TENNESSEE PERINATAL CARE SYSTEM

GUIDELINES FOR REGIONALIZATION, HOSPITAL CARE LEVELS, STAFFING AND FACILITIES

(Ninth Edition)

Effective October 14, 2020

Tennessee Department of Health
Division of Family Health and Wellness

Bill Lee
Governor

Lisa Piercey, MD, MBA, FAAP
Commissioner

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(Ninth Edition)

Prepared by the
Workgroup on Regionalization Guidelines Revision and the
Perinatal Advisory Committee

Web Address:
https://www.tn.gov/content/tn/health/health-program-areas/mch/mch-prp.html
(Under Program Areas/Maternal and Child Health/Perinatal Regionalization)

PERINATAL REGIONALIZATION IN TENNESSEE

Background/History

Efforts to implement a regionalized approach to perinatal care in Tennessee date back to the 1970's, at which time many national studies, including the landmark National March of Dimes document entitled "Toward Improving the Outcome of Pregnancy", revealed that a coordinated system of health care, outreach, and professional education could improve perinatal outcomes and lower infant mortality.

In 1974, a "Neonatal Law" was passed (T.C.A. § 68-1-801-804) to establish the High-Risk Newborn Program at the four existing NICUs in Memphis, Nashville, Chattanooga and Knoxville. In 1977, the law appropriated state funds as well as expanded the program to include high-risk obstetrics and thereby created the Tennessee Perinatal Care System, establishing a Perinatal Center within each of the four (4) designated regions. A fifth Center was established in Johnson City in 1986.

Perinatal Regions

Each perinatal region is comprised of a group of contiguous counties. The perinatal regions and counties are listed on page 6 of this document. Each region contains one Perinatal Center, which has been so designated by the Commissioner of the Tennessee Department of Health and is capable of providing Level III or Level IV obstetric and neonatal care. The Regional Perinatal Centers are:

West Tennessee Regional Perinatal Center
Regional Medical Center at Regional One Health
Memphis, Tennessee

Middle Tennessee Regional Perinatal Center
Vanderbilt University Medical Center/Monroe Carrell, Jr. Children's Hospital at Vanderbilt
Nashville, Tennessee

Southeast Tennessee Regional Perinatal Center
Erlanger Health System/T.C. Thompson Children's Hospital at Erlanger
Chattanooga, Tennessee

East Tennessee Regional Perinatal Center
The University of Tennessee Medical Center at Knoxville
Knoxville, Tennessee

Northeast Tennessee Regional Perinatal Center
Johnson City Medical Center/Niswonger Children's Hospital
Johnson City, Tennessee

Purpose and Responsibilities of Tennessee's Regionalization System

The Perinatal Care System is a statewide infrastructure for the diagnosis and treatment of high-risk pregnant women, fetuses and neonates if no other appropriate facility is available to manage their significant condition(s), regardless of financial status. All activities are in compliance with

medical and operation standards and the guidelines as set out in the Tennessee Perinatal Center Care Systems *Guidelines for Regionalization, Hospital Care Levels, Staffing and Facilities*, latest edition; Tennessee Perinatal Care System *Guidelines for Transportation*, latest edition; Tennessee Perinatal Care System *Educational Objectives for Nurses Levels I, II, III, IV, Neonatal Transport Nurses,* latest edition; Tennessee Perinatal Care System *Educational Objective in Medicine for Perinatal Social Workers*, latest edition; and Tennessee Perinatal Care System *Guidelines on Equipment, Supplies and Training for Emergency Medical Services and Emergency Department Staff*, latest edition.

While the five (5) Regional Perinatal Centers operate within a designated hospital or university, the program is a standalone entity which provides:

- 24-hour consultation and referral for facilities and for health care providers within the respective perinatal region
- Professional education for providers (nurses, midwives, nurse practitioners, physicians, respiratory therapists, social workers, paramedics, etc.) within the region
- Maternal and neonatal transport
- Site visits, upon request, to provide consultation regarding physical facilities, staffing, and policies and procedures at hospitals within the region
- Post-discharge maternal follow-up and post-discharge neonatal follow-up
- Measuring and monitoring maternal and newborn outcomes for the region
- Maintain ongoing relationships with regional providers, prenatal facilities and hospitals

Indirectly, the system impacts all mothers and babies in Tennessee by assuring that health care providers are educated on high risk perinatal care and have a system of consultation available to them. In FY 2020 (July 1, 2019 – June 30, 2020), Tennessee's Regional Perinatal Centers provided direct care for 5,077 high-risk neonates and 18,820 high-risk maternal patients.

All obstetric and neonatal-related activities within the Regional Perinatal Center should occur under the direction of a board-certified maternal fetal medicine specialist and a board-certified neonatologist, respectively. There should also, at a minimum, be one (1) obstetric and one (1) neonatal outreach educator/coordinator on-staff. It is also advisable to have an individual on staff to monitor expenditures and track contract services and deliverables. Staff of the Centers do not provide direct care; and therefore, should not be considered a part of a specific department within the direct services arm of the hospital/facility. The Regional Perinatal Center Co-directors are responsible for the staff hired to carry out the scope of services of the contract and for following all of the guidelines established for the Tennessee Perinatal Care System.

Perinatal Advisory Committee

The Perinatal Advisory Committee was established by statute (T.C.A. §68-1-803-804) and exists as a consultative body to advise the Department of Health in administration and implementation of the regionalization system across Tennessee. The Committee is comprised of twenty-one (21) members as designated in statute, including the obstetric and neonatal directors of the five Regional Perinatal Centers, private sector providers, hospital administrators, medical school representation, nurses working in perinatal medicine, and consumer and public health representatives. The committee is required to meet at least once annually. Committee members as well as invited experts are also instrumental in ensuring that the program's detailed Guidelines and other perinatal documents/guidelines/educational objectives remain current and are updated

every five years, a practice that has occurred since the first set of Guidelines was published in 1978.

Funding

The Division of TennCare oversees all contractual arrangements for this program, and the Tennessee Department of Health, Division of Family Health and Wellness, is responsible for the provision of technical assistance, the coordination of programmatic activities, and convening the Perinatal Advisory Committee. Each designated hospital/university accepts funds on behalf of the Regional Perinatal Center. The Centers are supported by funds from TennCare, Tennessee's Medicaid Plan with the Centers for Medicare & Medicaid Services, and state appropriations. Specific state appropriations were made available in 2016 to expand outreach education, and each Center was provided additional funds strictly for this purpose as outlined by the contract.

Resources

The Perinatal Regionalization Program has a variety of resources available, including copies of the latest editions of the Guidelines, a Perinatal Regionalization Fact Sheet, and a highlight video which may be accessed by visiting the website: https://www.tn.gov/health/health-program-areas/mch/mch-prp.html/.

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[1] A work group was convened in August 2020 to make updates to the obstetrics sections consistent with those published in the ACOG/SMFM Levels of Maternal Care Consensus, August 2019. Members who assisted with this project were added to the existing work group list from the 8th edition since no significant changes were made to the neonatal sections.

PERINATAL ADVISORY COMMITTEE

(As of October 2020)

Members

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GUIDELINES FOR REGIONALIZATION, HOSPITAL CARE LEVELS, STAFFING AND FACILITIES

PREFACE

The first edition of these Guidelines appeared in 1978; further editions were published in 1984, 1990, 1997, 2004, 2010, 2014 and 2017. This ninth edition was prepared by a work group representing a broad spectrum of health care professionals drawn from throughout the state. It was subsequently adopted by the Perinatal Advisory Committee. As was the case with the eight preceding editions, the ultimate goal of these Guidelines is to improve perinatal outcomes in Tennessee by providing quality care to every mother and newborn. The Guidelines describe components of various care levels with the full realization that many of these components are already in place while others are goals which are actively pursued. The document emphasizes the importance of communication and collaboration among all health care professionals who provide perinatal services in Tennessee. It is also important to remember that, because our state's population has grown to include people from all over the world, the services provided to mothers and newborns must be culturally, as well as medically, appropriate.

As described in Tennessee Code Annotated 68-1-802,

(a) The department [of Health] is directed to develop a plan to establish a program for the diagnosis and treatment of certain life-threatening conditions present in the perinatal period.

(b) The program shall assist pregnant women and their fetuses and newborn infants by developing a regionalized system of care, including highly specialized personnel, equipment and techniques that will decrease the existing high mortality rate and the life-long disabilities that currently prevail in surviving newborn infants.

Regionalization of perinatal health care in the State of Tennessee was motivated by an overwhelming need to ease access to contemporary care by as large a segment of the population as was feasible. Since publication of the first edition, the number of providers of perinatal health care has increased remarkably. There has also been an increase in the level of expertise in most institutions in the state. However, many Tennessee counties have hospitals without perinatal services. We must continue to provide professional advice and supervision on perinatal health care to health care providers, thereby making quality care available to every woman and child in Tennessee regardless of community size and geographic location.

In order to assure contemporary pertinence of these and subsequent Guidelines, the Perinatal Advisory Committee has limited its approval to a period no longer than five years from the date of approval by the Commissioner of the Department of Health. A revision of this document will be mandatory at that time, unless one becomes necessary at an earlier date.

INTRODUCTION

Professional advice and supervision of health care must be available to every pregnant woman and her newborn child in Tennessee. The vast majority of the newly born are healthy, but intact survival is jeopardized in a substantial number who require complex medical attention. These severe illnesses often can be anticipated and then ameliorated or eliminated by special management of high-risk mothers. In the extreme, this type of medical attention entails recruitment of a variety of specialized professional personnel who are generally more concentrated in densely populated communities. It is in these larger communities that the fullest spectrum of medical consultants, nurse specialists, laboratory capabilities and equipment are usually situated, but complex medical management must be accessible to all patients regardless of community size and geographic location. That perinatal mortality and morbidity can be substantially reduced by contemporary technology has been plainly documented for decades. From this fact alone, there remains a sense of urgency to make such technology available to all mothers and infants in Tennessee, to eliminate existing inaccessibility to complex care, and to assure a high quality of medical attention in every hospital that renders it, complexity of care and location of hospital notwithstanding.

The overall goal is effective care for the State as a whole. Available resources must be appropriately utilized. Access to care (Levels I, II, III, and IV) should be available within all perinatal regions, and each level of care, no matter how complex, should be of optimal quality. The sole determinant of where care will be administered, and by what types of personnel, should be the severity of illness and not be limited to or governed by financial constraints. The decision regarding the location of care should be made jointly by the obstetric and pediatric care providers caring for the mother and fetus / newborn, as level of maternal care and levels of neonatal care may not match within facilities.

When providing care and considering selection of a delivery site for the maternal fetal dyad, the perinatal provider(s) should evaluate both components separately. The delivery location selected should provide the highest level of care for the component with the highest acuity need. This decision must be made independent of gestational age, fetal weight, and maternal condition. For example, a woman with acute fatty liver of pregnancy at term requires Level IV maternal care because of this life-threatening condition. Conversely, a woman who experiences preterm premature rupture of membranes at 24 weeks of gestation but has no maternal issues should be transferred to a facility capable of providing appropriate neonatal care for this situation.

Although services should be available as close to home as possible, transfer of patients from one hospital to another is inevitable if all levels of care are to be provided. An effective system requires designation of hospitals for provision of care according to their capacity. These Guidelines have been written for that specific purpose. Beyond care levels, consultation and transport of patients should provide functional continuity between hospitals. Fundamental to all these activities is the continuing education of personnel within perinatal regions; without it the effectiveness of care will deteriorate.

Although these Guidelines are addressed to institutions that provide perinatal services, the basic emphasis is on the role of physicians, nurses and other health care personnel who directly and personally provide patient care. Institutions herein described differ from each other in the variety of services performed by their personnel. The institutional components of the Tennessee Perinatal

Care System include birth centers and four hospital categories that indicate their capacities to provide complex care for mothers and newborns: Levels I, II, III, and IV. Each level of care reflects required capabilities, physical facilities, and medical and support personnel. Each higher level of care includes and builds on the capabilities of the lower levels.

In regard to obstetric care, Levels I, II, III, and IV are adopted from the ACOG / SMFM consensus statement on levels of maternal care, initially published in 2014 and subsequently updated in August 2019. Trauma is not integrated into the levels of maternal care because trauma center levels are already established. Pregnant women should receive the same level of trauma care as non-pregnant patients. In terms of neonatal care, we have adopted the hospital designations (Levels I, II, III, and IV) recommended by the American Academy of Pediatrics Committee on Fetus and Newborn in its policy statement on Levels of Neonatal Care, which was published in 2012. Adoption of these designations brings Tennessee into compliance with national guidelines. Regional Perinatal Centers operate within Level III or Level IV institutions that have been designated by the State to coordinate certain regional activities that relate to professional education, patient transport and inter-hospital functions, as well as care of patients. The general characteristics of each care level are summarized in the paragraphs that follow. Details of these characteristics are set forth in the corresponding service level sections of these Guidelines.

The 2019 ACOG/SMFM consensus statement on levels of maternal care provided clarification related to the availability of personnel by providing more specific terminology as detailed below:

†**Readily available:** the specified person should be available 24 hours a day, 7 days a week, for consultation and assistance, and able to be physically present on-site within a time frame that incorporates maternal and fetal or neonatal risks and benefits with the provision of care. Further defining this time frame should be individualized by facilities and regions, with input from their obstetric care providers. If referring to the availability of a service, the service should be available 24 hours a day, 7 days a week unless otherwise specified.

Physically present: the specified person should be on-site in the location where perinatal care is provided 24 hours a day, 7 days a week.

REGIONAL PERINATAL CENTERS

I. REGIONS DEFINED

There are five perinatal regions in Tennessee: Northeast, East, Southeast, Middle, and West. Each region is comprised of a group of contiguous counties. The perinatal regions and the counties comprising them are listed on page 6. Each region contains one Regional Perinatal Center, which has been so designated by the Commissioner of the Tennessee Department of Health.

