that hospitals and NICUs operate within appropriate, clearly defined level of care designations and ensures collaboration among regional entities providing services to women, neonates/infants and families. Convening subject matter experts in OB, Neonatology, and Pediatrics was a unique opportunity to examine pediatric regionalization in Michigan. This collaborative approach also established a venue to develop comprehensive Michigan perinatal guidelines and obtain valuable recommendations for policy improvements in the area of perinatal care.

APPENDIX A Michigan Perinatal Level of Care Guidelines

ATTACHMENT A
MICHIGAN PERINATAL LEVEL OF CARE GUIDELINES

(Based on AAP/ACOG *Guidelines for Perinatal Care*, 6th Edition; AAP Policy Statement *Hospital Discharge of the High-risk Neonate*, 2008; and AAP *Follow-up Care of High-risk Infants*, 2004)

LEVELS OF CARE						
Neonatal *and* Maternal	Level I (Basic) Community-Based Maternal-Newborn Service	Level II A (Specialty) Community-Based Maternal-Newborn Service with a Special Care Nursery	Level II B (Specialty) Community-Based Maternal-Newborn Service with a Special Care Nursery	Level III A (Subspecialty) Perinatal Care Center and Neonatal Intensive Care Unit	Level III B (Subspecialty) Perinatal Care Center and Neonatal Intensive Care Unit with Neonatal Subspecialty Service	Level III C (Subspecialty) Perinatal care center or Freestanding Pediatric Hospital with Neonatal Subspecialty Service
PATIENT POPULATION						
Neonatal						
Gestation/weight/risk	Level I Greater or equal to 35 weeks gestation in pregnancies unlikely to deliver before 35 weeks gestation that have a low likelihood of neonatal or maternal morbidity. Care of the physiologically stable infants and normal newborns	Level II A Level I + Greater than 32 weeks gestation and weighing more than 1,500 grams (uncomplicated preterm infant with problems that are expected to resolve rapidly not needing urgent subspecialty service)	Level IIB Level I + Greater than 32 weeks gestation and weighing more than 1,500 grams (uncomplicated preterm infant)	Level IIIA Level II + Greater than 28 weeks gestation and weighing more than 1,000 grams	Level IIIB Level III A + Less than 28 weeks gestation and weighing less than 1,000 grams or who have severe or complex illnesses	Level IIIC Level III A + Less than 28 weeks gestation and weighing less than 1,000 grams or who have severe or complex illnesses
Minimum number of VLBW infants per year	NA	NA	NA	15	70	70
MATERNAL						
Gestation/weight/risk	Level I Pregnancies > 35 weeks gestation in pregnancies unlikely to deliver before 35 weeks gestation that have low likelihood of neonatal or maternal morbidity	Level II A Pregnancies >32 weeks gestation in selected high-risk pregnancy conditions judged unlikely to deliver before 33 weeks with low risk of	Level IIB Pregnancies >32 weeks gestation in selected high-risk pregnancy conditions judged unlikely to deliver before 33	Level III A Pregnancies >28 weeks gestation in women without significant co-morbidities	Level III B Pregnancies all gestational ages and all maternal conditions	Level III C Pregnancies all gestational ages and all maternal conditions

		neonatal or maternal morbidity	weeks with low risk of significant neonatal or maternal morbidity			
SURGERIES/PROCEDURES						
Neonatal						
Intensive care support **(higher level neonatal care above that of the perinatal service is acceptable due to geographical distance or demography)**	Level I Stabilization of sick newborn infants until transfer only Surgery: NA	Level II A Stabilization of sick newborn infants until transfer only Surgery: NA	Level II B Level II A + CPAP and mechanical ventilation for less than 24 hours Surgery: NA	Level III A Level II B + CPAP and conventional mechanical ventilation Surgery: minor – central line and hernia repair	Level III B Level III A + high frequency ventilation (HFV), inhaled nitric oxide (iNO) Surgery: Level III A + pediatric surgery	Level III C Level III B + ECMO (Extracorporeal membrane oxygenation) and cardiac surgery. Surgery: Level III B + open cardiac surgery.
MATERNAL						
Triage system	Level I Experience obstetric Registered Nurse with physician availability within 30 minutes	Level II A Experienced obstetric Registered Nurse with physician availability within 30 minutes	Level II B Experienced obstetric Registered Nurse with physician availability within 30 minutes	Level III A Experienced obstetric Registered Nurse with physician available in hospital for consult or directly providing service. Midlevel care provider (CNM, NP, or PA) or physician is available to triage patients transferred from lower level health care facility.	Level III B Experienced obstetric Registered Nurse with physician available in hospital for consult or directly providing service. Midlevel care provider (CNM, NP, or PA) or physician is available to triage patients transferred from lower level health care facility.	Level III C Experienced obstetric Registered Nurse with physician available in hospital for consult or directly providing service. Midlevel care provider (CNM, NP, or PA) or physician is available to triage patients transferred from lower level health care facility.

