TENNESSEE PERINATAL CARE SYSTEM

GUIDELINES FOR TRANSPORTATION

(Sixth Edition)

2014

Tennessee Department of Health
Division of Family Health and Wellness

Bill Haslam
Governor

John Dreyzehner, M.D., M.P.H., F.A.C.O.E.M.
Commissioner

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(Sixth Edition)

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

2014

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Click on Program Areas, then Emergency Medical Services, then General Information, or Maternal and Child Health, then Perinatal Regionalization, then Reports and Publications

TENNESSEE PERINATAL CARE SYSTEM

Tennessee Code Annotated 68-1-802 (passed in 1974) directed the Department of Health to develop a plan to establish a program for the diagnosis and treatment of certain life-threatening conditions in the perinatal period. The program was to develop a regionalized system of care, including highly specialized personnel, equipment, and techniques to decrease the high infant mortality rate and life-long disabilities in surviving newborns.

From this beginning, Tennessee created the infrastructure for a perinatal regionalization system with five Regional Perinatal Centers across the state. These Centers provide perinatal care for high risk pregnant women and newborns if no other appropriate facility is available to manage significant high risk conditions. All Centers provide the following to health care providers and hospitals within their geographic region:

- 24-hour consultation and referral for facilities and for health care providers within the respective perinatal region
- Professional education for staff of hospitals and for other health care providers within the region
- Maternal and neonatal transport
- Site visits
- Post-neonatal follow-up

The Regional Perinatal Centers provide a statewide system of high-risk maternal and infant care. Research indicates that ensuring that high-risk pregnant women and newborns receive risk-appropriate care can reduce maternal and infant morbidity and mortality.

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 2013, Tennessee's Regional Perinatal Centers provided direct care for 4,976 high-risk neonates and 15,728 high-risk maternal patients.

Since the 1970s, the Perinatal Advisory Committee, established by statue as an expert advisory group to the Department of Health, has been responsible for the development and revision of manuals related to perinatal care in Tennessee. Using the national guidelines from the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, work groups of health care providers from across the state have been responsible for review and revision of four manuals:

- *Guidelines for Regionalization, Hospital Care Levels, Staffing and Facilities*
- *Guidelines for Transportation*
- *Educational Objectives for Nurses Levels I, II, III, IV and Transport Nurses*
- *Educational Objectives in Medicine for Perinatal Social Workers*

***Guidelines for Transportation*, Tennessee Perinatal Care System**

The sixth edition of the *Guidelines for* Transportation was developed by a work group of experts in transport of high-risk pregnant women and infants. These guidelines were originally published in 1979. The transport of pregnant women and newborn infants between hospitals is recognized as an essential component of regionalized perinatal care. National experience suggests that perinatal outcome for high-

risk infants transported before delivery (maternal transport) is improved over that for high-risk infants transported after birth (neonatal transport). Tennessee experience also supports this.

Safe transport of the perinatal patient requires skilled personnel, appropriate equipment, and effective communication between the hospital facilities of the region. The purpose of this manual is to present specific guidelines to physicians, nurses, respiratory therapists, emergency medical personnel, and other health care providers involved with maternal-neonatal transport, so that such a transfer may be conducted in an optimal manner.

TRANSPORTATION GUIDELINES WORKGROUP

August 2013

Members

C. David Adair, MD, Chattanooga
Jerry Ballhagen, EMT-P, Nashville
Melanie Bodine, NNP-BC, Chattanooga
Kitty Cashion, RN-BC, MSN, Memphis
W. Michael DeVoe, MD, Johnson City
Susan Drummond, RN, MSN, Nashville
Connie Graves, MD, Nashville
Bobby C. Howard, MD, Knoxville
Lisa Lowery-Smith, MD, Chattanooga
Cheryl W. Major, RNC, BSN, Chairperson, Nashville
Melinda Markham, MD, Nashville
Kim Massey, MSN, RN, NE-BC, Knoxville
John T. Meadows, Jr., MD, Knoxville
Jill Rimmer, RNC, Chattanooga
Carolyn Riviere, RN, BSN, MS, Nashville
Barbara G. Rowe, RN, MSN, NNP-BC, Knoxville
Patricia A. Scott, DNP, APN, NNP-BC, C-NPT, Nashville
Bill Sewell, EMT-P, MPA, BS, Cookeville
Ajay Talati, MD, Memphis
Maria Wagner, RN, MSN, Johnson City
Michael Wallace, EMS, BSHS, CCPM, Franklin
Nicole Watson, BSN, CCRN, CLC, Knoxville
Amanda Whitlock, RN, BSN, Nashville
Zachary Young-Lutz, RN, BSN, C-EFM, Knoxville