II. REGIONAL PERINATAL CENTERS LISTED

Each of Tennessee's five Regional Perinatal Centers is capable of providing Level III or Level IV obstetric and neonatal care. The Regional Perinatal Centers are:

Northeast Tennessee Regional Perinatal Center
Johnson City Medical Center Hospital
Johnson City, Tennessee
Perinatal Center Office: (423) 431-6640
Obstetric Education/Training Requests: Patti Jacobs, RN-C, BSN
Phone: (423) 431-5352 E-mail: patti.jacobs@balladhealth.org
Neonatal Education/Training Requests: Vicki Davis, RN, BSN
Phone: (423) 431-5646 E-mail: vicki.davis@balladhealth.org
L&D: (423) 431-6436
Referrals: 1-800-365-5262
Neonatal Consult/Transport: (423) 952-3720
General Hospital Operator: (423) 431-6111

East Tennessee Regional Perinatal Center
The University of Tennessee Medical Center at Knoxville
Knoxville, Tennessee
Obstetric Education/Training Requests: Lauren Lake, APRN, FNP-C
Phone: (865) 305-9300 E-mail: llake@utmck.edu
Neonatal Education/Training Requests: Nicole Watson, RN, BSN, CLC
Phone: (865) 305-9300 E-mail: nwatson@utmck.edu
L&D: (865) 305-9830
Maternal Referrals: 1-800-422-9301 or 865-305-9300
Neonatal Consult/Transport: 1-800-732-7295 or (865) 305-9834
NICU: (865) 305-9834
General Hospital Operator: (865) 305-9000

Southeast Tennessee Regional Perinatal Center
Erlanger Health System/Children's Hospital at Erlanger
Chattanooga, Tennessee
Obstetric Education/Training Requests: Jennifer Shelton, RNC-OB, MSN
Phone: (423) 778-3547 E-mail: jennifer.shelton@erlanger.org
Neonatal Education/Training Requests: Jill Rimmer, RNC, NIC
Phone: (423) 778-5096 E-mail: elizabeth.rimmer@erlanger.org
L&D: (423) 778-7956
OB Consults / Referrals: (423) 778-8100 or 1-866-4HI-RISK
Neonatal Consult/Transport: (423) 778-6438
NICU: (423) 778-6438
General Hospital Operator (Erlanger): (423) 778-7000
General Hospital Operator (Children's Hospital): (423) 778-6011

Middle Tennessee Regional Perinatal Center
Vanderbilt University Medical Center/Monroe Carell, Jr. Children's Hospital at Vanderbilt
Nashville, Tennessee
Obstetric Education/Training Requests: Susan Drummond, RN, MSN, C-EFM
Phone: (615) 343-9930 E-mail: susan.drummond@vumc.org
Neonatal Education/Training Requests: Mary Lee Lemley RNC, MSN
Phone: (615) 343-8686 Email: mary.lemley@vumc.org
L&D: (615) 322-2555
OB Consults/Referrals: 1-888-636-8863 (1-888-MFM-VUMC)
Neonatal Consult / Transport: 1-855-322-9111
NICU: (615) 322-0963
General Hospital Operator (Vanderbilt): (615) 322-5000
General Hospital Operator (Children's Hospital): (615) 936-1000

West Tennessee Regional Perinatal Center
Regional Medical Center at Regional One Health
Memphis, Tennessee
Obstetric Education/Training Requests: Kitty Cashion, RN-BC, MSN
Phone: (901) 448-4794 Email: mcashion@uthsc.edu
Neonatal Education/Training Requests: Nancy Ruch, RN, MSN, NNP
Phone: (901) 448-6717) Email: nruch@uthsc.edu
L&D: (901) 545-7345
OB Inpatient Transport: (901) 545-8181
Neonatal Consult/Transport: (901) 545-7366
NICU: (901) 545-7366
General Hospital Operator: (901) 545-7100

PERINATAL REGIONS

NORTHEAST TENNESSEE (Johnson City)

Carter
Greene
Hancock
Hawkins
Johnson
Sullivan
Unicoi
Washington

EAST TENNESSEE (Knoxville)

Anderson
Blount
Campbell
Claiborne
Cocke
Cumberland
Fentress
Grainger
Hamblen
Jefferson
Knox
Loudon
Monroe
Morgan
Pickett
Roane
Scott
Sevier
Union

SOUTHEAST TENNESSEE (Chattanooga)

Bledsoe
Bradley
Grundy
Hamilton
McMinn
Marion
Meigs
Polk
Rhea
Sequatchie

MIDDLE TENNESSEE (Nashville)

Bedford
Cannon
Cheatham
Clay
Coffee
Davidson
Dekalb
Dickson
Franklin
Giles
Hickman
Houston
Humphreys
Jackson
Lawrence
Lewis
Lincoln
Macon
Marshall
Maury
Montgomery
Moore
Overton
Perry
Putnam
Robertson
Rutherford
Smith
Stewart
Sumner
Trousdale
Van Buren
Warren
Wayne
White
Williamson
Wilson

WEST TENNESSEE (Memphis)

Benton
Carroll
Chester
Crockett
Decatur
Dyer
Fayette
Gibson
Hardeman
Hardin
Haywood
Henderson
Henry
Lake
Lauderdale
McNairy
Madison
Obion
Shelby
Tipton
Weakley

III. SERVICES PROVIDED

Tennessee's Regional Perinatal Centers must provide the following services:

A. Consultation and Referral

1. If no other appropriate facility is available to manage significant high-risk conditions, the Regional Perinatal Center must accept all such patients regardless of financial status.

2. Telephone consultation by obstetric and newborn sub-specialists must be available to physicians and nurses within the region 24 hours a day, 7 days a week.

B. Professional Education

1. For the Staff of the Regional Perinatal Center: A program of professional education must be maintained for the staff of the Regional Perinatal Center. These programs should satisfy the educational requirements for physicians, nurses, social workers, and others who function in the administration of Level III or Level IV care.

2. For the Staff of Other Hospitals in the Region: The Regional Perinatal Center must maintain a program of professional outreach education for hospitals within its region. These programs of instruction require a staff of qualified educators to present ongoing courses to Level I, II, and III hospitals. These courses must satisfy the educational objectives set forth in the series of publications for the education of nurses and social workers published by the Tennessee Department of Health.

C. Maternal-Fetal and Neonatal Transport

The Regional Perinatal Center is responsible for maternal-fetal and neonatal transport described for Level III or Level IV facilities elsewhere in these Guidelines. Whereas the provision of these transport services is an option for Level III or Level IV units that do not function as Regional Perinatal Centers, transport services are required of a Regional Perinatal Center. Transport for the purpose of admission to the Regional Center must be made available to all patients within the state regardless of their financial status, and to patients referred from other Regional Perinatal Centers. Protocols for transport should conform to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health.

D. Site Visits

The Regional Perinatal Center staff will engage in site visits upon request within its region.

E. Post-discharge Maternal Follow-up

Follow-up evaluation of selected women who are discharged from the Regional Perinatal Center should be arranged.

F. Post-discharge Neonatal Follow-up

Follow-up evaluation of selected infants who are discharged from the Regional Perinatal Center should be performed. Neonatal intensive care unit graduates who are considered high risk and those with birthweights <1500 grams should be enrolled in an organized follow-up program that tracks and records medical and neurodevelopmental outcomes to allow later analysis.

G. Data Collection

The Regional Perinatal Center must compile data (Program Objectives Report [POR]) on educational outreach that is performed as well as the region's analysis and evaluation of maternal and neonatal outcomes for quality improvement according to requirements prescribed by the Tennessee Perinatal Care System. These data are forwarded to a central facility on a regular basis. All Regional Perinatal Centers, if possible, should support clinical teams within the institution that are responsible for implementing State or National continuous quality improvement initiatives by providing advisory assistance, sharing data from the POR, disseminating information to the region, and/or aiding with financial support.

H. Perinatal Advisory Committee

The Perinatal Advisory Committee was established by statute and exists as a consultative body to advise the Department in administration and implementation of the perinatal regionalization system across Tennessee. The Committee is composed of individuals with expertise and a vested interested in the health and wellbeing of pregnant women and newborns, including the State's Title V / MCH Block Grant Director, Co-directors of each of the five perinatal centers, as well as representation from local hospitals, medical specialists in obstetrics and newborn conditions/private practice, family physicians, obstetrical and neonatal intensive care nurses, a medical school, and the general public.

(TCA § 68-1-803-804)

SUMMARY OF PERINATAL SERVICE LEVELS

REGIONAL PERINATAL CENTERS

The perinatal regionalization program was established to provide for the diagnosis and treatment of certain life-threatening conditions of pregnant women and newborn infants. The five regional perinatal centers across the state have made this specialized care available by providing a statewide mechanism to health care providers for consultation and referral of high risk patients; transport of these patients, if necessary; personnel skilled in high risk perinatal care; post-graduate education for physicians, nurses, and other medical personnel; and site visits to local hospitals. These Centers, which are co-directed by the high risk perinatal sub-specialists, offer outreach education for facilities and health care providers in the region and analysis and evaluation of regional data, including perinatal complications and outcomes for quality improvement.

The regionalization system in Tennessee has been in place since the early 1970s and serves our state by providing the necessary statewide infrastructure for high risk perinatal care. Established as a result of State statute, the regionalization system addresses the needs of the State's pregnant women and infants. The regionalization system is a key component in the State's capacity to improve birth outcomes, especially infant mortality.

BIRTH CENTERS

These facilities are licensed to provide peripartum care for low-risk pregnant women whose fetuses are in vertex presentation at term, anticipating an uncomplicated singleton birth. These facilities must have the capability and equipment to provide low-risk maternal care and anticipate any potential emergency situation. There must exist an established agreement with a receiving hospital with which hospital policies and procedures confirm the ready availability of properly prepared transport systems. The facility must have a thorough data collection, storage and retrieval system and the capability to initiate quality improvement programs that include efforts to maximize patient safety. Medical consultation must be available at all times and at least two qualified professional attendants must be present at each delivery. Primary maternal care providers must be legally recognized to practice in the Birth Center facility and within the jurisdiction of the Center. CNMs, CMs, CPMs, licensed midwives, family physicians and obstetrician-gynecologists may be legally recognized to be a qualified professional attendant. The facility must have available an adequate number of qualified professionals with competence in Basic (Level 1) care criteria and ability to stabilize and transfer high-risk women and newborns.

LEVEL I UNITS

Level 1 units must provide care of low- to moderate-risk pregnancies with the ability to detect, stabilize and initiate management of unanticipated maternal-fetal or neonatal complications that occur during the antepartum, intrapartum or postpartum period until the patient can be transferred to a facility at which specialized maternal care is available. The facility must have all of the capabilities already delineated for the Birth Center plus readily available[†] 24 hours a day, 7 days a week within the institution: obstetrical ultrasonography with interpretation, laboratory testing and transfusion services; and the ability to perform an emergency Cesarean delivery in the appropriate time for the greatest maternal and fetal benefits.

[†] See page 3 for complete definition of *readily available.*

The ability to initiate a massive transfusion protocol, with process to obtain more blood and component therapy as needed, should be readily available† at all times.

A formal transfer plan must be established with an institution of high level obstetrical and neonatal care. The institution must have the ability to initiate education and quality improvement programs to maximize patient safety and to collaborate with the higher level obstetrical and neonatal care with which a formal transfer plan exists.

Level I units also provide a basic level of care for neonatal patients who are low risk. They have the capability to perform neonatal resuscitation at every delivery and to evaluate and provide routine postnatal care for healthy newborn infants. In addition, they can care for preterm infants at 35 to 37 weeks' gestation who are physiologically stable and can stabilize newborn infants who are less than 35 weeks of gestation or who are ill until they can be transferred to a facility where the appropriate level of neonatal care is provided (American Academy of Pediatrics and American College of Obstetricians and Gynecologists *Guidelines for Perinatal Care*, 7th edition, 2012).

Late preterm infants (34-36 weeks' gestation) are at risk for increased neonatal morbidity and mortality.

LEVEL II UNITS – OBSTETRIC

Level II obstetric units provide specialty care. They have the capabilities of Level I units. In addition, they provide care for appropriate moderate- to high-risk antepartum, intrapartum, or postpartum conditions. These units provide planned delivery services for women whose infants are expected to be >32 completed weeks of gestation and have a birthweight of at least 1500 grams. Additionally, a need for immediate pediatric subspecialty care for these newborns should not be anticipated. Level II obstetric units also provide emergency care for unplanned births of younger, smaller, or sicker babies before transfer to a facility at which newborn intensive care is provided.

A Level II unit must have more capabilities than the Level I unit including: computed tomography scan, nonobstetric ultrasound, maternal echocardiogram, and magnetic resonance imaging. Nursing leadership and staff should have formal training and experience in the provision of perinatal nursing care and should coordinate with respective neonatal care services with interpretation available. There should be sufficient RN staff with competence in level II care and the ability to stabilize and transfer high-risk women and newborns requiring higher levels of care. The director of the obstetric service should be a board-certified obstetrician-gynecologist actively practicing obstetrics. There should be an established relationship with a maternal-fetal medicine specialist (MFM) available for consultation by reasonable means (i.e., on-site, by phone or by telemedicine). There should be anesthesia services readily available† 24 hours a day, 7 days a week to provide labor analgesia and surgical anesthesia, with a board-certified anesthesiologist with special training or experience in obstetric anesthesia available for consultation. There should be medical and surgical consultants readily available† 24 hours a day, 7 days a week to stabilize the obstetrical patient who has been admitted to the facility or is prepared for transfer to another facility.

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† See page 3 for complete definition of *readily available.*

LEVEL II UNITS – NEONATAL

Level II nurseries provide specialty neonatal services. They provide care for stable or moderately ill infants born at ≥32 weeks gestation and weighing ≥1500 grams who have problems that are expected to resolve rapidly and are not anticipated to need subspecialty services on an urgent basis. These units also resuscitate and stabilize preterm and/or ill infants before transfer to a facility at which newborn intensive care is provided. Level II nurseries provide mechanical ventilation for brief (<24 hrs) duration and continuous positive airway pressure, until the infant's condition improves or the infant can be transferred to a higher-level facility (American Academy of Pediatrics and American College of Obstetricians and Gynecologists *Guidelines for Perinatal Care*, 7th edition, 2012). In addition, Level II units provide care for infants who are convalescing after intensive care.

LEVEL III UNITS – OBSTETRIC

Level III obstetric units provide subspecialty care. They have the capabilities of Level II units. In addition, they provide care for more complex maternal medical conditions, obstetric complications, and fetal conditions. These units should be committed to assist Level I and Level II facilities with quality improvement and safety programs and provide perinatal system leadership as necessary. Advanced imaging services should be readily available† 24 hours a day, 7 days a week, and medical and surgical ICUs should accept pregnant women with on-site critical care providers to actively collaborate with maternal-fetal medicine specialists (MFM) at all times. Appropriate equipment and personnel should be physically present** (on-site) 24 hours a day, 7 days a week to ventilate and monitor women in labor and delivery until they can be safely transferred to the ICU. Adequate numbers of nursing leaders and RNs who have special training and experience in the management of women with complex and critical maternal illnesses and obstetric complications are required in Level III units. These facilities will also have a massive transfusion protocol in place. The director of the obstetric service should be a board-certified MFM or a board-certified obstetrician-gynecologist and the director of maternal-fetal medicine should be a board-certified MFM with active inpatient privileges who is available at all times, either onsite, by phone or telemedicine. There should be anesthesia services available on-site 24 hours a day, 7 days a week, with a board-certified anesthesiologist with obstetric anesthesia fellowship training or experience in obstetric anesthesia in charge of the institution's obstetric anesthesia service. There should be a full complement of subspecialists readily available† for inpatient consultation.

LEVEL III UNITS – NEONATAL

Level III nurseries provide care for infants who are born at <32 weeks of gestation or weigh <1500 grams at birth or have complex medical or surgical conditions, regardless of gestational age. Level III units have continuously available personnel and equipment to provide life support for as long as needed. They can provide ongoing assisted ventilation for periods longer than 24 hours, which may include conventional ventilation, high-frequency ventilation, and inhaled nitric oxide. A broad range of pediatric medical subspecialists and pediatric surgical specialists should be readily accessible on site or by prearranged consultative agreements (American Academy of Pediatrics and American College of Obstetricians and Gynecologists *Guidelines for Perinatal Care*, 7th edition, 2012).

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† See page 3 for complete definition of *readily available.*

** See page 3 for complete definition of *physically present.*

LEVEL IV UNITS – OBSTETRICAL

Level IV units provide care on-site for the most complex maternal conditions of the critically ill pregnant woman and her fetus/es throughout the antepartum, intrapartum and postpartum care needed. The capabilities of Level III facilities are supplemented by on-site ICU care for the obstetrical patient long term in addition to critical care beds. In addition to the established criteria for the Level III facilities, the Level IV facility will have adequate nursing leadership and RNs with the appropriate experience at all times; there will be an maternal-fetal medicine team with full privileges readily available 24 hours a day, 7 days a week, to be on-site for consultation and management as well as to co-manage ICU admitted obstetric patients. These facilities will also have a massive transfusion protocol in place. The maternal-fetal medicine team is to be led by an active board-certified maternal-fetal medicine specialist (MFM) with experience in critical care obstetrics. The director of the obstetric service shall be a board-certified MFM, or board-certified obstetrician-gynecologist with experience in Critical Care Medicine. There must be anesthesia services on-site 24 hours a day, 7 days a week, with a board-certified anesthesiologist with special training or experience in obstetric anesthesia in charge of the institution's obstetric anesthesia service. There should be a full complement of subspecialists available for inpatient consultation and to collaborate with the maternal-fetal medicine team.

LEVEL IV UNITS – NEONATAL

Level IV units include the capabilities of Level III units with additional capabilities and considerable experience in the care of the most complex and critically ill newborn infants. Pediatric medical and pediatric surgical specialty consultants must be continuously available 24 hours a day, 7 days a week. Level IV facilities also must have the capability for surgical repair of complex conditions (e.g., congenital cardiac malformations that require cardiopulmonary bypass with or without extracorporeal membrane oxygenation) (American Academy of Pediatrics and American College of Obstetricians and Gynecologists *Guidelines for Perinatal Care*, 7th edition, 2012).