Cesarean Section	Level I Within 30 minutes of decision and appropriate to the current clinical situation	Level II A Within 30 minutes of decision and appropriate to the current clinical situation	Level II B Within 30 minutes of decision and appropriate to the current clinical situation	Level III A Within 30 minutes of decision and appropriate to the current clinical situation	Level III B Within 30 minutes of decision and appropriate to the current clinical situation	Level III C Within 30 minutes of decision and appropriate to the current clinical situation
Intensive Care Support	No	No	No	No	Required (does not require a dedicated obstetric unit)	Required (does not require a dedicated obstetric unit)
HOSPITAL ORGANIZATION						
Neonatal and Maternal						
Organization	All Levels Hospital's Board of Directors, administration, and medical and nursing staff shall demonstrate commitment to its specific level of perinatal center designation and to care of perinatal patients. This commitment shall be demonstrated by: 1. A Board resolution that the hospital agrees to meet the Michigan Department of Community Health Perinatal System Standards for its specific level of designation. 2. Assurance that all perinatal patients shall receive medical care commensurate with the level of the hospital's designation. 3. A Board resolution, bylaws, contracts, budgets - all specific to the perinatal program - indicating the hospital's commitment to the financial, human, and physical resources and to the infrastructure that are necessary to support the hospital's level of perinatal center designation. 4. The hospital shall obtain and maintain current equipment and technology, as described in these standards, to support optimal perinatal care for the level of the hospital's perinatal center designation. 5. Participation in the Michigan Perinatal System as described by this document including submission of clinical outcome data to the Michigan Department of Community Health as appropriate for system and quality management. 6. Hospital shall be licensed by the Michigan Department of Community Health as an acute care hospital 7. Accredited by nationally recognized accreditation organization (e.g., JCAHO, AOA)					
Neonatal						
Transport Meet the requirements of the most current version of the Guidelines for Perinatal Care (6Th edition, chapter 3).	All Levels 1. Demonstrate on-going relationship with referral hospitals for immediate consultation, urgent transport. 2. Written policy for transport including triage system for identifying at risk patients and transferring to appropriate level of care facility. 3. Ensure a provider's continuing responsibility for care until transport team assumes full responsibility.					

ATTACHMENT A
MICHIGAN PERINATAL LEVEL OF CARE GUIDELINES

(Based on AAP/ACOG *Guidelines for Perinatal Care*, 6th Edition; AAP Policy Statement *Hospital Discharge of the High-risk Neonate*, 2008; and AAP *Follow-up Care of High-risk Infants*, 2004)

	4. Provide communication and recommendations for ongoing patient care at discharge. 5. If maternal or neonatal air transports are accepted, then the hospital shall have a heliport, helipad, or access to a helicopter landing site near the hospital. 6. Patients whose condition has stabilized and no longer require specialized services should be considered for transporting back to the referring hospital.					
NICU Transition and Discharge	Level I, Level II A, Level II B Must have a relationship or memorandum of understanding with a NICU follow-up clinic			Level III A, Level III B, Level III C Must have a NICU follow-up clinic		
Education for the Region: The staff of regional centers shall provide perinatal educational programs in both maternal and neonatal care in the region on a regular basis.	Level I, Level II A, Level II B NA			Level III A, Level III B, Level III C Requirement for regional perinatal center: 1. Review major perinatal conditions, their medical treatment and nursing care. 2. Review of perinatal complications and outcomes. 3. Feedback for all transports and frequency of failure to transfer appropriately to tertiary care center.		
MATERNAL						
Transport	Level I Relationship with Level 2B and/or Level 3A,B,C hospitals to facilitate/coordinate maternal transport out; responsibility for care continues until care assumed by receiving hospital -Stabilization and transport for unexpected maternal problems consistent with ACOG guidelines -Establish guidelines /procedures for identifying patients at risk who should be transferred -Transfer via advanced	Level II A Relationship with Level 2B and/or Level 3A,B,C hospitals to facilitate/coordinate maternal transport out; responsibility for care continues until care assumed by receiving hospital -Stabilization and transport for unexpected maternal problems consistent with ACOG guidelines -Establish guidelines /procedures for identifying patients at risk who should be transferred and (in case of diversion) necessary	Level II B Relationship with Level 3A,B,C hospitals to facilitate/coordinate maternal transport out and with Level 1, 2A for transport in; responsibility for care continues by referring hospital until care assumed by receiving hospital -Stabilization and transport for unexpected maternal problems consistent with ACOG guidelines - Establish guidelines /procedures for	Level III A Relationship with Level 3B,C hospitals to facilitate/coordinate transport out and with Level 1, 2A,B from transport in; responsibility for care continues by referring hospital until care assumed by receiving hospital - Maintain 24 hour system for reliable comprehensive communications between hospitals for immediate consultation and approval of	Level III B Relationship with Level 3C hospitals to facilitate/coordinate maternal transport out and with Level 1 through 3A for transport in; responsibility for care continues by referring hospital until care assumed by receiving hospital - Maintain 24 hour system for reliable comprehensive communications within and between hospitals for immediate consultation and approval of transports and within systems (i.e., EMS)	Level III C Relationship with all other levels to facilitate/coordinate maternal transport in; responsibility for care continues by referring hospital until care assumed by receiving hospital - Maintain 24 hour system for reliable comprehensive communications within and between hospitals for immediate consultation and approval of transports and

	life support if felt appropriate to the clinical situation	communication from upper level to lower level unit -Transfer via advanced life support if felt appropriate to the clinical situation	identifying patients at risk who should be transferred and (in case of diversion) necessary communication from upper level to lower level unit -Transfer via advanced life support if felt appropriate to the clinical situation	transports - Establish guidelines /procedures for identifying patients at risk who should be transferred and (in case of diversion) necessary communication from upper level to lower level unit - Involvement in statewide perinatal educational outreach programs in both OB and neonatal specialties in collaboration with the Michigan Dept Health	- Involvement in statewide perinatal educational outreach programs in both OB and neonatal specialties in collaboration with the Michigan Dept Health	within systems (i.e., EMS) - Involvement in statewide perinatal educational outreach programs in both OB and neonatal specialties in collaboration with the Michigan Dept Health
UNIT CAPABILITY						
Neonatal						
Equipment, Supplies, and Personnel **(The hospital shall demonstrate its capability of providing uncomplicated and complicated neonatal care through written standards, protocols, or guidelines.)**	<u>Level I, Level II A</u> 1. Resuscitation and stabilization of unexpected neonatal problems according to most current Neonatal Resuscitation Program (NRP) guidelines. 2. Selection and management of neonatal patients at a neonatal risk level appropriate to its capability - • Antibiotic administration, • Glucose management, • IV fluid administration, • Oxygen administration,	<u>Level II B</u> Level II A + Capability to include 1. Mechanical ventilation (<24 hrs) and nCPAP. 2. Umbilical lines	<u>Level III A</u> Level IIB + 1. Capability for prolonged mechanical ventilation 2. Minor surgery – central line or inguinal hernia repair	<u>Level III B</u> Level III A + 1. Management of all neonatal patients, including those requiring advanced modes of neonatal ventilation and life support, pediatric subspecialty services, 2. Advanced imaging and interpretation 3. Development and	<u>Level III C</u> Level III B + Pediatric subspecialty surgical services such as pediatric cardio-thoracic open-heart surgery, pediatric organ transplant and neurosurgery