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† See page 3 for complete definition of *readily available.*

** See page 3 for complete definition of *physically present*.

BIRTH CENTER FACILITIES

I. SERVICES PROVIDED

Birth centers provide peripartum care of low-risk women with uncomplicated singleton term pregnancies with a vertex presentation who are expected to have an uncomplicated birth.

These facilities must have the capability and equipment to provide low-risk maternal care and a readiness at all times to initiate emergency procedures to meet unexpected needs of the woman and newborn within the center, and to facilitate transport to an acute care setting when necessary.

A. Educational Services

Educational services should include the following:

1. Parent Education: Ongoing perinatal education programs for parents.

2. Nurses' Education: Programs for nurses should conform to the most recent edition of *Tennessee Perinatal Care System Educational Objectives for Nurses, Level I*, published by the Tennessee Department of Health. These courses may be made available periodically at the birth center by instructors from a Regional Perinatal Center. The courses may also transpire at a Regional Perinatal Center, or at any other site remote from the hospital, thus requiring that the hospital provide nurses with educational leave for attendance. The birth center is responsible for the necessary arrangements for nurse education. Nurses should maintain a level of competency in fetal monitoring as determined by their institution.

3. All perinatal care providers, including anesthesia care providers, should maintain current Neonatal Resuscitation Program (NRP) provider status. All newborn care providers should also maintain current S.T.A.B.L.E. provider status.

B. Maternal-Fetal Care

1. Anticipated Low-Risk Patients: Prenatal care for uncomplicated patients should meet criteria published in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

2. Maternal / Fetal Evaluation: A capability for assessment of mother and fetus should be maintained. Ultrasound technology for fetal evaluation should be available.

3. Complicated Patients: Medical consultation must be available at all times. There should be an established agreement with a receiving hospital with policies and procedures for timely transport.

C. Neonatal Care

A birth center should provide basic neonatal care as follows (see the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists):

1. Newborn services have the capabilities to:

   Provide neonatal care at every delivery according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program.

   Evaluate and provide postnatal care to stable term newborn infants. Hearing, metabolic, and CCHD screening programs should adhere to the most recent State of Tennessee regulations and the most recent edition of *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

   Stabilize newborn infants who have unexpected complications until transfer to a facility that can provide the appropriate level of neonatal care. Provide neonatal post-resuscitation care and pre-transport stabilization care per the most recent edition of the S.T.A.B.L.E. Program.

D. Support Services

1. Breastfeeding educational services should be available as described in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

E. Social Services

Social services and family support should be available, provided by utilization of public and private agencies.

F. Maintenance of Data

Birth centers have the capability to collect, store, and retrieve data as follows:

1. Maternal

   - Name, medical record number
   - Age, gravidity, parity, etc.
   - Date of first prenatal visit
   - Gestation (weeks)
   - Availability of prenatal records (including prenatal labs) on admission. Prenatal lab results that should be available on admission include: hepatitis B surface antigen, HIV, serology, Group B strep, blood type and Rh status, antibody status, rubella, gonorrhea, chlamydia, and other tests as appropriate

- Social history to include alcohol, drug, or tobacco use and/or history or suspicion of domestic violence
- Prior cesarean section
- Electronic fetal monitoring (Yes or No)
- Induction (Yes or No)
- Indications for induction
- Time of membrane rupture
- Presentation
- Type of delivery (cesarean section, type of forceps, vacuum extraction, spontaneous)
- Indication for cesarean section / operative vaginal delivery
- Time of birth
- Birthweight
- Apgar scores
- Resuscitation (Yes or No)
- Type of resuscitation
- Maternal-fetal complications
- Anesthesia (type)
- Infant status on leaving delivery room (normal, abnormal, expired)
- Physician's name
- Nurse's name
- Disposition
    - Discharged home
    - Transferred to a higher level of care / Receiving hospital / Transport service
    - Expired

2. <u>Neonatal</u>

- Name, gender, hospital medical record number
- Date of birth
- Birthweight
- Gestational age
- Apgar scores
- Maternal complications (test results relevant to neonatal care; maternal illness potentially affecting the fetus; history of illicit substance use or any other known socially high-risk circumstances; complications of pregnancy associated with abnormal fetal growth; fetal anomalies, or abnormal results from tests of fetal well-being; information regarding labor and delivery; and situations in which lactation may be compromised)
- Discharge diagnoses
- Special care administered (specify)
- Documentation of newborn metabolic, hearing, and critical congenital heart disease (CCHD) screens, and immunizations and medications given
- Bilirubin screen (according to American Academy of Pediatrics guidelines)
- Disposition

- Discharged home
- Transferred to a higher level of care / Receiving hospital / Transport service
- Expired

G. Quality Improvement

All birth centers must have the ability to initiate quality improvement programs that include efforts to maximize patient safety.

H. Consultation and Transfer

1. Maternal-Fetal: Planned vaginal deliveries at gestational ages below 37 weeks or of multiple gestations should be referred to an appropriate higher level of care. Consultation with an obstetric provider at the higher-level facility is indicated if past history, prenatal course, and/or intrapartum or postpartum events indicate that mother or fetus is at risk.

2. Neonatal: Stabilize newborn infants who have unexpected complications until transfer to a facility that can provide the appropriate level of neonatal care.

3. Protocols for maternal-fetal and neonatal transport should conform to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health.

II. PERSONNEL: QUALIFICATIONS AND FUNCTIONS

At least two qualified professional attendants must be present at each birth.

Primary maternal care providers include CNMs, CMs, CPMs, and licensed midwives who are legally recognized to practice in the jurisdiction of the birth center; family physicians; and obstetrician-gynecologists.

The facility must have available an adequate number of qualified professionals with competence in basic (Level 1) care criteria and ability to stabilize and transfer high-risk women and newborns.

III. SPACE AND EQUIPMENT FOR INTRAPARTAL AND POSTPARTAL CARE

A. Physical Facilities and Equipment

Physical facilities and equipment should meet criteria published in the latest edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists. All rooms where babies are delivered should be kept at a temperature of 25 degrees C. (77 degrees F.) or higher to prevent hypothermia in the newborn.

B. Resuscitation

Provision must be made for resuscitation of infants at delivery. The capability for resuscitation should include assisted ventilation with oxygen administered by bag and mask or bag and endotracheal tube, chest compression, and appropriate intravascular therapy. A treatment station for this purpose should be located in each delivery room with the following: suction apparatus; a pulse oximeter; a source of blended oxygen; infant resuscitation positive pressure ventilation equipment, masks and endotracheal tubes in appropriate sizes; laryngoscope and blades; appropriate drugs; and equipment for umbilical vessel catheterization. Infusion pumps must be immediately available. An optimal thermal environment for the infant should be provided by a radiant warmer that is immediately available.

IV. SPACE AND EQUIPMENT FOR THE NORMAL INFANT

A. Physical facilities and equipment should meet criteria published in the latest edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

B. Minimal equipment for the newborn:

1. A platform scale, preferably with metric indicators.
2. A controlled source of continuous and/or intermittent suction.
3. Incubators and/or radiant warmers for adequate thermal support.
4. Equipment for determination of blood glucose at the bedside.
5. A device for the external measurement of blood pressure from the infant's arm or thigh.
6. Oxygen flow meters, tubing, binasal cannulas for short-term administration of oxygen.
7. A headbox assembly (oxygen hood), an oxygen blending device, and warming nebulizer for short-term administration of oxygen.
8. An oxygen analyzer that displays the ambient concentration of oxygen.
9. A newborn pulse oximeter for non-invasive blood oxygen monitoring.
10. An infusion pump that can deliver appropriate volumes of continuous fluids and/or medications for newborns.
11. A fully equipped neonatal resuscitation cart.
12. Positive pressure ventilation equipment and masks; endotracheal tubes in all the appropriate sizes for neonates.
13. A laryngoscope with premature and infant size blades.
14. A CO_2 detector.
15. Laryngeal mask airway (LMA, size 1)

V. LABORATORY DATA

A. Maternal

In-house laboratory capabilities should include the following procedures:

- Hemoglobin
- Serum glucose
- Urinalysis

B. Neonatal

In-house laboratory capabilities should include the following procedures, utilizing microvolume samples, when possible. In most instances, abnormal results will indicate a need for consultation and/or transfer of the baby.

- Hemoglobin
- Serum glucose

LEVEL I FACILITIES

I. SERVICES PROVIDED

The services provided by a Level I facility include education of personnel and parents, and anticipated low- to moderate-risk maternal and neonatal care. Specifically, the Level I facility should have the capacity to manage anticipated low- to moderate-risk pregnancies with the ability to detect, stabilize, and initiate management of unanticipated maternal-fetal or neonatal problems that occur during the antepartum, intrapartum, or postpartum period until the patient can be transferred to a facility at which specialty maternal or infant care is available.

A. Educational Services

Educational services should include the following:

1. Parent Education: Ongoing perinatal education programs for parents.

2. Nurses' Education: Programs for nurses should conform to the most recent edition of *Tennessee Perinatal Care System Educational Objectives for Nurses, Level I*, published by the Tennessee Department of Health. These courses may be made available periodically at the Level I facility by instructors from a Regional Perinatal Center. The courses may also transpire at a Regional Perinatal Center, or at any other site remote from the hospital, thus requiring that the hospital provide nurses with educational leave for attendance. The Level I hospital is responsible for the necessary arrangements for nurse education. Nurses should maintain a level of competency in electronic fetal monitoring (EFM) as determined by their institution. Competency in Advanced Cardiac Life Support (ACLS) is recommended for all nurses who provide post-anesthesia care for obstetric patients.

3. Physicians' Education: Educational opportunities for physicians should be available upon request, provided by the instructional staff of the Regional Perinatal Center and by qualified individuals on the staff of the Level I institution. Physicians should maintain a level of competency in electronic fetal monitoring (EFM) as determined by their institution.

4. All perinatal care providers, including anesthesia care providers, should maintain current Neonatal Resuscitation Program (NRP) provider status. All newborn care providers should also maintain current S.T.A.B.L.E. provider status.

B. Maternal-Fetal Care

1. Anticipated Low- to Moderate-Risk Patients: Prenatal care for uncomplicated patients should meet criteria published in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of

Obstetricians and Gynecologists and the ACOG / SMFM consensus statement.

2. Fetal Evaluation: A capability for continuous electronic fetal monitoring of the fetus should be maintained. Availability of limited obstetric ultrasound services and interpretation daily and during all shifts is not likely an option for some facilities. However, an ultrasound unit should be available in the labor and delivery area that can be used for basic fetal evaluation including amniotic fluid volume, fetal presentation, placental localization, etc. This equipment should have the capability of recording, storing and printing images for appropriate documentation.

3. Complicated Patients: Personnel should be capable of identifying and stabilizing maternal-fetal complications that require intervention before transfer to another facility. There should be an ongoing relationship for consultative services in accordance with EMTALA guidelines. Care of complicated patients requires direct consultation with the referral facility. The availability of anesthesia, radiologic services, and laboratory/transfusion services should be appropriate for effective support of these emergencies. Early identification of maternal and fetal complications that require higher levels of care should be accomplished so that transfer can occur as soon as possible.

4. Cesarean Section: A physician with privileges to perform emergency cesarean delivery should be readily available[†] 24 hours a day, 7 days a week. The timing of need for providers to be on-site is directed by the urgency of the clinical situation.

5. Postpartum Care: Personnel should provide care for anticipated low- to moderate-risk patients during the postpartum period. In the event of complications, consultation and/or referral should be sought when appropriate.

C. Neonatal Care

A Level I facility should provide basic neonatal care as follows (see the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists):

1. Newborn services have the capabilities to:

   Provide neonatal care at every delivery according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program.

   Evaluate and provide postnatal care to stable term newborn infants.

[†] See page 3 for complete definition of *readily available.*

Stabilize and provide care for infants born at 35 - 37 weeks or more gestation who remain physiologically stable.

Stabilize newborn infants who are ill and those born at <35 weeks' gestation until transfer to a facility that can provide the appropriate level of neonatal care. Provide neonatal post-resuscitation care and pre-transport stabilization care per the most recent edition of the S.T.A.B.L.E. Program.

2. Referred Infants:

Provide continuing care for infants who are back transferred from a referral facility, after their acute problems have been resolved.

D. Support Services

1. Every hospital should have a hemorrhage protocol in place. Blood and fresh frozen plasma should be readily available† in-house or on-call 24 hours a day, 7 days a week. The ability to initiate a massive transfusion protocol, with process to obtain more blood and component therapy as needed, should be readily available† at all times.

2. Anesthesia services should be readily available† 24 hours a day, 7 days a week for labor analgesia and surgical anesthesia, consistent with the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists and the ACOG / SMFM consensus statement.

   Regional anesthesia should be initiated and maintained only by health care providers who are approved through the institutional credentialing process to administer or supervise the administration of obstetric anesthesia. These individuals must be qualified to manage anesthetic complications.

3. Respiratory therapists who are current Neonatal Resuscitation Program (NRP) providers should be available in-house or on-call 24 hours a day, 7 days a week.

4. Radiologic and ultrasound services should be readily available† 24 hours a day, 7 days a week , including the capability to perform portable radiologic studies in the nursery.

5. Clinical laboratory services will be readily available† 24 hours a day, 7 days a week, including testing, transfusion services and a capacity to perform microanalyses listed in Section V (Laboratory Data) that are for the initial care of sick neonates.

6. A registered pharmacist should be immediately available for consultation 24 hours a day, 7 days a week. Access to pediatric emergency medications should also be available 24 hours a day, 7 days a week, as described in

† See page 3 for complete definition of *readily available.*

the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

7. Breastfeeding educational services should be available as described in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

E. Social Services

Social services and family support should be available, provided either through the hospital or by utilization of public and private agencies.

F. Maintenance of Data

Care of the newborn is aided by effective communication of information about the mother and her fetus to the pediatrician or other health care provider. The following items represent the minimum information that should be in the medical record of each patient:

1. Maternal

- Name, hospital medical record number
- Age, gravidity, parity, etc.
- Date of first prenatal visit
- Gestation (weeks)
- Availability of prenatal records (including prenatal labs) on admission. Prenatal lab results that should be available on admission include: hepatitis B surface antigen, HIV, serology, Group B strep, blood type and Rh status, antibody status, rubella, gonorrhea, chlamydia, and other tests as appropriate
- Social history to include alcohol, drug, or tobacco use and/or history or suspicion of domestic violence
- Prior cesarean section
- Electronic fetal monitoring (Yes or No)
- Induction (Yes or No)
- Indications for induction
- Time of membrane rupture
- Presentation
- Type of delivery (cesarean section, type of forceps, vacuum extraction, spontaneous)
- Indication for cesarean section / operative vaginal delivery
- Time of birth
- Birthweight
- Apgar scores
- Resuscitation (Yes or No)

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† See page 3 for complete definition of *readily available.*

- Type of resuscitation
- Maternal-fetal complications
- Anesthesia (type)
- Infant status on leaving delivery room (normal, abnormal, expired)
- Physician's name
- Nurse's name
- Disposition
    - Discharged home
    - Transferred to a higher level of care / Receiving hospital / Transport service
    - Expired

2. Neonatal

- Name, gender, hospital medical record number
- Date of birth
- Birthweight
- Gestational age
- Apgar scores
- Maternal complications (test results relevant to neonatal care; maternal illness potentially affecting the fetus; history of illicit substance use or any other known socially high-risk circumstances; complications of pregnancy associated with abnormal fetal growth; fetal anomalies, or abnormal results from tests of fetal well-being; information regarding labor and delivery; and situations in which lactation may be compromised)
- Discharge diagnoses
- Special care administered (specify)
- Documentation of newborn metabolic, hearing, and critical congenital heart disease (CCHD) screens, and immunizations and medications given
- Bilirubin screen (according to American Academy of Pediatrics guidelines)
- Disposition
    - Discharged home
    - Transferred to a higher level of care / Receiving hospital / Transport service
    - Expired

G. Quality Improvement

All Level I facilities must have the ability, to initiate and sustain education and quality improvement programs to maximize patient safety and/or collaborate with higher level facilities to do so.

All Level I facilities should have the capability to implement patient safety bundles for common causes of preventable maternal morbidity, such as management of maternal venous thromboembolism, obstetric hemorrhage, and severe hypertension in pregnancy.

H. Consultation and Transfer

Level I personnel should be capable of risk identification and determination of conditions necessitating consultation, referral, and transfer.

1. Maternal-Fetal: Planned deliveries at gestational ages below 35 weeks should be referred to an appropriate higher level of care. Consultation with an obstetric provider at the higher-level facility is indicated if past history, prenatal course, and/or intrapartum or postpartum events indicate that mother or fetus is at risk.

2. Neonatal: Infants born at 35-37 weeks gestation are at higher risk for newborn complications, and appropriate pediatric consultation should be considered. Level I facilities should be able to stabilize newborn infants who are ill and those born at <35 weeks gestation until transfer to a higher level of care.

3. A mechanism and procedure for maternal-fetal and neonatal transfer/transport to a higher level hospital should be readily available[†] 24 hours a day, 7 days a week, and should conform to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health. A reliable, accurate, and comprehensive communication system must exist between participating hospitals, hospital personnel, and transport teams.

II. PERSONNEL: QUALIFICATIONS AND FUNCTIONS

A. Physicians

1. Co-directors of Level I facilities should be board-certified in obstetrics and pediatrics, respectively. Family physicians may serve as co-directors if institutional necessity so indicates, or if board-certified individuals are not available.

B. Nursing

1. Required skills and knowledge for perinatal nurses are listed in the latest edition of *Tennessee Perinatal Care System Educational Objectives for Nurses, Level I*, published by the Tennessee Department of Health. All perinatal staff nurses should have the knowledge and skills that are prescribed in this publication, in addition to maintaining current NRP provider status. It is recommended that all nurses who provide post-anesthesia care to obstetric patients maintain Advanced Cardiac Life Support (ACLS) competency. All nurses who provide care to newborns should also maintain current S.T.A.B.L.E. provider status. Adequate numbers of registered nurses who have completed unit orientation, demonstrated competence in the care of women and newborns, and can

[†] See page 3 for complete definition of *readily available.*

stabilize and transfer high risk women and newborns are readily available[†] 24 hours a day, 7 days a week.

2. Every Level I facility should have a registered nurse(s) with level-appropriate formal training and experience in maternal and newborn care, whose primary responsibility is the organization and supervision of nursing services in the labor/delivery area, the newborn nursery and/or the postpartum area.

C. Labor and Delivery

1. The physician (family physician or obstetrician-gynecologist) or certified nurse midwife should examine the mother at appropriate intervals during labor. He or she should be readily available[†] 24 hours a day, 7 days a week during the later stages of labor. The physician should be physically present** (on-site) when fetal or maternal complications are imminent or apparent. All deliveries should be attended by a physician or certified nurse midwife, and a registered nurse. The physician or nurse midwife and the nurse should be capable of performing resuscitation of the mother and newborn infant.

2. Responsibility for following the course of labor and the status of the fetus may not be delegated by the physician or certified nurse midwife to anyone except a registered nurse (R.N.). The registered nurse is responsible for continuous assessment and evaluation of the course of labor, for the status of the fetus, and for the identification of abnormalities. The nurse should remain in attendance during labor, delivery and the immediate recovery period.

3. Every delivery should be attended by at least one person whose primary responsibility is for the newborn and who is capable of initiating neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines. Either that person or someone else who is physically present** (on-site) 24 hours a day, 7 days a week should have the skills required to perform a complete resuscitation, including endotracheal intubation and administration of medications. With multiple gestations, a separate team should be organized for each baby.

4. If a high-risk mother is unavoidably delivered at a Level I facility, additional qualified personnel should be present for the management of the baby. A written plan should be devised to set forth in detail the procedures for gathering required additional equipment and personnel in the presence of complications.

[†] See page 3 for complete definition of *readily available.*
** See page 3 for complete definition of *physically present*.

D. Postpartum Period

1. Mother: The mother's care following delivery should be supervised by a physician or certified nurse midwife and administered by a registered nurse (R.N.) or a licensed practical nurse (L.P.N.) supervised by a registered nurse (R.N.).

2. Infant: An initial evaluation of every neonate after birth should be performed by the physician responsible for care of the infant or by a registered nurse (R.N.) with education and experience in the recognition of abnormalities. Serial observations should be performed according to a clearly delineated protocol that has been established by the medical and nursing personnel of the nursery.

   The care of infants who require transport to another institution should be directly supervised by the physician. In instances of acute distress, a physician or advanced practice nurse should be present. The physician's presence is of paramount importance when the transport team arrives.

   Newborn Screening: Hearing, metabolic, and CCHD screening programs should adhere to the most recent State of Tennessee regulations and the most recent edition of *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

III. SPACE AND EQUIPMENT FOR INTRAPARTAL AND POSTPARTAL CARE

A. Physical Facilities and Equipment

Physical facilities and equipment should meet criteria published in the latest edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists and the ACOG / SMFM consensus statement.

All rooms where babies are delivered should be kept at a temperature of 25 degrees C. (77 degrees F.) or higher to prevent hypothermia in the newborn. Separate facilities should be maintained for obstetric patients, but the obstetric unit may also be utilized for patients with gynecologic problems that do not involve infection. The facility should also have a plan in place to care for obese women.

B. Resuscitation

Provision must be made for resuscitation of infants at delivery. The capability for resuscitation should include assisted ventilation with oxygen administered by bag and mask or bag and endotracheal tube, chest compression, and appropriate intravascular therapy. A treatment station for this purpose should be located in each delivery room with the following: suction apparatus; pulse oximeter; source of blended oxygen; infant resuscitation positive pressure ventilation equipment, masks and endotracheal tubes in appropriate sizes; laryngoscope and blades; appropriate drugs; and equipment for umbilical vessel catheterization. Infusion

pumps must be immediately available. An optimal thermal environment for the infant should be provided by a radiant warmer that is immediately available.

IV. SPACE AND EQUIPMENT FOR THE NORMAL INFANT

A. Physical facilities and equipment should meet criteria published in the latest edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

B. Minimal equipment for the newborn nursery:

1. A platform scale, preferably with metric indicators.
2. A controlled source of continuous and/or intermittent suction.
3. Incubators and/or radiant warmers for adequate thermal support.
4. Equipment for determination of blood glucose at the bedside.
5. Ability to provide intensive phototherapy.
6. A device for the external measurement of blood pressure from the infant's arm or thigh.
7. Oxygen flow meters, tubing, binasal cannulas for short-term administration of oxygen.
8. A headbox assembly (oxygen hood), an oxygen blending device, and warming nebulizer for short-term administration of oxygen.
9. An oxygen analyzer that displays the ambient concentration of oxygen.
10. A newborn pulse oximeter for non-invasive blood oxygen monitoring.
11. An infusion pump that can deliver appropriate volumes of continuous fluids and/or medications for newborns.
12. A fully equipped neonatal resuscitation cart.
13. Positive pressure ventilation equipment and masks; endotracheal tubes in all the appropriate sizes for neonates.
14. A laryngoscope with premature and infant size blades.
15. A CO_2 detector.
16. Laryngeal mask airway (LMA, size 1)

V. LABORATORY DATA

A. Maternal

In-house laboratory capabilities should include the following procedures:

- Complete blood count
- Major blood groups and Rh typing; blood cross match
- Coombs' test, indirect
- Liver function tests

- Plasma fibrinogen
- Platelet count
- Prothrombin time
- INR
- Partial thromboplastin time
- Serum glucose
- Serum sodium, potassium, chloride, bicarbonate, creatinine, BUN, magnesium, and calcium
- Serum protein and albumin
- Urinalysis
- Drug screen
- Serologic test for syphilis
- Bacterial cultures (aerobic and anaerobic); sensitivities
- Group B strep screening and /or rapid Group B strep screening
- Rapid HIV testing
- Hepatitis B surface antigen

B. Neonatal

In-house laboratory capabilities should include the following procedures, utilizing microvolume samples, when possible. In most instances, abnormal results will indicate a need for consultation and/or transfer of the baby.

- Complete blood count
- Major blood group and Rh typing; blood cross match
- Coombs' test (direct and indirect)
- Serum glucose
- Serum bilirubin (total and direct)
- Blood gas/pH
- Urinalysis
- Drug screen
- Bacterial cultures and antibiotic sensitivities
- C-reactive protein (CRP)
- Serum sodium, potassium, chloride, bicarbonate, creatinine, BUN, magnesium, and calcium

LEVEL II FACILITIES - OBSTETRIC

I. SERVICES PROVIDED

Level II obstetric units have the capabilities of Level I institutions plus the requisites to care for women with moderate- to high-risk antepartum, intrapartum, or postpartum conditions. The level of obstetric care provided by a hospital should be determined by the institution's ability to meet the criteria specified by the ACOG / SMFM consensus statement. The goal of care is to ensure that both mother and newborn are cared for at the appropriate level of care by appropriate personnel.

Planned delivery of women with massive hemorrhage risk or infants with anticipated risk for Level III or IV care is not encouraged at Level II obstetric units.

Level II units should be able to provide:

- Care for women with:
  - Preeclampsia with severe features at term
  - Placenta previa with no prior uterine surgery
- Emergency stabilization for critically ill obstetric patients
- Emergency care for unplanned births of younger, smaller, or sicker babies before transfer to a facility at which newborn intensive care is provided.

A. Educational Services

Educational services should include the following:

1. Parent Education: Ongoing perinatal education programs for parents.

2. Nurses' Education: Programs for nurses that conform to the latest edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level II*, for obstetric nurses, published by the Tennessee Department of Health. These courses should be made available periodically at Level II facilities by instructors on the staff of that institution and/or the staff from a Regional Perinatal Center. Courses may also transpire at a Regional Perinatal Center or at another site remote from the Level II hospital, thus requiring that the hospital provide nurses with educational leave for attendance. Level II hospitals are responsible for the necessary arrangements for nurse education.

3. Physicians' Education: A program of courses for physicians should be provided by the instructional staff of the Regional Perinatal Center and by qualified individuals on the staff of the Level II institution.

4. All perinatal care providers should maintain current NRP provider status. Competency in Advanced Cardiac Life Support (ACLS) is recommended for all nurses who provide post-anesthesia care for obstetric patients.

5. All Level II programs are strongly encouraged to participate in a state or national continuous quality improvement initiative that includes ongoing

data collection and review for benchmarking and evaluation of outcomes. Examples of continuous quality improvement initiatives available in Tennessee are those provided by TIPQC and THA.

B. Antepartum Care

1. Uncomplicated Patients: Prenatal care for uncomplicated patients should meet criteria published in the latest edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

2. Identification and Planning for Moderate- to High-Risk Patients: Identification of the mother and fetus at high risk and multispecialty planning of management and therapy through the postpartum and neonatal periods should be routine. This planning should include consultation with, or transfer to, a Level III or Level IV facility.

3. Medical and Surgical Complications: Facilities must be available for patients with complications of pregnancy. Early identification of maternal and fetal complications that require higher levels of care should be accomplished so that transfer can occur as soon as possible.

4. Laboratory Services: In-house or readily accessible laboratory services should be available.

5. Imaging Services and Interpretation: Computed tomography scan, magnetic resonance imaging, nonobstetric ultrasound imaging, and maternal echocardiography with interpretation should be readily available daily (at all times not required).

6. Fetal Evaluation: A capability for continuous electronic fetal monitoring of mother and fetus should be maintained. Ability of standard obstetric ultrasound services and interpretation daily and during all shifts is not likely an option for some facilities. However, an ultrasound unit should be available in the labor and delivery area that can be used for basic fetal evaluation including amniotic fluid volume, fetal presentation, placental localization, etc. This equipment should have the capacity of recording, storing and printing images for appropriate documentation.

7. Social Services: Social services should be available, provided either through the hospital or by utilization of public and private agencies.

8. Home Nursing: Nursing services provided in patients' homes should be available if needed.

9. Dietary and Lactation Consultation: Dietary and lactation consultation services should be available as described in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

10. Pharmacy: A registered pharmacist should be immediately available for consultation 24 hours a day, 7 days a week. Access to pediatric emergency medications should also be available 24 hours a day, 7 days a week, as described in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

C. Intrapartum Care

1. Medical Personnel:

   a. An obstetrician-gynecologist should be readily available[†] 24 hours a day, 7 days a week. The timing of need for providers to be on-site is directed by the urgency of the clinical situation.

      - Based upon available resources and facility determination of the most appropriate staffing, it may be acceptable for a family physician with obstetric fellowship training or equivalent training and skills in obstetrics, and with surgical skill and privileges to perform cesarean delivery to meet criteria for being readily available[†].

   b. A maternal-fetal medicine specialist (MFM) should be readily available[†] 24 hours a day, 7 days a week for consultation on-site, by phone, or by telemedicine, as needed. The timing of need for providers to be on-site is directed by the urgency of the clinical situation.

   c. Internal medicine or family medicine physicians should be readily available[†] 24 hours a day, 7 days a week for obstetric patients. The timing of need for providers to be on-site is directed by the urgency of the clinical situation.

   d. General surgeons should be readily available[†] 24 hours a day, 7 days a week for obstetric patients. The timing of need for providers to be on-site is directed by the urgency of the clinical situation

2. Physical Facilities and Equipment: Physical facilities and equipment should meet the criteria outlined in the latest edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, and any additional criteria as herein outlined.

3. Labor and Delivery Area: Labor and delivery rooms should occupy a clearly and specifically designated area in the hospital.

4. Complicated Intrapartum Care: Personnel should be capable of identifying and stabilizing maternal-fetal complications that require intervention before transfer to another facility. There should be an ongoing relationship for

[†] See page 3 for complete definition of *readily available.*

consultative services in accordance with EMTALA guidelines. Care of complicated patients requires direct consultation with the referral facility.

5. Cesarean Section: Personnel should maintain the capability to perform cesarean section in accordance with the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, or sooner if indicated.

6. Anesthesia: An anesthesiologist must be readily available[†] 24 hours a day, 7 days a week. Timing of need to be on-site is directed by the urgency of the clinical situation.

7. Transfusion Services: Transfusion services should be readily available[†] 24 hours a day, 7 days a week. An appropriately trained technician should be in-house 24 hours a day, 7 days a week. All blood components must be available on an emergency basis, either on the premises or by pre-arrangement with another facility.

8. Imaging Services and Interpretation: Imaging services, including portable studies, should be readily available[†] 24 hours a day, 7 days a week.

9. Fetal Monitoring: A capability for continuous electronic monitoring of mother and fetus should be maintained. Ability of standard obstetric ultrasound services and interpretation daily and during all shifts is not likely an option for some facilities. However, an ultrasound unit should be available in the labor and delivery area that can be used for basic fetal evaluation including amniotic fluid volume, fetal presentation, placental localization, etc. This equipment should have the capacity of recording, storing and printing images for appropriate documentation.

10. Laboratory Services: Clinical laboratory services should be readily available[†] 24 hours a day, 7 days a week to fully support clinical obstetric functions.

D. Postpartum Care

1. Space and Personnel: There should be an area specifically designated for high-risk postpartum care. In this area, nursing care must be administered by a registered nurse. A protocol for clinical observations is required. The care of low-risk mothers during the immediate recovery period must be administered or supervised by a registered nurse. A protocol for clinical observations is required.

2. Discharge Planning and Education: Specific personnel should be assigned this responsibility.

3. Interconceptional Health Care: Information on interconceptional health

[†] See page 3 for complete definition of *readily available.*

care issues should be provided, such as nutrition, folic acid use, lifestyle choices, and child spacing.

E. Consultation and Transfer

Level II facilities should maintain active relationships with a Level III or IV facility in the region for consultation and transfer. Protocols for maternal-fetal transport should conform to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health. Unless emergency circumstances require otherwise, Level II facilities cannot receive transferred patients with maternal, fetal or neonatal illnesses.