	• Thermoregulation, • Sepsis Evaluation (blood draws, lumbar puncture), • Provision for parental contact prior to transfer etc.				evaluation of new technology and therapies	
MATERNAL						
Labor and Delivery	Level I Electronic fetal monitoring capabilities Level I Ultrasound (US) available to delivery area with appropriate support staff and equipment	Level II A Electronic fetal monitoring capabilities Level II A Limited US services available in delivery area	Level IIB Electronic fetal monitoring capabilities Level II B Limited ultrasound services available in delivery area	Level III A Electronic fetal monitoring capabilities Level III A - US available in L&D -Advanced level ultrasound available on-site	Level III B Electronic fetal monitoring capabilities Level III B - US available in L&D -Advanced level ultrasound available on-site	Level III C Electronic fetal monitoring capabilities Level III C - US available in L&D - Advanced level ultrasound available on-site
PERSONNEL						
Neonatal						
Leadership	Level I Physician with board-certified in pediatrics	Level II A Physician board-certified in pediatrics or in neonatal-perinatal medicine	Level II B, Level III A, Level III B, Level III C Physician board-certified in neonatal-perinatal medicine			
Coverage for Urgent Neonatal Issues	Level I, Level II A 1. Pediatrician, 2. Family practitioner.		Level II B 1. Neonatologist on call, 2. Pediatrician or NNP / PA shall be immediately available when needed	Level III A, Level III B, Level III C 1. Neonatologist to be available in-house within 30 minutes, 2. Pediatrician or NNP / PA or Neonatal Fellow (personnel qualified to manage emergencies) shall be immediately available in-house 24 hours a day.		
Subspecialty Staff	Level I, Level II A The hospital shall have written consultation and referral agreements in place with pediatric cardiology,		Level II B The hospital shall have written consultation and referral agreements	Level III A The hospital shall have on staff an ophthalmologist with experience in	Level III B The hospital shall have the following pediatric specialists on staff, in active	Level III C Level III B + pediatric surgical subspecialists: neurosurgery,

<table>
<tr><td></td><td colspan="2"></td><td>in place with pediatric cardiology and Genetics.</td><td>neonatal retinal examination and a written consulting relationship with pediatric cardiologist(s), genetics, and surgeon(s) etc.</td><td>practice and, if needed, in-house within 30 minutes or be urgently available at a closely related institution for consultation and care: <u>Pediatric subspecialists</u>: cardiology, neurology, genetics, hematology, Infectious disease, endocrinology, pulmonary, Nephrology, gastrointestinal, renal, Pathology, pharmacology, ophthalmology and <u>Pediatric surgery:</u> General and subspecialists.</td><td>cardiothoracic surgery, orthopedic surgery, plastic surgery, ophthalmology and ECMO team.</td></tr>
<tr><td>Nursing Staff

Meet the requirements of the most current version of the Guidelines for Perinatal Care (6th Edition, chapter 2)</td><td colspan="6"><u>All Levels</u>
1. A registered nurse skilled in the recognition and management of complications in newborns readily available to the Mother-Baby unit 24 hours a day.
2. A registered nurse with demonstrated training and experience in the assessment, evaluation, and care of newborns readily available to the neonatal unit 24 hours a day.
3. All nurses caring for ill newborns must possess demonstrated knowledge in observation and treatment of newborn to the appropriate level of care.
Registered nurses in the NICU should have specialty certification or advanced training and experience in the nursing management of neonates at high risk, including stabilization of unstable neonate and multi-organ system problems and supportive of their families.</td></tr>
<tr><td>Nursing – Neonatal Surgery</td><td colspan="4"><u>Level I, Level II A, Level II B</u>
<u>NA</u></td><td colspan="2"><u>Level III A, Level III B, Level III C</u>
A hospital perinatal program that performs neonatal surgery shall have nurses on staff with special expertise in perioperative management of neonates.</td></tr>
<tr><td>Nurse-Patient Ratio

Meet the requirements of the most current version of the Guidelines for Perinatal Care (6th Edition,)</td><td><u>Level I</u>
1. Newborn requiring only routine well baby care 1:6-8</td><td><u>Level II A</u>
1. Newborn requiring only routine care (well baby care) 1:6-8</td><td><u>Level II B</u>
1. Newborn requiring only routine care 1:3-4
2. Newborn requiring</td><td colspan="2"><u>Level III A, Level III B, Level III C</u>
1. Newborn requiring only routine care 1:3-4
2. Newborn requiring intermediate care 1:2-3
3. Newborn requiring intensive care 1:1-2
4. Newborn requiring multisystem support 1:1</td></tr>
</table>

ATTACHMENT A
MICHIGAN PERINATAL LEVEL OF CARE GUIDELINES

(Based on AAP/ACOG *Guidelines for Perinatal Care*, 6th Edition; AAP Policy Statement *Hospital Discharge of the High-risk Neonate*, 2008; and AAP *Follow-up Care of High-risk Infants*, 2004)