The transport of mothers should be individually arranged by the Level II and Level III or Level IV facilities involved. If delivery is anticipated at a gestational age of less than 32 completed weeks or an estimated fetal weight of 1500 grams or less, or need for immediate pediatric subspecialty care is anticipated, transfer to a Level III or IV facility which provides the required services should be initiated.

F. Maintenance of Data

The following items represent the minimum information that should be in medical records maintained at Level II facilities:

- Name, hospital medical record number
- Age, gravidity, parity, etc.
- Date of first prenatal visit
- Gestation (weeks)
- Availability of prenatal records (including prenatal labs) on admission. Prenatal lab results that should be available on admission include: hepatitis B surface antigen, HIV, serology, Group B strep, blood type and Rh status, rubella, gonorrhea, chlamydia, and other tests as appropriate
- Social history to include alcohol, drug, or tobacco use and/or history or suspicion of domestic violence
- Prior cesarean section
- Electronic fetal monitoring (Yes or No)
- Induction (Yes or No)
- Indications for induction
- Time of membrane rupture
- Presentation
- Type of delivery (cesarean section, type of forceps, vacuum extraction, spontaneous)
- Indication for cesarean section / operative vaginal delivery
- Time of birth
- Birthweight
- Apgar scores (per current NRP guidelines)
- Resuscitation (Yes or No)
- Type of resuscitation
- Maternal-fetal complications
- Status of prenatal testing such as Group B strep, hepatitis B, etc.
- Anesthesia (type)

- Infant status on leaving delivery room (normal, abnormal, expired)
- Physician's name
- Nurse's name
- Disposition
  - Discharged home
  - Transferred to a Level III facility / Receiving hospital / Transport service
  - Expired

II. PERSONNEL: QUALIFICATIONS AND FUNCTIONS

Requirements for adequate staffing are based upon the assumption that patients will be transferred to a Level III or IV facility when their illnesses necessitate a level of care that exceeds the capability of Level II facilities.

A. Physicians

1. At a hospital with a Level II obstetric facility, physician obstetric leadership should be a board-certified obstetrician-gynecologist (or physician who has completed residency training and eligible for board certification according to applicable board policies) with experience in obstetric care or a maternal fetal medicine specialist.

    - Based upon available resources and facility determination of the most appropriate staffing, it may be acceptable for such leader to be board-certified in another specialty with privileges and expertise in obstetric care including with surgical skill and privileges to perform cesarean delivery.

2. The chiefs of the obstetric and neonatal services should coordinate the hospital's perinatal care services and, in conjunction with other medical, anesthesia, nursing, respiratory therapy, and hospital administration staff, develop policies concerning staffing, procedures, equipment, and supplies. These physicians are responsible for setting the hospital's standard of perinatal care by working together to incorporate evidence-based practice patterns and nationally recognized care standards.

3. Regional anesthesia should be initiated and maintained only by health care providers who are approved through the institutional credentialing process to administer or supervise the administration of obstetric anesthesia. These individuals must be qualified to manage anesthetic complications.

4. Normal deliveries should be attended by a physician or a certified nurse midwife, and a registered nurse.

5. Every delivery should be attended by at least one person whose primary responsibility is for the newborn and who is capable of initiating neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines. Either that person or someone else who is immediately available should have the

skills required to perform a complete resuscitation, including endotracheal intubation and administration of medications.

6. Deliveries of high-risk fetuses should be attended by an obstetrician and at least two other persons qualified in neonatal resuscitation whose only responsibility is the neonate. With multiple gestations, each newborn should have his or her own dedicated team of care providers who are capable of performing neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines.

B. Nurses

1. The Nurse Manager (R.N.) is responsible for all obstetric nursing activities. The nurse manager in a hospital with a Level II nursery must complete the Level II obstetrics course prescribed in the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level II*, published by the Tennessee Department of Health.

2. Staff nurses in obstetrics working in facilities with Level II nurseries must complete the Level II obstetrics course outlined in the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level II*, published by the Tennessee Department of Health. Nurses should maintain institutional unit-specific competencies. In addition, all nurses should be NRP providers. It is recommended that all nurses who provide post-anesthesia care to obstetric patients maintain ACLS competency.

3. Recommended Registered Nurse (R.N.) / Patient Ratios for Perinatal Care (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010):

Ratio	**Care Provided**
1:2	Patients in labor without complications
1:1	Patients in second stage of labor
2:1	Birth. 1 nurse responsible for the mother and 1 nurse whose sole responsibility is the baby
1:1	Patients with medical or obstetric complications
1:1	Patients receiving oxytocin during labor
1:1	Coverage for initiating epidural anesthesia
1:1	Patients in the immediate postoperative recovery period (at least the first 2 hours after birth)
1:3	Antepartum and postpartum patients with complications but in stable condition
1:3	Mother-newborn couplets on the immediate post-operative day (no more than 2 of the mothers should be recovering from cesarean birth)
1:5-6	Postpartum patients without complications (no more than 2-3 of these patients should be

recovering on the immediate post-operative day from cesarean birth)

4. The mother's care immediately following delivery must be supervised by a registered nurse. An institutional protocol for clinical observation is required.

5. A registered nurse is primarily responsible for the organization of care in the postpartum unit.

C. Social Services / Case Management

Personnel experienced in dealing with perinatal issues, discharge planning and education, follow-up and referral, home care planning, and bereavement support should be available to perinatal unit staff members and families.

D. Nutritionist / Dietitian / Lactation Consultant

The staff must include at least one dietitian or nutritionist who has special training in perinatal nutrition and can plan diets that meet the special needs of high risk antepartum and postpartum women. Availability of lactation consultants 7 days a week is recommended to assist with complex breastfeeding issues. In Level II perinatal facilities, 1.6 full-time equivalent lactation consultants are recommended for every 1,000 births based on annual birth volume (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010).

III. SPACE AND EQUIPMENT FOR LEVEL II FACILITIES

Physical facilities and equipment should meet criteria published in the latest edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

The facility should have a plan in place to care for obese women.

LEVEL II FACILITIES - NEONATAL

I. INTRODUCTION

Level II nurseries provide specialty neonatal services.

Level II units have the capabilities of Level I nurseries, plus:

- Provide care for infants born at ≥32 weeks' gestation and weighing ≥1500 grams who have physiologic immaturity or who are moderately ill with problems that are expected to resolve rapidly and are not anticipated to need subspecialty services on an urgent basis.

- Provide mechanical ventilation for brief duration (<24 hours) and provide continuous positive airway pressure (CPAP).

- Stabilize infants born at <32 weeks' gestation and weighing <1500 grams until transfer to a neonatal intensive care facility.

- Provide care for infants who are convalescing after intensive care.

  (American Academy of Pediatrics *Levels of Neonatal Care*, 2012)

II. SERVICES PROVIDED

A. Educational Services

Educational services should include the following:

1. Parent Education: Ongoing perinatal education programs for parents.

2. Nurses' Education: Programs for nurses that conform to the latest edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level II*, for neonatal nurses, published by the Tennessee Department of Health. These neonatal courses should be made available periodically at Level II facilities by instructors on the staff of that institution and/or the staff from a Regional Perinatal Center. Courses may also transpire at a Regional Perinatal Center or at another site remote from the Level II hospital, thus requiring that the hospital provide nurses with educational leave for attendance. Level II hospitals are responsible for the necessary arrangements for nurse education.

3. Physicians' Education: Educational opportunities for physicians should be available upon request, provided by the instructional staff of the Regional Perinatal Center and by qualified individuals on the staff of the Level II institution.

4. All neonatal care providers should maintain both current NRP and S.T.A.B.L.E. provider status. The S.T.A.B.L.E. Cardiac Module is also recommended.

B. Ancillary Services

1. Laboratory Services: Laboratory capabilities should include but not be limited to the following:

   a. Routine Availability

   - Clotting factors
   - Serum total protein
   - Serum albumin
   - Serum IgM
   - Serum triglycerides (for parenteral nutrition)
   - Metabolic screen
   - Liver function tests
   - Serologic test for syphilis
   - Serology for hepatitis
   - Screening for HIV
   - TORCH titers
   - Viral cultures

   b. Available 24 Hours - 7 Days a Week

   - Hematocrit
   - Hemoglobin
   - Complete blood count
   - Reticulocyte count
   - Blood typing: major groups and Rh
   - Cross match
   - Minor blood group antibody screen
   - Coombs' test
   - Prothrombin time
   - Partial thromboplastin time
   - Platelet count
   - Fibrinogen concentration
   - Serum sodium, potassium, chloride
   - Serum calcium
   - Serum phosphorus
   - Serum magnesium
   - Serum blood glucose
   - Therapeutic drug levels
   - Serum bilirubin, total and direct
   - Blood gases/pH
   - Blood urea nitrogen
   - Serum creatinine
   - Serum/urine osmolalities

- Urinalysis
- Cerebrospinal fluid: cells, chemistry
- Bacterial cultures and sensitivities
- C-reactive protein (CRP)
- Gram stain
- Toxicology
- Group B strep screening

2. Transfusion Services: Transfusion services should be maintained at all times. An appropriately trained technician should be in-house 24 hours a day, 7 days a week. All blood components must be available on an emergency basis, either on the premises or by pre-arrangement with another facility.

C. Consultation and Transfer

The Level II facility should maintain an active relationship with a Level III or Level IV facility in the region for consultation and transfer. Protocols for transport should conform to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health.

Neonatal Consultation and Transport: When the severity of an illness requires a level of care that exceeds the capacity of the Level II facility, the infant should be transferred to a Level III or Level IV institution capable of providing required care. Transfer of these infants should be provided after consultation with the receiving Level III or Level IV unit. Refer to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health, for more information.

D. Maintenance of Data

The following items represent the minimum information that should be in medical records maintained at Level II facilities:

- Name, gender, hospital medical record number
- Date of birth
- Birthweight
- Gestational age
- Apgar scores
- Maternal complications (test results relevant to neonatal care; maternal illness potentially affecting the fetus; history of illicit substance use or any other known socially high-risk circumstances; complications of pregnancy associated with abnormal fetal growth, fetal anomalies, or abnormal results from tests of fetal well-being; information regarding labor and delivery; and situations in which lactation may be compromised)
- Discharge diagnoses
- Special care administered (specify)

- Documentation of newborn metabolic, hearing and critical congenital heart disease (CCHD) screens, and immunizations and medications given
- Bilirubin screen (according to American Academy of Pediatrics guidelines)
- Disposition
  - Discharged home
  - Transferred to a higher level of care / Receiving hospital / Transport service
  - Expired

III. PERSONNEL: QUALIFICATIONS AND FUNCTIONS

Requirements for adequate staffing are based upon the assumption that patients will be transferred to a Level III or Level IV facility when their illnesses necessitate a level of care that exceeds the capabilities of Level II facilities. Level II nurseries must have the personnel (e.g., physicians, specialized nurses, respiratory therapists, radiology technicians, laboratory technicians) and equipment (e.g., portable chest radiograph, blood gas laboratory) continuously available to provide ongoing care as well as to address emergencies. When the unit has an infant on a ventilator, specialized personnel must be available on-site to manage respiratory emergencies.

A. Physicians

1. In a Level II hospital, a board-certified pediatrician with subspecialty certification in neonatal-perinatal medicine should be chief of the neonatal care service. The chief should assure that appropriate trained and adequate staff are available at all times.

2. The co-directors of perinatal services should coordinate the hospital's perinatal care services and, in conjunction with other medical, anesthesia, nursing, respiratory therapy, and hospital administration staff, develop policies concerning staffing, procedures, equipment, and supplies. The medical directors of obstetrics and neonatology are responsible for setting the hospital's standard of perinatal care by working together to incorporate evidence-based practice patterns and nationally recognized care standards.

3. Every delivery should be attended by at least one person whose primary responsibility is for the newborn and who is capable of initiating neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines. Either that person or someone else who is immediately available should have the skills required to perform a complete resuscitation, including endotracheal intubation and administration of medications.

4. Deliveries of high-risk fetuses should be attended by an obstetrician and at least two other persons qualified in neonatal resuscitation whose only responsibility is the neonate. With multiple gestations, each newborn should have his or her own dedicated team of care providers who are

capable of performing neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines.

B. Nurses

1. The nurse manager (R.N.) is responsible for all nursing activities in the nurseries of Level II facilities. The nurse manager in a hospital with a Level II nursery must complete the Level II neonatal courses prescribed for staff nurses in the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level II*, published by the Tennessee Department of Health.

2. All staff nurses (R.N.) must be skilled in the observation and treatment of sick infants. For Level II facilities, they must complete the Level II neonatal course for nurses outlined in the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses*, published by the Tennessee Department of Health. Nurses should maintain institutional unit-specific competencies. In addition, all nurses should be current NRP and S.T.A.B.L.E. providers.

3. Recommended Registered Nurse (R.N.) / Patient Ratios for Newborn Care (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010):

Ratio	**Care Provided**
1:5-6	Newborns requiring only routine care
1:3-4	Newborns requiring continuing care
1:2-3	Newborns requiring intermediate care
1:1-2	Newborns requiring intensive care
1:1	Newborns requiring multisystem support
1 or more :1	Unstable newborns requiring complex critical care

C. Respiratory Therapists

Respiratory therapists who can provide supplemental oxygen, assisted ventilation and continuous positive pressure ventilation (including high flow nasal cannula) of neonates with cardiopulmonary disease should be continuously available on-site to provide ongoing care as well as to address emergencies.

D. Social Services / Case Management

Personnel experienced in dealing with perinatal issues, discharge planning and education, follow-up and referral, home care planning, and bereavement support should be available to intermediate and intensive care unit staff members and families.

E. Dietitian / Lactation Consultant

The staff must include at least one dietitian who has special training in perinatal nutrition and can plan diets that meet the special needs of high-risk neonates. Availability of lactation consultants 7 days a week is recommended to assist with complex breastfeeding issues. 1.6 full-time equivalent lactation consultants are recommended for every 1,000 births based on annual birth volume in Level II perinatal facilities (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010),

F. Pharmacist

A registered pharmacist with expertise in compounding and dispensing medications, including total parenteral nutrition (TPN) for neonates must be available 24 hours a day, 7 days a week.

IV. SPACE AND EQUIPMENT FOR LEVEL II FACILITIES

A. Physical facilities and equipment should meet criteria published in the latest edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

B. Minimal equipment for care of the normal infant includes:

1. A platform scale, preferably with metric indicators.
2. A controlled source of continuous and/or intermittent suction.
3. Incubators and/or radiant warmers for adequate thermal support.
4. Equipment for determination of blood glucose at the bedside.
5. Ability to provide intensive phototherapy.
6. A device for the external measurement of blood pressure from the infant's arm or thigh.
7. Oxygen flow meters, tubing, binasal cannulas for short-term administration of oxygen.
8. A headbox assembly (oxygen hood), an oxygen blending device, and warming nebulizer for short-term administration of oxygen.
9. An oxygen analyzer that displays the ambient concentration of oxygen.
10. A newborn pulse oximeter for non-invasive blood oxygen monitoring.
11. An infusion pump that can deliver appropriate volumes of continuous fluids and/or medications for newborns.
12. A fully equipped neonatal resuscitation cart.
13. Positive pressure ventilation equipment and masks; endotracheal tubes in all the appropriate sizes for neonates.
14. A laryngoscope with premature and infant size blades.
15. A CO_2 detector.
16. Laryngeal mask airway (LMA, size 1)

C. Intermediate Care Nursery

Additional equipment needed for intermediate care newborns includes:

1. A servo-controlled incubator or heated open bed for each infant who requires a controlled thermal environment.
2. Cardiorespiratory monitors that include pressure and waveform monitoring.
3. Oxygen analyzers, blenders, heaters, and humidifiers sufficient for anticipated census.
4. A sufficient number of headbox assemblies (oxygen hoods).
5. Modes of respiratory support: binasal cannulas, conventional mechanical ventilator, mechanism to deliver nasal CPAP.
6. A bag or t-piece resuscitator and mask for each infant.
7. An adequate supply of endotracheal tubes and other intubation supplies and LMA.
8. A device for viewing x-rays in the infant area.

LEVEL III FACILITIES - OBSTETRIC

I. INTRODUCTION

Level III obstetric units possess the capabilities of Level II institutions plus the ability to provide care for women with more complex maternal medical conditions, obstetric complications, and fetal conditions. The level of obstetric care provided by a hospital should be determined by the institution's ability to meet the criteria specified by the ACOG / SMFM consensus statement published in August 2019. The goal of care is to reduce maternal morbidity and mortality by encouraging the growth and maturation of systems for the provision of risk-appropriate care specific to maternal health needs.

The responsibilities and capabilities that are prescribed for these facilities are solely concerned with the level of patient care. Designation as a Level III facility does not imply designation as a Regional Perinatal Center. The additional responsibilities of Regional Perinatal Centers are described elsewhere in these Guidelines.

II. SERVICES PROVIDED

A. Educational Services

Educational services should include the following:

1. Parent Education: Ongoing perinatal education programs for parents.

2. Education of Personnel: Level III units are required to provide ongoing educational programs for their nurses that conform to the latest edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level III*, published by the Tennessee Department of Health. Outreach educational activities are not required to be provided.

3. Physicians' Education: Level III units are required to provide ongoing educational programs for physicians practicing in that institution. Outreach educational activities are not required.

4. All perinatal care providers should maintain current NRP provider status. It is recommended that all nurses who provide post-anesthesia care to obstetric patients maintain Advanced Cardiac Life Support (ACLS) competency.

B. Antepartum Care

A complete range of prenatal care for both normal and complicated patients will be provided as follows:

1. Uncomplicated Patients: Prenatal care for uncomplicated patients should meet standards published in the most recent edition of the *Guidelines for*

Perinatal Care, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

2. Identification of High-Risk Mothers: Identification and multispecialty planning for management and therapy of the mother and the fetus at high risk must be ongoing.

3. In-patient Care of Complications: An antenatal area must be available for patients with complications of pregnancy.

4. Imaging Services: Computed tomography scan, magnetic resonance imaging, maternal echocardiography, and nonobstetric ultrasound imaging should be readily available† 24 hours a day, 7 days a week.

5. Fetal Evaluation: Specialized obstetric ultrasound and fetal assessment, including Doppler studies, with interpretation should be readily available† 24 hours a day, 7 days a week.

6. Social Work: Full-time licensed social workers with perinatal expertise must be on the staff of the hospital.

7. Home Nursing: Access to home nursing services should be available.

8. Dietary and Lactation Consultation: Dietary and lactation consultation services should be available as described in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

9. Pharmacy. A registered pharmacist should be immediately available for consultation 24 hours a day, 7 days a week. Access to emergency medications should also be available 24 hours a day, 7 days a week, as described in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

C. Intrapartum Care

1. Medical Personnel:
   a. Board-certified obstetrician-gynecologists (or physicians who have completed residency training and are eligible for board certification) should be physically present** (on-site) in the location where perinatal care is provided 24 hours a day, 7 days a week.
   b. A maternal-fetal medicine specialist (MFM) with inpatient privileges must be readily available† 24 hours a day, 7 days a week, either on-site, by phone, or via telemedicine. Timing of need to be on-site is directed by the urgency of the clinical situation. However, the MFM must be able to be on-site to provide direct care within 24 hours.

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† See page 3 for complete definition of *readily available.*
** See page 3 for complete definition of *physically present*.

2. Physical Facilities and Equipment: Physical facilities and equipment should meet the standards in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, and any additional criteria as herein presented.

   The facility should be prepared to care for and deliver obese women. Appropriate birthing beds, operating tables and rooms, and operating equipment should be available.

3. Labor and Delivery Area: Labor and delivery rooms must occupy a clearly and specifically designated area in the hospital.

4. Intensive Care Area: The ability to provide intensive care for intrapartum patients must be provided. Nursing care of high-risk patients must be administered by qualified registered nurses who possess both critical care and obstetrical care knowledge and skills.

5. Cesarean Section: Personnel should maintain the capability to perform cesarean section in accordance with the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, or sooner if indicated.

6. Anesthesia: A board-certified (or physician who has completed residency training and eligible for board certification according to applicable board policies) anesthesiologist should be physically present** (on-site) in the location where perinatal care is provided 24 hours a day, 7 days a week.

7. Transfusion Services: In-house availability of all blood components is required. Level III facilities should have the ability at all times to initiate massive transfusion protocol, with process to obtain more blood and component therapy as needed.

8. Imaging Services and Interpretation: Computed tomography scan, magnetic resonance imaging, maternal echocardiography, and nonobstetric ultrasound imaging should be readily available† 24 hours a day, 7 days a week.

9. Fetal Monitoring: A capability for continuous electronic monitoring of mother and fetus must be maintained. Specialized obstetric ultrasound and fetal assessment, including Doppler studies, with interpretation should be readily available† 24 hours a day, 7 days a week.

10. Laboratory Services: Clinical laboratory services must be available to fully support clinical obstetric functions.

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† See page 3 for complete definition of *readily available.*

** See page 3 for complete definition of *physically present*.

11. Interventional Radiology: Basic service (capable of performing uterine artery embolization) should be readily available† 24 hours a day, 7 days a week.

12. Respiratory Support: Appropriate equipment and personnel must be physically present** (on-site) in the location where care is provided, 24 hours a day, 7 days a week to ventilate and monitor women in Labor and Delivery until they can be safely transferred to ICU.

13. Intensive Care Area: Level III facilities must have on-site medical and surgical ICUs that accept pregnant women. The ICUs must have adult critical care providers physically present** (on-site) 24 hours a day, 7 days a week. An MFM must be readily available† 24 hours a day, 7 days a week for active communication and consultation on all obstetric patients in the ICU. The MFM should be able to be physically present** (on-site) within a time frame that incorporates maternal and fetal or neonatal risks and benefits with the provision of care.

D. Postpartum Care

1. Postpartum Area: There must be specifically designated areas for postpartum care.

2. Intensive Care Area: Level III facilities must have on-site medical and surgical ICUs that accept women during the postpartum period. The ICUs must have adult critical care providers physically present** (on-site) 24 hours a day, 7 days a week. A maternal-fetal medicine specialist (MFM) with inpatient privileges must be readily available† 24 hours a day, 7 days a week for active communication and consultation on all obstetric patients in the ICU. The MFM should be able to be physically present** (on-site) within a time frame that incorporates maternal and fetal or neonatal risks and benefits with the provision of care.

3. Discharge Planning and Education: Specific personnel should be assigned responsibility for assuring that mothers are given helpful preparation for the care of themselves and their newborns at home.

4. Counseling for Complications: Personnel who are specifically qualified should be assigned responsibility for fully discussing with parents the complications of pregnancy and their implications for future pregnancies and fetal outcomes. Special attention should be given to families who experience fetal or neonatal death. Bereavement support is essential. Counseling consults / referrals should be made as necessary.

5. Interconceptional Health Care: Information on interconceptional health care issues should be provided, such as nutrition, folic acid use, lifestyle choices, and child spacing.

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† See page 3 for complete definition of *readily available.*
** See page 3 for complete definition of *physically present*.

E. Consultation and Transfer

Maternal-Fetal Transport: If the Level III facility chooses to accept referred patients, it should have a documented mechanism to facilitate and accept maternal transfers/transports. The logistics and mode of transport of each maternal patient should be individually determined by the Level III facility and the referring institution, conforming to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health. Transport should also conform to regulations prescribed by the State of Tennessee. Detailed records of the maternal transport system should be maintained by the Level III facility. The Level III facility should provide patient transfer feedback to designated Level I and Level II facilities to address maternal care quality issues.

F. Maintenance of Data and Assessment of Quality Measures

A systematic ongoing compilation of data should be maintained to reflect the care of sick patients, in addition to the listing of minimal data that is specified for Level I and Level II facilities. In addition, guidelines for storage and retrieval that encourage regular data review for trends should be established. All Level III programs should participate in a state or national continuous quality improvement initiative that includes ongoing data collection and review for benchmarking and evaluation of outcomes. Examples of continuous quality improvement initiatives available in Tennessee are those provided by TIPQC and THA.

III. PERSONNEL: QUALIFICATIONS AND FUNCTIONS

A. Physicians

1. Director: The director of the maternal-fetal medicine service of a hospital providing subspecialty care should be a, board-certified obstetrician with subspecialty certification in maternal-fetal medicine. The director of the obstetric service should be a board-certified obstetrician-gynecologist or maternal-fetal medicine specialist (MFM). The director is responsible for maintaining practice guidelines and, in cooperation with the obstetric medical director, nursing, and hospital administration, is responsible for developing the operating budget; evaluating and purchasing equipment; planning, developing, and coordinating in-hospital and outreach educational programs; and participating in the evaluation of perinatal care.

2. Obstetricians: Board-certified obstetricians (or physicians who have completed residency training and are eligible for board certification) may assume primary responsibility for the hospital care of high-risk patients and must be physically present** (on-site) 24 hours a day, 7 days a week. The institution is responsible for development of guidelines that prescribe circumstances in which the obstetrician will consult the maternal-fetal specialist.

** See page 3 for complete definition of *physically present.*

3. Normal deliveries should be attended by a physician or a certified nurse midwife, and a registered nurse.

4. Every delivery should be attended by at least one person whose primary responsibility is for the newborn and who is capable of performing neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines. Either that person or someone else who is immediately available should have the skills required to perform a complete resuscitation, including endotracheal intubation and administration of medications.

5. Deliveries of high-risk fetuses should be attended by an obstetrician and at least two other persons qualified in neonatal resuscitation whose only responsibility is the neonate. With multiple gestations, each newborn should have his or her own dedicated team of care providers who are capable of performing neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines.

6. Anesthesiologists: Obstetric anesthesia services should be directed by a board-certified anesthesiologist with obstetric anesthesia fellowship training or experience in obstetric anesthesia.

7. Sub-specialty Consultants: A full complement of subspecialists, such as subspecialists in critical care, general surgery, infectious disease, hematology, cardiology, nephrology, neurology, gastroenterology, internal medicine, behavioral health, and neonatology should be readily available[†] for inpatient consultation 24 hours a day, 7 days a week. Subspecialists should be able to be physically present** (on-site) within a time frame that incorporates maternal and fetal or neonatal risks and benefits with the provision of care. A geneticist for obstetric and newborn patients should maintain an ongoing service program, either as a member of the active staff of the hospital, or as a consultant whose responsibility for the hospital's genetic program is clearly identifiable.

B. Nurses

1. The nurse manager in a maternal-fetal unit should have completed education according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level III*, for obstetric nurses, published by the Tennessee Department of Health. A baccalaureate degree is required.

2. In Level III facilities, staff nurses (R.N.) in obstetrics who are responsible for Level II or Level III care should have completed Level III education according to the most recent edition of the *Tennessee Perinatal Care*

[†] See page 3 for complete definition of *readily available.*
** See page 3 for complete definition of *physically present.*

System Educational Objectives for Nurses, Level III, for obstetric nurses, published by the Tennessee Department of Health. Nurses should maintain institutional unit-specific competencies. In addition, all nurses should be current NRP providers. Nurses should maintain a level of competency in electronic fetal monitoring (EFM) as determined by their institution. It is recommended that all nurses who provide post-anesthesia care to obstetric patients maintain ACLS competency.

3. The Level III obstetric unit should have at least one obstetric nurse on its full-time staff who is responsible for staff education. This nurse should either be masters' prepared or actively pursuing an advanced degree.

4. Recommended Registered Nurse (R.N.) / Patient Ratios for Perinatal Care (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010):

Ratio	**Care Provided**
1:2	Patients in labor without complications
1:1	Patients in second stage of labor
2:1	Birth. 1 nurse responsible for the mother and 1 nurse whose sole responsibility is the baby
1:1	Patients with medical or obstetric complications
1:1	Patients receiving oxytocin during labor
1:1	Coverage for initiating epidural anesthesia
1:1	Patients in the immediate postoperative recovery period (at least the first 2 hours after birth)
1:3	Antepartum and postpartum patients with complications but in stable condition
1:3	Mother-newborn couplets on the immediate post-operative day (no more than 2 of the mothers should be recovering from cesarean birth)
1:5-6	Postpartum patients without complications (no more than 2-3 of these patients should be recovering on the immediate post-operative day from cesarean birth)

In-house minimal staffing for care of antepartum and postpartum patients should be adequate to handle possible emergencies. Sufficient staff skilled in obstetrics should be immediately available and free to respond to these emergencies without decreasing the unit staffing below safe levels as described above.

C. Social Workers

The services of social workers should be made available by the hospital 24 hours a day, 7 days a week. These services should be provided by a staff that is qualified in perinatal social work. This requires that social workers be educated according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives in Medicine for Perinatal Social Workers*, published by the Tennessee Department of Health.

D. Case Manager / Discharge Coordinator

Personnel experienced in dealing with discharge planning and education, follow-up and referral, and home care planning must be available to antepartum, intrapartum, and postpartum unit staff members, patients, and families.

E. Dietitian / Lactation Consultant

The staff must include at least one dietitian who has special training in perinatal nutrition and can plan diets that meet the special needs of high risk antepartum and postpartum women. Availability of lactation consultants 7 days a week is recommended to assist with complex breastfeeding issues. 1.9 full-time equivalent lactation consultants are recommended for every 1,000 births based on annual birth volume in Level III perinatal units (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010).

LEVEL III FACILITIES - NEONATAL

I. INTRODUCTION

Level III nurseries provide neonatal intensive care (NICU) services.

Level III units have the capabilities of Level II nurseries, plus:

- Provide sustained life support
- Provide comprehensive care for infants born <32 weeks gestation and weighing <1500 grams and infants born at all gestational ages and birth weights with critical illness
- Provide prompt and readily available access to a full range of pediatric medical subspecialists, pediatric surgical specialists, pediatric anesthesiologists, and pediatric ophthalmologists
- Provide a full range of respiratory support that may include conventional and/or high-frequency ventilation and inhaled nitric oxide
- Perform advanced imaging with interpretation on an urgent basis, including computed tomography, MRI, and echocardiography

(American Academy of Pediatrics *Levels of Neonatal Care*, 2012)

The responsibilities and capabilities that are prescribed for these facilities are solely concerned with the level of patient care. Designation as a Level III facility does not imply designation as a Regional Perinatal Center. The additional responsibilities of Regional Perinatal Centers are described elsewhere in these Guidelines.

II. SERVICES PROVIDED

A. Educational Services

Educational services should include the following:

1. Parent Education: Ongoing perinatal education programs for parents.

2. Nurses' Education: Level III units are required to provide ongoing educational programs for their nurses that conform to the latest edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level III,* for neonatal nurses, published by the Tennessee Department of Health. Outreach educational activities are not required.

3. Physicians' Education: Level III units are required to provide ongoing educational programs for physicians practicing in that institution. Outreach educational activities are not required.

4. All neonatal care providers should maintain both current NRP and S.T.A.B.L.E. provider status. The S.T.A.B.L.E. Cardiac Module is also recommended.

B. Neonatal Care

Level III facilities accommodate normal infants (unless located in a free-standing children's hospital), moderately ill, and severely ill infants who are either inborn or are transferred from other hospitals. The care of normal neonates should conform to the standards published in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists. The principal commitment of all Level III facilities is the care of sick neonates in an intensive care unit that is staffed and equipped to treat the most severe and complex neonatal disorders.

1. Resuscitation: Provision must be made for resuscitation of infants immediately after birth. Resuscitation capabilities should include assisted ventilation with blended oxygen administered by bag or T-piece resuscitator with mask or endotracheal tube, chest compression, and appropriate intravascular therapy. Refer to the most recent edition of the American Heart Association and American Academy of Pediatrics *Neonatal Resuscitation Program Guidelines* for a complete list of resuscitation equipment and supplies.