	2. Normal mother-newborn couple care or breast-feeding care 1:3-4	2. Normal mother-newborn couple care or breast-feeding care 1:3-4	intermediate care 1:2-3 Newborn requiring intensive care 1:1-2	Unstable newborn requiring complex critical care 1:1 or greater		
Administrative Nursing Staff	Level I BSN optimal; RN required for programmatic responsibility for the neonatal services	Level II A, Level II B BSN required for programmatic responsibility for the neonatal services		Level III A, Level III B, Level III C Shall have administrative staff, a RN with BSN preferably with a Master's or higher degree in nursing or a health related field and experience with high-risk neonatal nursing who shall have programmatic responsibility for the neonatal nursing services.		
MATERNAL						
L&D Medical Director	Level I Board certified or active candidate for board certification in Family Practice or OB/GYN	Level II A Board certified or active candidate in OB/GYN or Family Practice	Level II B Board certified or active candidate in OB/GYN	Level III A Board certified or active candidate in OB/GYN	Level III B Board certified or active candidate in OB/GYN or MFM	Level III C Board certified or active candidate in OB/GYN or MFM
Hospital medical Obstetric Care Providers on Staff	Level I Family practice physician (with cesarean section privileges or general surgeon available for c/s in 30 minutes) Or Ob/Gyn or CNM with C/S back-up; Health care provider not in house 24/7 but available within 30 minutes	Level II A Obstetrician (Board certified or active candidate with ACOG or ACOOG) + Level I; not in house but available within 30 minutes	Level II B Obstetrician (Board certified or active candidate with ACOG or ACOOG) + Level I; not in house but available within 30 minutes	Level III A Obstetrician (Board certified or active candidate with ACOG or ACOOG) + Level I; physician is in house 24/7	Level III B Maternal-Fetal Medicine (Board certified or active candidate with ACOG or ACOOG) + Level 2; physician is in house 24/7	Level III C Maternal-Fetal Medicine (Board certified or active candidate with ACOG or ACOOG) + Level 2; physician is in house 24/7
Maternal-Fetal Medicine support	Level I Relationship allowing telephone consultation for immediate support as needed	Level II A Formalized working consultative relationship	Level II B Formalized working consultative relationship	Level III A Maternal-Fetal Medicine on staff for consultation or co-	Level III B MFM on staff for co-management, consultation, or primary	Level III C MFM on staff for co-management, consultation or primary

				management	management	management
Administrative Nursing Staff	Level I BSN optimal; RN required for programmatic responsibility for the obstetrical and neonatal nursing services	Level II A, Level II B, Level III A, Level III B, Level III C BSN				
OTHER PERSONNEL						
ANESTHESIA						
Neonatal	Level I NA	Level II A NA	Level II B NA	Level III A, Level III B, Level III C If the hospital performs neonatal surgery, then a board-certified anesthesiologist with experience in neonatal anesthesia shall be present for the surgery.		
Maternal	Level I Anesthesia available to begin c/s within 30 minutes of notification by Board certified or active candidate for certification in anesthesia on medical staff or CRNA	Level II A Anesthesia available to begin c/s within 30 minutes of notification by Board certified or active candidate for certification in anesthesia on medical staff or CRNA	Level II B Anesthesia available to begin c/s within 30 minutes of notification by Board certified or active candidate for certification in anesthesia on medical staff or CRNA	Level III A Level 1 + 24/7 in house anesthesia with board certified or active candidate in anesthesiology or CRNA readily available to delivery area	Level III B Level 1 +Dedicated obstetric anesthesia team	Level III C **Level 1** +Dedicated obstetric anesthesia team
RADIOLOGY SERVICES						
Neonatal	Level I , Level II A, Level II B - Staff radiologist on call with daily availability			Level III A, Level III B, Level III C The hospital shall have a physician on the medical staff with privileges for providing critical interventional radiology services.		
Maternal	All Levels -Staff radiologist on call with daily availability					
DIETITIAN						
Neonatal	Level I OPTIONAL	Level II A OPTIONAL	Level II B OPTIONAL	Level III A, Level III B, Level III C The hospital shall have a registered dietician or other health care		

				professional with knowledge of and experience in neonatal parenteral/enteral management on staff.	
Maternal	Level I -Consultation available	Level II A -Consultation available	Level II B -Consultation available	Level III A, Level III B, Level III C -On staff -one registered	
SOCIAL WORKER					
Neonatal	Level 1, Level II A, Level II B, Level III A The hospital shall have a licensed social worker with a Master's degree (MSW) and experience in psychosocial assessment and intervention with women and their families readily available to the perinatal service.				Level III B, Level III C 1. The hospital shall have a licensed social worker with a Master's degree (MSW - for every 30 beds) and experience in psychosocial assessment and intervention with women and their families dedicated to the NICU, available 7 days / week. 2. Personnel skilled in pastoral care available as needed.
Maternal	Level I, Level II A, Level II B At least one MSW with relevant experience whose responsibilities include perinatal patients; specific personnel for discharge planning and education community follow-up referral process and home care arrangements			Level III A Full time MSW with experience in socioeconomic and psychosocial problems of high risk mothers available 24/7	Level III B, Level III C Dedicated obstetric/perinatal social worker with experience in socioeconomic and psychosocial problems of high risk mothers. Back-up MSW available 24/7

RESPIRATORY THERAPIST					
Neonatal	Level I Respiratory therapist (RT) available 24/7	Level II A RT available 24/7	Level II B The hospital shall have respiratory therapists skilled in neonatal ventilator management available when an infant is receiving assisted ventilation.	Level III A, Level III B The hospital shall have respiratory therapists skilled in neonatal ventilator management present or assigned in-house 24 hours a day.	Level III C The hospital shall have respiratory therapists skilled in neonatal ventilator management assigned to the NICU and not shared with other units 24 hours a day.