2. Transport from Delivery Room to the Special Care Nursery: Transport to a special care nursery requires a capacity for uninterrupted support. An appropriately equipped pre-warmed transport incubator, with blended oxygen, should be used for this purpose.

3. Transitional Care: Recurrent observation of the neonate should be performed by personnel who can identify and respond to the early manifestations of neonatal disorders.

4. Care of Sick Neonates: The care of moderately and severely ill infants entails the following essentials:

    a. Continuous cardiorespiratory monitoring.
    b. Serial blood gas determinations and non-invasive blood gas monitoring.
    c. Periodic blood pressure determinations (intra-arterial when necessary).
    d. Portable diagnostic imaging for bedside interpretation.
    e. Availability of electrocardiograms and echocardiograms with rapid interpretation.
    f. Laboratory Services: Clinical laboratory services must be available to fully support clinical neonatal functions.
    g. Fluid and electrolyte management and administration of blood and blood components.
    h. Phototherapy and exchange transfusion.
    i. Administration of parenteral nutrition through peripheral or central vessels.

j. Provision of appropriate enteral nutrition and lactation support.

5. Mechanical Ventilatory Support: The Level III unit must be qualified to provide mechanical ventilatory support. The essential qualifications are as follows:

   a. Continuous in-house presence of personnel experienced in airway management, endotracheal intubation, and diagnosis and treatment of air leak syndromes.
   b. A staff of nurses (R.N.) and respiratory therapists (R.T.) who are specifically educated in the management of neonatal respiratory disorders.
   c. Blood gas determinations and other data essential to treatment must be available 24 hours a day, 7 days a week.
   d. Level III nurseries should be able to provide a full range of respiratory support, including sustained conventional and/or high frequency ventilation and inhaled nitric oxide.

6. Diagnostic Imaging: Perform advanced imaging, with interpretation on an urgent basis, including CT, MRI, and echocardiography.

7. Laboratory Services: Clinical laboratory services must be available to fully support clinical neonatal functions.

8. Transfusion Services: Transfusion services must be maintained at all times. An appropriately trained technician should be available in-house 24 hours a day, 7 days a week. All blood components must be obtainable on an emergency basis, either on the premises or by pre-arrangement with another facility.

C. Consultation and Transfer

1. Neonatal Transport:

   a. The Level III facility that operates a transport service is required to maintain equipment and a trained team of personnel that must be available at all times for the transport of newborn patients. The Level III facility is responsible for transport of referred infants with its own equipment, or alternatively, with equipment from a commercial source.

   b. The Level III facility that operates a transport service should originate a protocol that describes procedures, staffing patterns, and equipment for the transport of referred infants. The protocol should conform to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health.

   c. The Level III facility that operates a transport service is required to maintain records of its activities. (See the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*.)

D. Maintenance of Data and Assessment of Quality Measures

A systematic ongoing compilation of data should be maintained to reflect the care of sick patients, in addition to the listing of minimal data that is specified for Level I and Level II facilities. All Level III programs should participate in a state or national continuous quality improvement initiative that includes ongoing data collection and review for benchmarking and evaluation of outcomes. Examples of continuous quality improvement initiatives available in Tennessee are those provided by TIPQC and THA.

III. PERSONNEL: QUALIFICATIONS AND FUNCTIONS

A. Physicians

1. Director: The director of the newborn intensive care unit must be a full-time, board-certified pediatrician with subspecialty certification in neonatal-perinatal medicine. The director is responsible for maintaining practice guidelines and, in cooperation with nursing and hospital administration, is responsible for developing the operating budget; evaluating and purchasing equipment; planning, developing, and coordinating in-hospital and outreach educational programs; and participating in the evaluation of perinatal care.

2. Neonatologists: The attending physician for sick neonates must be fellowship-trained and board-certified or eligible to take the board certification exam in neonatal-perinatal medicine.

3. Pediatricians: A board-certified neonatologist must have primary and ultimate responsibility for infants who receive intensive care. Board-certified pediatricians, whose qualifications and appointments have been approved by the appropriate hospital committee, can care for infants who need more than routine care as long as they are under the supervision of a neonatologist.

4. In-House Coverage: In-house physician consultation and coverage should be provided 24 hours a day, 7 days a week by a board-certified neonatologist or a board-certified neonatal nurse practitioner. However, when in-house coverage does not include a board-certified neonatologist, he/she must be on-call and available to be on-site within 30 minutes of request.

5. Every delivery should be attended by at least one person whose primary responsibility is for the newborn and who is capable of performing neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines. Either that person or someone else who is immediately available should have the skills required to perform a complete resuscitation, including endotracheal intubation and administration of medications.

6. Deliveries of high-risk fetuses should be attended by an obstetrician and at least two other persons qualified in neonatal resuscitation whose only responsibility is the neonate. With multiple gestations, each newborn should have his or her own dedicated team of care providers who are capable of performing complete neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines.

7. Anesthesiologists: Pediatric anesthesia services should be directed by a board-certified anesthesiologist who has a special interest and an expertise in pediatric anesthesia.

8. Radiologists: A radiologist must be available on-call at all times.

9. Sub-specialty Consultants: For Level III units, qualified sub-specialists, including pediatric medical subspecialists, pediatric surgical specialists, pediatric anesthesiologists, and pediatric ophthalmologists, should be available on-site or at a closely related institution by prearranged consultative agreement, ideally in close geographic proximity.

B. Nurses

1. The nurse manager of the Level III nursery should have completed education according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level III*, Neonatal, published by the Tennessee Department of Health. A baccalaureate degree is required.

2. Staff nurses (R.N.) must have received courses as outlined in the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level III*, for neonatal nurses, published by the Tennessee Department of Health. Nurses should maintain institutional unit-specific competencies. In addition, all nurses should be current NRP and S.T.A.B.L.E. providers.

3. The Level III nursery should have at least one neonatal nurse on its full-time staff who is responsible for staff education. This nurse should either be masters' prepared or actively pursuing an advanced degree.

4. Recommended Registered Nurse (R.N.) / Patient Ratios for Newborn Care (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Unit*s, 2010):

Ratio	**Care Provided**
1:2-3	Newborns requiring intermediate care
1:1-2	Newborns requiring intensive care
1:1	Newborns requiring multisystem support
1 or more :1	Unstable newborns requiring complex critical care

C. Social Workers

The services of social workers should be made available by the hospital 24 hours a day, 7 days a week. These services should be provided by a staff that is qualified in perinatal social work. This requires that social workers be educated according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives in Medicine for Perinatal Social Workers*, published by the Tennessee Department of Health.

D. Case Manager / Discharge Coordinator

Personnel experienced in dealing with discharge planning and education, follow-up and referral, and home care planning should be available to neonatal intensive care unit staff members and families.

E. Respiratory Therapists

Dedicated respiratory therapists who can provide the assisted ventilation of neonates with cardiopulmonary disease must be available. The nursery's respiratory therapy director must be a registered respiratory therapist (R.R.T.).

F. Dietitian / Lactation Consultant

The staff must include at least one dietitian who is knowledgeable in the management of parenteral and enteral nutrition of low birthweight and other high-risk infants. Availability of lactation consultants 7 days a week is recommended to assist with complex breastfeeding issues. 1.9 full-time equivalent lactation consultants are recommended for every 1,000 births based on annual birth volume in Level III perinatal facilities (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010).

G. Pharmacist

A registered pharmacist with expertise in compounding and dispensing medications for neonates must be included on staff. Registered pharmacists with expertise in dispensing neonatal medications, including total parenteral nutrition (TPN), must be available 24 hours a day, 7 days a week.

H. Occupational Therapist / Physical Therapist / Speech Therapist

At least one occupational therapist or physical therapist and one speech therapist with neonatal expertise must be included on staff. These disciplines will work collaboratively with the medical and nursing staffs to provide developmentally appropriate care.

I. Neonatal Follow-up Services

Neonatal intensive care unit graduates who are considered high risk and those with birthweights <1500 grams should be enrolled in an organized follow-up

program that tracks and records medical and neurodevelopmental outcomes to allow later analysis.

IV. EQUIPMENT FOR THE INTENSIVE CARE NURSERY

Equipment in the intensive care nursery of a Level III facility should be adequate for the care of moderately and severely ill infants in accordance with contemporary standards. The quantities of all items of equipment should be sufficient to support the management of the maximum number of infants that are anticipated at times of peak census loads. An in-house Bioengineering Department should have an active program for preventive maintenance and rapid repair.

LEVEL IV FACILITIES - OBSTETRIC

I. INTRODUCTION

Level IV units provide care on-site for the most complex maternal conditions of the critically ill pregnant woman and her fetus/es throughout the antepartum, intrapartum and postpartum period as needed. The capabilities of the Level III facility are supplemented by the ability of the Level IV facility to provide specialized ICU care for obstetrical patients.

The level of obstetric care provided by a hospital should be determined by the institution's ability to meet the criteria specified by the ACOG / SMFM consensus statement. The goal of care is to ensure that both mother and newborn are cared for at the appropriate level of care by appropriate personnel.

The responsibilities and capabilities that are prescribed for these facilities are solely concerned with the level of patient care. Designation as a Level IV facility does not imply designation as a Regional Perinatal Center. The additional responsibilities of Regional Perinatal Centers are described elsewhere in these Guidelines.

II. SERVICES PROVIDED

A. Educational Services

Educational services should include the following:

1. Parent Education: Ongoing perinatal education programs for parents.

2. Education of Personnel: Level IV units are required to provide ongoing educational programs for their nurses that conform to the latest edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level IV*, published by the Tennessee Department of Health. Outreach educational activities are not required.

3. Physicians' Education: Level IV units are required to provide ongoing educational programs for physicians practicing in that institution. Outreach educational activities are not required to be provided.

4. All perinatal care providers in Level IV units should maintain current NRP provider status and Advanced Cardiac Life Support (ACLS) competency.

B. Antepartum Care

A complete range of prenatal care for normal and complicated patients will be provided as follows:

1. Uncomplicated Patients: Prenatal care for uncomplicated patients should meet standards published in the most recent edition of the *Guidelines for*

Perinatal Care, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

2. Identification of High-Risk Mothers: Identification and multispecialty planning for management and therapy of the mother and the fetus at high risk must be ongoing.

3. In-patient Care of Complications: Medical and surgical care of complex maternal conditions with the availability of critical care unit or ICU beds should be on-site.

4. Laboratory Services: In-house or readily accessible laboratory services to assess fetal and maternal well-being must be available. Appropriate turnaround time for laboratory results is indispensable.

5. Fetal Evaluation: The full range of antepartum surveillance techniques must be available in house 24 hours a day, 7 days a week. Access to genetic consultation and invasive fetal procedures (PUBS, CVS, others) should be readily available[†].

6. Social Work: Full-time licensed social workers with perinatal expertise must be on the staff of the hospital.

7. Home Nursing: Access to home nursing services should be available.

8. Dietary and Lactation Consultation: Dietary and lactation consultation services should be available as described in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

9. Pharmacy. A registered pharmacist should be immediately available for consultation 24 hours a day, 7 days a week. Access to emergency medications should also be available 24 hours a day, as described in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.

C. Intrapartum Care

1. Medical Personnel:
   a. Board-certified obstetricians (or physicians who have completed residency training and are eligible for board certification) must be physically present** 24 hours a day, 7 days a week in order to provide an acceptable level of patient care. Sufficient resources should be available to support this staffing pattern.

[†] See page 3 for complete definition of *readily available.*
** See page 3 for complete definition of *physically present*.

b. Level IV units must have a maternal-fetal medicine care team with expertise to manage highly-complex, critically ill, or unstable maternal patients. A board-certified maternal-fetal medicine attending with full in-patient privileges must be readily available† 24 hours a day, 7 days a week. This includes co-management of ICU-admitted obstetric patients.

2. Physical Facilities and Equipment: Physical facilities and equipment should meet the standards in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, and any additional criteria as herein presented.

   The facility should be prepared to care for and deliver obese women. Appropriate birthing beds, operating tables and rooms, and operating equipment should be available.

3. Labor and Delivery Area: Labor and delivery rooms must occupy a clearly and specifically designated area in the hospital.

4. Intensive Care Area: ICU care for obstetric patients, with primary or co-management by maternal-fetal medicine team should be available onsite. Co-management includes at least daily rounds by a maternal-fetal medicine specialist (MFM) with interaction with the ICU team and other subspecialists with daily documentation. Nursing care of high-risk patients must be administered by qualified registered nurses who possess both critical care and obstetrical care knowledge and skills. In some settings, the ICU is in an adjoining or connected building, which is acceptable as long as maternal-fetal medicine care is as noted above. If the woman must be transported by ambulance to the ICU, this is not considered on-site.

5. Cesarean Section: Personnel should maintain the capability to perform cesarean section in accordance with the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, or sooner if indicated.

6. Anesthesia: A board-certified anesthesiologist with obstetric anesthesia fellowship training or experience in obstetric anesthesia must be physically present** (on-site) 24 hours a day, 7 days a week.

7. Transfusion Services: Transfusion services must be maintained at all times. A trained technician should be available in-house 24 hours a day, 7 days a week. All blood components must be obtainable on an emergency basis, on the premises. The facility must be able to handle patients with significant blood loss. A massive transfusion protocol is required.

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† See page 3 for complete definition of *readily available.*

** See page 3 for complete definition of *physically present*.

8. Imaging: Imaging services must be available 24 hours a day, 7 days a week, including the capacity to perform portable studies, CT, and/or MRI. On-site attending to read the scans must be available 24 hours a day, 7 days a week. The ability to perform interventional radiological procedures should be available on-site.

9. Fetal Monitoring: A capability for continuous electronic monitoring of mother and fetus must be maintained. Ultrasound services for fetal evaluation should be available 24 hours a day, 7 days a week. Preferably, Maternal Fetal Medicine should be actively involved in providing quality control for obstetrical ultrasound. In addition, an ultrasound unit must be immediately available for use in labor and delivery. Proper data storage and documentation are essential.

10. Laboratory Services: Clinical laboratory services must be available to fully support clinical obstetric functions.

D. Postpartum Care

1. Postpartum Area: There must be specifically designated areas for postpartum care.

2. Intensive Care Area: Space, equipment and personnel for intensive care in the postpartum period must be provided. Nursing care of high-risk patients must be administered by qualified registered nurses who possess both critical care and obstetrical care knowledge and skills.

3. Discharge Planning and Education: Specific personnel should be assigned responsibility for assuring that mothers are given helpful preparation for the care of themselves and their newborns at home.

4. Counseling for Complications: Personnel who are specifically qualified should be assigned responsibility for fully discussing with parents the complications of pregnancy and their implications for future pregnancies and fetal outcomes. Special attention should be given to families who experience fetal or neonatal death. Bereavement support is essential. Counseling consults / referrals should be made as necessary.

5. Interconceptional Health Care: Information on interconceptional health care issues should be provided, such as nutrition, folic acid use, lifestyle choices, and child spacing.

E. Consultation and Transfer

Maternal-Fetal Transport: If the Level IV facility chooses to accept referred patients, it should facilitate the transport of mothers who are referred by any institution. The logistics and mode of transport of each maternal patient should be individually determined by the Level IV facility and the referring institution, conforming to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health. Transport should also conform to regulations prescribed by the State of

Tennessee. Detailed records of the maternal transport system should be maintained by the Level IV facility.

F. Maintenance of Data and Assessment of Quality Measures

A systematic ongoing compilation of data should be maintained to reflect the care of sick patients, in addition to the listing of minimal data that is specified for Level I, Level II, and Level III facilities. All Level IV programs should participate in a state or national continuous quality improvement initiative that includes ongoing data collection and review for benchmarking and evaluation of outcomes. Examples of continuous quality improvement initiatives available in Tennessee are those provided by TIPQC and THA.

III. PERSONNEL: QUALIFICATIONS AND FUNCTIONS

A. Physicians

1. Director: The director of the maternal-fetal medicine service of a hospital providing subspecialty care should be a full-time, board-certified obstetrician with subspecialty certification in maternal-fetal medicine. Specialized training in critical care obstetrics or some experience in caring for critically ill pregnant women is preferred. The ability for maternal-fetal medicine specialists (MFM) to admit directly to the ICU is highly desirable. The director is responsible for maintaining practice guidelines and, in cooperation with the obstetric medical director, nursing, and hospital administration, is responsible for developing the operating budget; evaluating and purchasing equipment; planning, developing, and coordinating in-hospital and outreach educational programs; and participating in the evaluation of perinatal care.

2. Obstetricians: Board-certified obstetricians (or physicians who have completed residency training and are eligible for board certification), whose qualifications and appointments have been approved by the appropriate hospital committee, may assume primary responsibility for the hospital care of high-risk patients. The institution is responsible for development of guidelines that prescribe circumstances in which the obstetrician will consult the maternal-fetal specialist.

3. Low-risk deliveries should be attended by a physician or a certified nurse midwife, and a registered nurse.

4. Every delivery should be attended by at least one person whose primary responsibility is for the newborn and who is capable of initiating neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines. Either that person or someone else who is immediately available should have the skills required to perform a complete resuscitation, including endotracheal intubation and administration of medications.

5. Deliveries of high-risk fetuses should be attended by an obstetrician and at least two other persons qualified in neonatal resuscitation whose only responsibility is the neonate. With multiple gestations, each newborn should have his or her own dedicated team of care providers who are capable of performing neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines.

6. Anesthesiologists: Obstetric anesthesia services should be directed by a board-certified anesthesiologist with obstetric anesthesia fellowship training or experience in obstetric anesthesia.

7. Sub-specialty Consultants: Sub-specialty consultants for obstetric patients should include, at a minimum, neonatologist available for antepartum / intrapartum consultation, hematologist, cardiologist, neurosurgery, transplant and other appropriate sub-specialists in internal medicine, such as infectious diseases, and surgery. Subspecialists should be readily available[†] 24 hours a day, 7 days a week for consultation and treatment as needed onsite. Availability of gynecology/oncology for assistance in management of conditions such as placenta accreta spectrum is advised. A geneticist for obstetric and newborn patients should maintain an ongoing service program, either as a member of the active staff of the hospital, or as a consultant whose responsibility for the hospital's genetic program is clearly identifiable.

B. Nurses

1. The nurse manager in a maternal-fetal unit should have completed education according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level IV*, for obstetric nurses, published by the Tennessee Department of Health. A baccalaureate degree is required; advanced degree and national certification is preferred.

2. In Level IV facilities, staff nurses (R.N.) in obstetrics who are responsible for Level II, Level III, or Level IV care should have completed Level IV education according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level IV*, for obstetric nurses, published by the Tennessee Department of Health. Nurses should maintain institutional unit-specific competencies with competency documentation readily available. In addition, all nurses should be current NRP providers and maintain current ACLS competency. Nurses should maintain a level of competency in electronic fetal monitoring (EFM) as determined by their institution.

3. The Level IV obstetric unit should have at least one obstetric nurse on its full-time staff who is responsible for staff education. This nurse should

[†] See page 3 for complete definition of *readily available.*

either be masters' prepared in a nursing-related field or actively pursuing an advanced degree.

4. Recommended Registered Nurse (R.N.) / Patient Ratios for Perinatal Care (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010):

Ratio	Care Provided
1:1	Patients presenting for initial OB triage
1:2-3	Patients in OB triage after initial assessment and in stable condition
2:1	Birth. 1 nurse responsible for the mother and 1 nurse whose sole responsibility is the baby
1:1	Patients with medical or obstetric complications
1:1	Patients receiving oxytocin during labor
1:1	Coverage for initiating epidural anesthesia
1:1	Patients in the immediate postoperative recovery period (at least the first 2 hours after birth)
1:3	Antepartum and postpartum patients with complications but in stable condition
1:3	Mother-newborn couplets on the immediate post-operative day (no more than 2 of the mothers should be recovering from cesarean birth)
1:5-6	Postpartum patients without complications (no more than 2-3 of these patients should be recovering on the immediate post-operative day from cesarean birth)

In-house minimal staffing for care of antepartum and postpartum patients should be adequate to handle possible emergencies. Adequate numbers of RNs skilled in the care of women with complex medical illnesses and obstetric complications should be continuously available and free to respond to these emergencies without decreasing the unit staffing below safe levels as described above.

C. Social Workers

The services of social workers should be made available by the hospital 24 hours a day, 7 days a week. These services should be provided by a staff that is qualified in perinatal social work. This requires that social workers be educated according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives in Medicine for Perinatal Social Workers*, published by the Tennessee Department of Health.

D. Case Manager / Discharge Coordinator

Personnel experienced in dealing with discharge planning and education, follow-up and referral, and home care planning must be available to antepartum, intrapartum, and postpartum unit staff members, patients, and families.

E. Dietitian / Lactation Consultant

The staff must include at least one dietitian who has special training in perinatal nutrition and can plan diets that meet the special needs of high risk antepartum and postpartum women. Availability of lactation consultants 7 days a week is recommended to assist with complex breastfeeding issues. 1.9 full-time equivalent lactation consultants are recommended for every 1,000 births based on annual birth volume in Level III (also applies to Level IV) perinatal facilities (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010).

LEVEL IV FACILITIES - NEONATAL

I. INTRODUCTION

Level IV nurseries provide regional NICU services.

Level IV units have Level III capabilities, plus:

- Located within an institution with the capability to provide surgical repair of complex congenital or acquired conditions
- Maintain a full range of pediatric medical subspecialists, pediatric surgical subspecialists, and pediatric anesthesiologists at the site
- Facilitate transport

(American Academy of Pediatrics *Levels of Neonatal Care*, 2012)

The responsibilities and capabilities that are prescribed for these facilities are solely concerned with the level of patient care. Designation as a Level IV facility does not imply designation as a Regional Perinatal Center. The additional responsibilities of Regional Perinatal Centers are described elsewhere in these Guidelines.

II. SERVICES PROVIDED

A. Educational Services

Educational services should include the following:

1. Parent Education: Ongoing perinatal education programs for parents.

2. Nurses' Education: Level IV units are required to provide ongoing educational programs for their nurses that conform to the latest edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level IV,* for neonatal nurses, published by the Tennessee Department of Health. Outreach educational activities are not required.

3. Physicians' Education: Level IV units are required to provide ongoing educational programs for physicians practicing in that institution. Outreach educational activities are not required.

4. All neonatal care providers should maintain both current NRP and S.T.A.B.L.E. provider status. The S.T.A.B.L.E. Cardiac Module is also recommended.

B. Neonatal Care

Level IV facilities accommodate normal infants (unless located in a free-standing children's hospital), moderately ill, and severely ill infants who are either inborn or are transferred from other hospitals. The care of normal neonates should conform to the standards published in the most recent edition of the *Guidelines for Perinatal Care*, jointly published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists. The principal commitment of all Level IV facilities is the care of sick neonates in an intensive care unit that is staffed and equipped to treat the most severe and complex neonatal disorders.

1. Resuscitation: Provision must be made for resuscitation of infants immediately after birth. Resuscitation capabilities should include assisted ventilation with blended oxygen administered by bag or T-piece resuscitator with mask or endotracheal tube, chest compression, and appropriate intravascular therapy. Refer to the most recent edition of the American Heart Association and American Academy of Pediatrics *Neonatal Resuscitation Program Guidelines* for a complete list of resuscitation equipment and supplies.

2. Transport from Delivery Room to the Special Care Nursery: Transport to a special care nursery requires a capacity for uninterrupted support. An appropriately equipped pre-warmed transport incubator, with blended oxygen, should be used for this purpose.

3. Transitional Care: Recurrent observation of the neonate should be performed by personnel who can identify and respond to the early manifestations of neonatal disorders.

4. Care of Sick Neonates: The care of moderately and severely ill infants entails the following essentials:

    a. Continuous cardiorespiratory monitoring.
    b. Serial blood gas determinations and non-invasive blood gas monitoring.
    c. Periodic blood pressure determinations (intra-arterial when necessary).
    d. Portable diagnostic imaging for bedside interpretation.
    e. Availability of electrocardiograms and echocardiograms with rapid interpretation.
    f. Laboratory Services: Clinical laboratory services must be available to fully support clinical neonatal functions.
    g. Fluid and electrolyte management and administration of blood and blood components.
    h. Phototherapy and exchange transfusion.
    i. Administration of parenteral nutrition through peripheral or central vessels.
    j. Provision of appropriate enteral nutrition and lactation support.

5. Mechanical Ventilatory Support: The Level IV unit must be qualified to provide mechanical ventilatory support. The essential qualifications are as follows:

   a. Continuous in-house presence of personnel experienced in airway management, endotracheal intubation, and diagnosis and treatment of air leak syndromes.
   b. A staff of nurses (R.N.) and respiratory therapists (R.T.) who are specifically educated in the management of neonatal respiratory disorders.
   c. Blood gas determinations and other data essential to treatment must be available 24 hours a day, 7 days a week.
   d. Level IV nurseries should be able to provide a full range of respiratory support, including sustained conventional and/or high frequency ventilation and inhaled nitric oxide.

6. Diagnostic Imaging: Perform advanced imaging, with interpretation on an urgent basis, including CT, MRI, and echocardiography.

7. Laboratory Services: Clinical laboratory services must be available to fully support clinical neonatal functions.

8. Transfusion Services: Transfusion services must be maintained at all times. An appropriately trained technician should be available in-house 24 hours a day, 7 days a week. All blood components must be obtainable on an emergency basis from within the facility.

C. Consultation and Transfer

1. Neonatal Transport:

   a. The Level IV facility that operates a transport service is required to maintain equipment and a trained team of personnel for the transport of newborn patients. The team and equipment must be available at all times. The Level IV facility is responsible for transport of referred infants with its own equipment, or alternatively, with equipment from a commercial source.

   b. The Level IV facility that operates a transport service should originate a protocol that describes procedures, staffing patterns, and equipment for the transport of referred infants. The protocol should conform to the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*, published by the Tennessee Department of Health.

   c. The Level IV facility that operates a transport service is required to maintain records of its activities. (See the most recent edition of the *Tennessee Perinatal Care System Guidelines for Transportation*.)

D. Maintenance of Data and Assessment of Quality Measures

A systematic ongoing compilation of data should be maintained to reflect the care of sick patients, in addition to the listing of minimal data that is specified for Level I, Level II, and Level III facilities. All Level IV programs should participate in a state or national continuous quality improvement initiative that includes ongoing data collection and review for benchmarking and evaluation of outcomes. Examples of continuous quality improvement initiatives available in Tennessee are those provided by TIPQC and THA.

III. PERSONNEL: QUALIFICATIONS AND FUNCTIONS

A. Physicians

1. Director: The director of the newborn intensive care unit must be a full-time, board-certified pediatrician with subspecialty certification in neonatal-perinatal medicine. The director is responsible for maintaining practice guidelines and, in cooperation with nursing and hospital administration, is responsible for developing the operating budget; evaluating and purchasing equipment; planning, developing, and coordinating in-hospital and outreach educational programs; and participating in the evaluation of perinatal care.

2. Neonatologists: The attending physician for sick neonates must be fellowship-trained and board-certified or eligible to take the board certification exam in neonatal-perinatal medicine.

3. Pediatricians: A board-certified neonatologist must have primary and ultimate responsibility for infants who receive intensive care. Board-certified pediatricians, whose qualifications and appointments have been approved by the appropriate hospital committee, can care for infants who need more than routine care as long as they are under the supervision of a neonatologist.

4. In-House Coverage: In-house physician consultation and coverage should be provided 24 hours a day, 7 days a week by a board-certified neonatologist or a board-certified neonatal nurse practitioner. However, when in-house coverage does not include a board-certified neonatologist, he/she must be on-call and available to be on-site within 30 minutes of request.

5. Every delivery should be attended by at least one person whose primary responsibility is for the newborn and who is capable of performing neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines. Either that person or someone else who is immediately available should have the skills required to perform a complete resuscitation, including endotracheal intubation and administration of medications.

6. Deliveries of high-risk fetuses should be attended by an obstetrician and at least two other persons qualified in neonatal resuscitation whose only responsibility is the neonate. With multiple gestations, each newborn should have his or her own dedicated team of care providers who are capable of performing complete neonatal resuscitation according to the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program guidelines.

7. Anesthesiologists: Pediatric anesthesia services should be directed by a board-certified anesthesiologist who has a special interest and an expertise in pediatric anesthesia.

8. Radiologists: A radiologist must be available on-call at all times.

9. Sub-specialty Consultants: A Level IV unit should have pediatric surgical sub-specialists on call and readily available for consultation and continuous patient management.

B. Nurses

1. The nurse manager of the Level IV nursery should have completed education according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level IV*, Neonatal, published by the Tennessee Department of Health. A baccalaureate degree is required.

2. Staff nurses (R.N.) must have received courses as outlined in the most recent edition of the *Tennessee Perinatal Care System Educational Objectives for Nurses, Level IV*, for neonatal nurses, published by the Tennessee Department of Health. Nurses should maintain institutional unit-specific competencies. In addition, all nurses should be current NRP and S.T.A.B.L.E. providers.

3. The Level IV nursery should have at least one neonatal nurse on its full-time staff who is responsible for staff education. This nurse should either be masters' prepared or actively pursuing an advanced degree.

4. Recommended Registered Nurse (R.N.) / Patient Ratios for Newborn Care (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010):

Ratio	**Care Provided**
1:2-3	Newborns requiring intermediate care
1:1-2	Newborns requiring intensive care
1:1	Newborns requiring multisystem support
1 or more :1	Unstable newborns requiring complex critical care

C. Social Workers

The services of social workers should be made available by the hospital 24 hours a day, 7 days a week. These services should be provided by a staff that is qualified in perinatal social work. This requires that social workers be educated according to the most recent edition of the *Tennessee Perinatal Care System Educational Objectives in Medicine for Perinatal Social Workers*, published by the Tennessee Department of Health.

D. Case Manager / Discharge Coordinator

Personnel experienced in dealing with discharge planning and education, follow-up and referral, and home care planning should be available to neonatal intensive care unit staff members and families.

E. Respiratory Therapists

Dedicated respiratory therapists who can provide the assisted ventilation of neonates with cardiopulmonary disease must be available. The nursery's respiratory therapy director must be a registered respiratory therapist (R.R.T.).

F. Dietitian / Lactation Consultant

The staff must include at least one dietitian who is knowledgeable in the management of parenteral and enteral nutrition of low birthweight and other high-risk infants. Availability of lactation consultants 7 days a week is recommended to assist with complex breastfeeding issues. 1.9 full-time equivalent lactation consultants are recommended for every 1,000 births based on annual birth volume in Level III (also applies to Level IV) perinatal facilities (Association of Women's Health, Obstetric, and Neonatal Nurses *Guidelines for Professional Registered Nurse Staffing for Perinatal Units*, 2010),

G. Pharmacist

A registered pharmacist with expertise in compounding and dispensing medications for neonates must be included on staff. Registered pharmacists with expertise in dispensing neonatal medications, including total parenteral nutrition (TPN), must be available 24 hours a day.

H. Occupational Therapist / Physical Therapist / Speech Therapist

At least one occupational therapist or physical therapist and one speech therapist with neonatal expertise must be included on staff. These disciplines will work collaboratively with the medical and nursing staffs to provide developmentally appropriate care.

I. Neonatal Follow-up Services

Neonatal intensive care unit graduates who are considered high risk and those with birthweights <1500 grams should be enrolled in an organized follow-up

program that tracks and records medical and neurodevelopmental outcomes to allow later analysis.

IV. EQUIPMENT FOR THE INTENSIVE CARE NURSERY

Equipment in the intensive care nursery of a Level IV facility should be adequate for the care of moderately and severely ill infants in accordance with contemporary standards. The quantities of all items of equipment should be sufficient to support the management of the maximum number of infants that are anticipated at times of peak census loads. An in-house Bioengineering Department should have an active program for preventive maintenance and rapid repair.