ATTACHMENT A
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Maternal	All Levels RT 24/7			
GENETICS				
Neonatal	All Levels The hospital shall have genetic diagnostic and counseling services or written consultation and referral agreements for these services in place.			
Maternal	Level I, Level II A, Level II B -Genetic diagnostic and counseling services or written consultation and referral agreements for these services in place			Level III A, Level III B, Level III C Genetic counseling with diagnostic prenatal testing
PEDIATRIC NEURODEVELOPMENTAL FOLLOW-UP				
NICU Follow-Up Clinic	Level I NA	Level II A NA	Level II B NA	Level III A, Level III B, Level III C Core Team shall include: - Neurodevelopmental pediatrician as medical director of the clinic - Nurse Coordinator (RN) - Social Worker - Nutritionist or WIC RD - Psychologist - Physical and Occupational Therapist - Speech and Language Pathologist - Audiologist or staff trained to do objective hearing assessment Team members may come from the hospital or community setting.
STAFF EDUCATOR				
Neonatal	All Levels A hospital perinatal program shall have nurses with special expertise in obstetrical and neonatal nursing identified for staff education.			
PHARMACY				
Neonatal	Level I, Level II A 1. 24 hours provision of access to emergency drugs. 2. Registered Pharmacist with Neonatal		Level II B 1. 24 hours provision of access to	Level III A, Level III B, Level III C 1. 24 hours provision of access to emergency drugs. 2. Registered Pharmacist with Neonatal pharmacology resources available in-house 24 hours / 7 days a week .

	pharmacology resources available by telephone consultation.	emergency drugs. 2. Registered Pharmacist with Neonatal pharmacology resources available in-house 7 days a week or available for telephone consultation.	

Maternal	Level I Registered pharmacist immediately available for telephone consultation 24/7 with provision for or access to emergency drugs	Level II A, Level II B, Level III A, Level III B, Level III C Registered pharmacist available 24/7				
LACTATION						
Maternal	Level I Nursing or staff trained in lactation consultation -must have access to consultation with a lactation consultant certified by the International Board of Certified Lactation Consultants (IBCLC) -Must have hospital grade electric pump and	Level II A Nursing or staff trained in lactation consultation -must have access to consultation with a certified lactation consultant (IBCLC)	Level II B Nursing or staff trained in lactation consultation -must have access to consultation with an IBCLC -Must have hospital grade electric pump and collection kit -Policies for milk storage	Level III A Dedicated consultant	Level III B Dedicated consultant	Level III C Dedicated consultant

	collection kit -Policies for milk storage	-Must have hospital grade electric pump and collection kit -Policies for milk storage				
NON-OBSTETRIC SPECIALTY CONSULTATION						
Maternal	Level I General Surgery Family Practice	Level II A, Level II B General Surgery Internal Medicine		Level III A More complete range of consultative services for adults including but not limited to Pulmonary, GI, Cardiology, Infectious Diseases, etc	Level III B, Level III C More complete range of consultative services for adults including but not limited to Genetics, pulmonary, GI, Cardiology, Infectious Diseases, etc Access to Pediatric Pathology	
ENGINEERING						
Neonatal and Maternal	All Levels The hospital engineering department should include electrical, mechanical and biomedical technicians who are responsible for the safety and reliability of the equipment.					
TRANSITION PLANNING and FOLLOW-UP						
Neonatal						

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(Based on AAP/ACOG *Guidelines for Perinatal Care*, 6th Edition; AAP Policy Statement *Hospital Discharge of the High-risk Neonate*, 2008; and AAP *Follow-up Care of High-risk Infants*, 2004)

<table>
<tr><td rowspan="3">ICU Transition and Discharge Planning</td><td>Level I
Transition plan to home
Assess the need for a home visit
Referral to a regional neonatal follow-up clinic if a infant is a back transfer and meets follow-up criteria</td><td>Level IIA, Level II B
Transition plan to home
Assess the need for a home visit
Referral to a regional neonatal follow-up clinic if a infant is a back transfer and meets follow-up criteria</td><td>Level III A, Level III B, Level III C
Transition plan to home
Coordinate with public health and other community resources the provision of home visitation prior to discharge and one to two weeks after discharge for all Level III babies
Must have a neonatal follow-up clinic with appropriate staffing, linked with early intervention system.</td></tr>
<tr><td colspan="3">Discharge Planning Team should include;
Parent
Case manager
Social Worker
Hospital Nurse
Home Nurse
Neonatologist/Pediatrician
Other professional staff as needed</td></tr>
<tr><td colspan="3">All Levels
Help parents understand what to expect regarding development of their NICU infant. Prior to discharge, discuss
feeding issues<ol type="a">
Reflux issues
Calorie needs
Follow-up care, including immunizations, and make follow-up appointments
The child’s medical home and what to expect regarding the specific challenges of the NICU graduate.
When to be alarmed
When to call the Doctor
Resources available to the child
Develop a detailed follow-up plan including the designation of a primary care physician and appointments with appropriate pediatric subspecialists
Refer for CSHCS for services, as appropriate
Referral to early intervention services
Utilize a standardized tool to assess neurobehavioral status between 38 and 40 weeks gestation
Give appropriate immunizations and discuss follow-up
Establish a medical home
Request a smoke free environment for the child
Provide universal home visits to the NICU population, with one visit prior to discharge and at least one visit following discharge regardless of insurance.</td></tr>
</table>

ATTACHMENT A
MICHIGAN PERINATAL LEVEL OF CARE GUIDELINES

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CRITERIA FOR NICU FOLLOW-UP	Level I, Level II A, Level II B Referral to a regional neonatal follow-up clinic if infant is a back transfer and meets follow-up criteria	Level III A, Level III B, Level III C Criteria For infant to be referred to neonatal Intensive Care Follow-up clinic: **Preterm:** • VLBW ≤ 1500 grams • Infants with cranial ultrasound abnormalities, including periventricular, leukomalacia/ intraventricular hemorrhage and linear hyperechogenicity • Other neurologic problems (seizures, hydrocephalus) • Necrotizing enterocolitis • Chronic lung disease • Complex medical problems • Hyperbilirubinemia requiring exchange transfusion • Failure to grow in the NICU • Culture proven sepsis, meningitis and nosocomial infections • Abnormal neurologic exam at discharge **Term:** • Encephalopathy persisting at discharge • Other neurologic problems/seizures and hydrocephalus • Complex medical problems • Twin-twin transfusion • Complex congenital anomalies • Meningitis • Hyperbilirubinemia requiring exchange transfusion • Abnormal neurologic exam at discharge • Extracorporeal Membrane Oxygenation Other infants or preterm infants where there are significant concerns from the medical team should be referred for follow-up. Ideally all infants with level III acuity would be referred to early intervention for ongoing follow-up between the time of discharge and their visit in the follow-up clinic.

NICU FOLLOW-UP SERVICES	All Levels - Coordinate with public health and other community resources the provision of home visitation prior to discharge and one to two weeks after discharge for all Level III babies - Discuss family planning (make sure the mother has follow-up with OB) - Assess ability to care for child - Assess ability to get to medical appointments - Assess/discuss sleep environment - Recommended Schedule for comprehensive visits in the NICU follow-up clinic: - 6-8 months - 12-14 months - 18-24 months - 3 years - After 3 years if there are persisting concerns, refer to another center depending on the specific concern(s), e.g., cerebral palsy, autism, etc.		
LABORATORY			
Neonatal			
Processing and Reporting Time	Level I The hospital laboratory shall demonstrate the capability to immediately obtain appropriate samples, process, and timely report urgent/emergent neonatal laboratory requests.	Level II A, Level II B Level I + 1. Lab Technician in house 24 hrs / day 2. Skilled phlebotomist available 24 hrs / day 3. Micro technique for hematocrit and blood gases with in 15 minutes.	Level III A, Level III B, Level III C Comprehensive services available 24 hours / day.
Hearing Test	All Levels The hospital shall have available the equipment and trained personnel to perform newborn hearing screening on all infants born at or transferred to the institution as required by the Universal Newborn Hearing Screening, Diagnosis, and Intervention Guidelines. The hearing test should be performed when the infant is term, even if still in the NICU and still on a ventilator. If being discharged before term, the test should be done at discharge.		

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Maternal			
	Level I The hospital laboratory shall demonstrate the capability to immediately obtain appropriate samples, process, and timely report urgent /emergent obstetric laboratory requests -Policy to report critical results -Standard maternal antepartum testing shall be available to the providers prior to discharge, if not will be performed during the hospitalization and available prior to d/c of neonate -Rapid HIV 24/7	Level II A, Level II B - Level I, plus - Lab tech available 24/7 - Phlebotomist available 24/7	Level III A, Level III B, Level III C Comprehensive lab services available 24/7 with established network
BLOOD BANK			
Neonatal	All Levels Blood bank technicians shall be present in-house 24 hours a day.		
Maternal	Level I -provision for emergent availability of blood products -techs present 24/7	Level II A, Level II B, Level III A, Level III B, Level III C 24 hour/day availability of blood products	
GENETIC TESTING			
Neonatal and Maternal	All Levels 1. The hospital shall have molecular, cytogenetic, and biochemical genetic testing available or written consultation and referral agreements for these services in place. 2. Completion of state required metabolic screening.		
IMAGING CAPABILITIES			
Neonatal			

Portable X-Ray and Ultrasound	All Levels Portable x-ray and head ultrasound equipment, with the services of appropriate support staff, shall be available to the neonatal units.					
CT Scan and MRI	Level I, Level II A, Level II B OPTIONAL			Level III A, Level III B, Level III C Computerized tomography (CT) and Magnetic resonance imaging (MRI) capability, with the services of appropriate support staff, shall be available on campus.		
Interventional Radiology Service	Level I, Level II A, Level II B NA			Level IIIA, Level III B OPTIONAL		Level III C The hospital shall have equipment for performing interventional radiology services.
Neonatal Echocariography	Level I, Level II A, Level II B OPTIONAL			Level III A, Level III B, Level III C Neonatal echocardiography equipment and experienced technician shall be available on campus as needed with interpretation by pediatric cardiologist.		
Pediatric Cardiac Catheterization Laboratory	Level I, Level II A, Level II B NA			Level III A, Level III B OPTIONAL		Level III C The hospital shall have a pediatric cardiac catheterization laboratory and appropriate staff.
Maternal						
Radiology Support	Level I - Optimal but not expected to have interventional radiology	Level II A - - Optimal but not expected to have interventional radiology	Level II B - -Optimal but not expected to have interventional radiology	Level III A Interventional radiology optimal	Level III B -Interventional Radiology	Level III C -Interventional Radiology
EQUIPMENT						
Neonatal						
Equipment and Supplies	All Levels The hospital shall have all of the following equipment and supplies immediately available for existing patients and for the next potential patient: a. O2 analyzer, stethoscope, intravenous infusion pumps					

<table>
<tr><td></td><td colspan="4">b. Radiant heated bed in delivery room and available in the neonatal units
c. Oxygen hood with humidity
d. Bag and masks capable of delivering a controlled concentration of oxygen to the infant
e. Orotracheal tubes
f. Aspiration equipment
g. Laryngoscope
h. Umbilical vessel catheters and insertion tray
i. Cardiac monitor
j. Pulse oximeter
k. Phototherapy unit
l. Doppler blood pressure for neonates
m. Cardioversion/defibrillation capability for mothers and neonates
n. Resuscitation equipment for mothers and neonates
o. Individual oxygen, air, and suction outlets for mothers and neonates
p. Emergency call system</td></tr>
<tr><td>Equipment for the Neonatal Follow-up Clinic</td><td colspan="4">a. Infant Scale
b. Stand-up scale
c. Length board
d. Stadiometer
e. Oto-ophthalmoscope
f. Sphygmomanometer
g. Equipment for Hearing Assessment
h. Exam rooms appropriate for examining children 0-3 years old.
i. Neurodevelopment Assessment Kits</td></tr>
<tr><td>Intensive Care Bed

Physical facilities meet the requirements of the most current version of the Guidelines for Perinatal Care (6Th edition, chapter 2).</td><td>Level I, Level II A
NA</td><td>Level II B
OPTIONAL</td><td colspan="2">Level III A, Level III B, Level III C
The hospital shall have a neonatal intensive care unit bed set up and equipment available at all times for an emergency admission.</td></tr>
<tr><td>Laser Coagulation for Treatment of Retinopathy of Prematurity</td><td colspan="2">Level I, Level II A, Level II B
NA</td><td>Level III A
OPTIONAL</td><td>Level III B, Level III C
The hospital shall have laser coagulation capability for retinopathy of prematurity or at closely related institution.</td></tr>
<tr><td>Respiratory Equipment</td><td colspan="4">All Levels
The hospital shall have appropriate equipment (including back-up equipment) for neonatal respiratory care as well as protocols for the use and maintenance of the equipment as required by its defined level status.</td></tr>
</table>

Advanced Ventilatory Support	Level I, Level II A, Level II B, Level III A NA	Level III B, Level III C The hospital shall be capable of providing advanced ventilatory support for neonates of all birth weights.
MEDICATIONS		
Neonatal		
Emergency Medications	All Levels Emergency medications, as listed in the Neonatal Resuscitation Program of the American Academy of Pediatrics/American Heart Association (AAP/AHA), shall be present in the delivery area and neonatal units.	
Emergent Medications	Level I, Level II A, Level III A The following medications shall be immediately available to the neonatal units: a. Antibiotics, anticonvulsants, and emergency cardiovascular drugs	Level III A, Level III B, Level III C The following medications shall be immediately available to the neonatal units: a. Antibiotics, anticonvulsants, and emergency cardiovascular drugs b. Surfactant, prostaglandin E1
EDUCATION		
Neonatal		
Competencies	All Levels The hospital shall have identified minimum competencies for perinatal clinical staff, not otherwise credentialed, that are assessed prior to independent practice and on a regular basis thereafter.	
Education for Physicians	All Levels The hospital shall provide continuing education programs for physicians, nurses, and allied health personnel on staff concerning the treatment and care of obstetrical and neonatal patients.	
Education for Referring Hospitals/Providers	Level I, Level II A, Level II B NA	Level III A, Level III B, Level III C A hospital that accepts maternal or neonatal primary transports shall provide the following to the referring hospital/providers: a. Guidance on indications for consultation and referral of patients at high risk b. Information about the accepting hospital's response times and clinical capabilities c. Information about alternative sources for specialized care not provided by the accepting hospital

		d. Guidance on the pre-transport stabilization of patients e. Feedback on the pre-transport care of patients
Education for Pediatrics	The NICU Follow-up Clinic shall provide for continuing education programs for physicians, psychologists, nurses and other allied health professionals on the follow-up of the NICU graduate.	
MATERNAL		
Competencies	<u>All Levels</u> The hospital shall have identified minimum competencies for the obstetric clinical staff, not otherwise credentialed, that are assessed on a regular basis thereafter (ie fetal monitoring interpretation, management of obstetric emergencies)	
Education for Physicians	<u>All Levels</u> The hospital shall provide continuing education programs for physicians, nurses, and allied health personnel on staff concerning the care of obstetric patients	
Education for Referring Hospitals or Providers	<u>Level I, Level II A</u> N/A	<u>Level II B, Level III A, Level III B, Level III C</u> A hospital that accepts maternal transports needs to provide to the referring hospital or health care provider the following: 1. Guidance on indications for consultation 2. Information about the accepting hospital regarding how to proceed with a transfer 3. Information about alternative locations for referral in the circumstance where a transport cannot be taken (this should be an unusual occurrence) 4. Guidance on the pre-transport stabilization of the maternal condition 5. Feedback on the pre-transport care 6. Information regarding the outcome and condition of the patient at discharge 7. Information regarding care after discharge
PERFORMANCE IMPROVEMENT		
Neonatal		
Continuous Quality Improvement (CQI)	<u>In Hospital</u> 1. Data collection, storage and retrieval. 2. Identifying processes in need of improvement (see page 38, Perinatal care 6th edition). 3. The hospital shall have a multi-disciplinary continuous quality improvement program for improving maternal and neonatal health outcomes that includes initiatives to promote patient safety including safe medication practices, Universal Protocol to prevent surgical error, and educational programs to improve communication and teamwork. Vermont Oxford Network quality improvement could be one of the resources for CQI. <u>NICU Follow-up Clinic</u>	

	1. Data collection, storage and retrieval. 2. Identifying processes in need of improvement.
Case Review	All Levels The hospital shall conduct internal perinatal case reviews, which include all neonatal deaths, as well as all neonatal transports.
Performance Review	In Hospital The hospital shall utilize a multidisciplinary forum to conduct quarterly performance reviews of perinatal program. This review shall include a review of trends, all deaths, all transfers, all very low birth weight infants, problem identification and solution, issues identified from the quality management process, and systems issues. NICU Follow-up Clinic An annual meeting with all Michigan NICU Follow-up Clinics to review clinic processes, data collection and outcomes.
Health Department and Infant Mortality Review	All Levels The hospital shall participate with the Michigan health department Fetal and Infant Mortality Review programs.
Improving Michigan Perinatal Health Outcomes	All Levels The hospital shall participate in the collaborative collection and assessment of data with the Michigan Department of Health Systems for the purpose of improving perinatal health outcomes.
MATERNAL	
Continuous Quality Improvement	All Levels 1. Data collection, storage, and retrieval 2. Identifying processes in need of improvement 3. The hospital shall have a multi-disciplinary continuous quality improvement program for improving maternal health care and promote patient safety including safe medication practices, protocols to prevent surgical error, and education programs promoting teamwork and communication
Measures for monitoring outcomes	All Levels Quality Performance Measures for Monitoring of Outcomes should also incorporate the knowledge that the largest impact on maternal and fetal outcomes may relate to access to prenatal care, preterm birth rates, and delivery of preterm gestations in a facility able to provide appropriate intensive neonatal care. Specific indices: 1. Delivery Volumes 2. Gestational age and birthweight range at delivery and number outside the Defined Level 3. B-methasone administration prior to delivery in <34 weeks intact membranes and <32 weeks ruptured membranes 4. GBS prophylaxis

	5. Unexpected transfers of neonate to higher level facility after delivery 6. Use of 17-OH progesterone prophylaxis in patients with history of prior non-iatrogenic (spontaneous) preterm singleton birth 7. Fetal Trauma/Birth trauma 8. Elective delivery via induction or cesarean section prior to 39 weeks gestation 9. Prenatal care (gestational age at onset)
POLICIES AND PROTOCOLS	
Neonatal	
Written Policies	All Levels The hospital shall have written policies and protocols for: 1. The initial stabilization and continuing care of all neonatal patients appropriate to the level of care rendered at its facility. 2. The hospital shall have neonatal resuscitation protocols. 3. The hospital medical staff credentialing process shall include documentation of competency to perform neonatal invasive procedures appropriate to its designated level of care. 4. The hospital shall have written guidelines for accepting or transferring neonates as "back transports" including criteria for accepting the patient and patient information on the required care. 5. The hospital shall have a licensed neonatal transport service or written agreement with a licensed neonatal transport service. 6. The hospital shall have policies that allow families (including siblings) to be together in the hospital following the birth of an infant and that promote parental involvement in the care of the neonate including the neonate in the NICU.
MATERNAL	
Written Policies	All Levels The hospital will have written policies and protocols for: 1. The initial stabilization and continuing care of all obstetric patients appropriate to the level of care rendered at its facility 2. The hospital shall have protocols for treatment of common obstetric conditions including medication use for oxytocin, Magnesium sulfate, cytotec, 3. The hospital medical staff credentialing process shall include documentation of competency to perform common obstetric procedures (including spontaneous vaginal delivery, operative vaginal delivery, breech delivery, cesarean section) dependent on the level of privileges granted and management of high risk obstetric patients 4. The hospital shall have written guidelines for accepting or transferring obstetric patients 5. The hospital shall have a transport service or agreement on method of transportation of appropriate patients 6. The hospital shall have policies that allow families to be together for the birthing process unless emergent circumstances prevent

Appendix B: DEFINITIONS

Board Certified	A board certified physician has taken and passed a medical specialty examination and is certified by an American Board of Medical Specialties Member Board
Back transfer	The return of previously critically ill neonates from Level III NICUs to Level II and Level I nurseries for immediate and/or convalescing care (Jung, A.L. & Bose, C. L., 1983)
Case manager	Health care professionals who concurrently plan for transitions of care, discharge and post-discharge follow-up; coordinate the services associated with discharge or return home; provide patient education; provide post-care follow-up; and coordinate services with other health care providers.
Developmental Pediatrician	A physician who has completed a U.S. neurodevelopmental or developmental behavioral fellowship
Early Intervention	An array of early childhood services provided in response to a diagnosis or an identified developmental concern/need which are designed to meet the developmental needs of each child and the needs of the family related to supporting and enhancing the child's development (does not include routine medical services such as immunizations and well-child care).
Early On Program	State program established under Part C of the federal Individuals with Disabilities Education Act (IDEA). *Early On*® is a statewide, comprehensive, coordinated interagency system that provides and coordiantes early intervention services for infants and toddlers birth to age three years with disabilities and their families.
Family Practitioner	A physician who is residency trained in family medicine, which includes training in internal medicine, pediatrics and obstetrics
Immediately available	A resource available as soon as it is requested
In-house	Physically present in the hospital
International Board Certified Lactation Consultant (IBCLC)	A health care professional who specializes in the clinical management of breastfeeding. IBCLCs are certified by the International Board of Lactation Consultant Examiners (www.iblce.org) under the direction of the U.S. National Commission for Certifying Agencies. IBCLCs work in a wide variety of health care settings, including hospitals, pediatric offices, public health clinics, and private practice.
Maternal Fetal Medicine	Medical specialty with advanced training in high risk pregnancies.
Medical Home	The Patient Centered Medical Home (PCMH) is an approach to providing comprehensive primary care for children, youth and adults. The PCMH is a health care setting that facilitates partnerships between individual

	patients, and their personal physicians, and when appropriate, the patient's family.
Memorandum of Understanding (MOU)	A legal document outlining the terms and details of an agreement between parties, including each parties requirements and responsibilities
Neonatal Fellow	A physician who is completing a fellowship in neonatology
Neonatal Intensive Care Unit (NICU) Graduate	Any infant who has spent more than 48 hours in a neonatal intensive care unit
Neonatal Intensive Care Follow-up Clinic	A clinic established to monitor NICU graduates who meet specific criteria for being at risk or having developmental delays. The clinic is staffed by personnel trained in evaluating the growth and development of high risk infants
Neonatal Nurse Practitioner	A registered nurse with an active license authorized to practice in the expanded role by the Michigan Board of Registration in Nursing and certified as a neonatal nurse practitioner by a nationally recognized accrediting body approved by the Board for nurse practitioners
Neonate	An infant aged one month or less
Neonatologist	A physician who has satisfactorily completed a U.S. Neonatology fellowship program with hospital credentials in neonatology/newborn medicine
Pediatric subspecialist	Pediatrician certified in a recognized pediatric subspecialty (e.g., pediatric pulmonologist, pediatric cardiology, pediatric nephrology)
Pediatrician	A physician either certified or eligible for certification by the American Board of Pediatrics
Physician's Assistant (PA)	A health care professional licensed to practice medicine with physician supervision
Programmatic responsibility	The writing, review and maintenance of practice guidelines; policies and procedures; development of operating budget (in collaboration with hospital administration and other program directors); evaluation and guiding of the purchase of equipment; planning, development and coordinating of educational programs (in-hospital and/or outreach as applicable); participation in the evaluation of perinatal care; and participation in perinatal quality improvement and patient safety activities.
Readily available	A resource available for use a short time after it is requested
Thirty minute access	Access to a hospital within thirty (30) minutes under normal driving conditions which include, but are not limited to, weather, traffic, and other circumstances that may be beyond the individual's control

Appendix C: REFERENCES

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