PERINATAL ADVISORY COMMITTEE

January 2014

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Lenita H. Thibault, M.D., Kingsport

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Selman Welt, M.D., Johnson City

Jeff Whitehorn, Nashville

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TENNESSEE PERINATAL CARE SYSTEM

GUIDELINES FOR TRANSPORTATION

PREFACE

This manual is a revision of the *Guidelines for Transportation* in the State of Tennessee that was originally published in September 1979. These guidelines are written in response to the recommendation of the Perinatal Advisory Committee and are developed to accomplish improvement in the overall quality of maternal-newborn transportation in the state. Prepared by the *Transportation Guidelines* Revision Work Group, and adopted by its parent committee, the Perinatal Advisory Committee, this manual has been carefully considered by representatives from a broad spectrum of the health care delivery disciplines from throughout the state. This manual provides specific guidelines regarding procedures, staffing patterns, and equipment for the transport of high-risk mothers and neonates. It is recommended that physicians, nurses, respiratory therapists, emergency medical personnel, and other health care providers involved with such transportation will make reasonable efforts to attain the guidelines described herein.

Transports should not be initiated unless the patient can be safely moved by trained personnel with appropriate treatment. Patients should be cared for and transported by the most qualified team available.

In order to insure the contemporary pertinence of these guidelines, the Perinatal Advisory Committee has limited its approval to a period that is no longer than five years from the date of approval by the Commissioner of the Department of Health. A complete review will thus be mandatory at that time or sooner if deemed appropriate.

INTRODUCTION

The transport of pregnant women and newborn infants between hospitals is recognized as an essential component of regionalized perinatal care. National experience suggests that perinatal outcome for high-risk infants transported before delivery (maternal transport) is improved over that for high-risk infants transported after birth (neonatal transport). Tennessee experience also supports this. The Perinatal Advisory Committee, therefore, strongly urges that maternal transport to an appropriate referral center be considered, especially in those pregnancies in which there is a high probability of neonatal transport following delivery (Resolution passed by the Perinatal Advisory Committee on March 31, 1982).

Safe transport of the perinatal patient requires skilled personnel, appropriate equipment, and effective communication between the hospital facilities of the region. The purpose of this manual is to present specific guidelines to physicians, nurses, respiratory therapists, emergency medical personnel, and other health care providers involved with maternal-neonatal transport, so that such a transfer may be conducted in an optimal manner.

This manual is divided into four main sections: Level I Facilities, Level II Facilities, Level III Facilities, and Level IV Facilities. The guidelines within each section are organized in the subsections highlighted below. In each of these subsections, maternal transport discussion precedes neonatal discussion.

1. Indications for Consultation and/or Transport
   The circumstances in which patients are transported vary according to the level of care of the facilities in each region. The indications highlighted in this subsection are designed to assist the health care providers in seeking consultation and/or transfer. These indications remain guidelines and will vary with individual patient needs and institutional capabilities.

2. Referral Process
   The transfer of care of a perinatal patient from one care facility to another requires effective communication between facilities and a clear understanding of the responsibilities of the parties involved. The guidelines highlighted in this subsection are designed to clarify the roles of both referring and receiving facilities.

3. Transport Personnel
   The level of expertise of the transport personnel needed to provide optimal transfer of pregnant women and newborn infants is variable and largely dependent on the complexity of care demanded by the individual patient. However, in order to eliminate any possibility of encountering a situation in which the demands of the transported patient exceed the care level that can be adequately provided, it is desirable to define certain minimal requirements. The guidelines highlighted in this subsection are designed to assist the health care providers in selecting appropriate transport personnel.

4. Transport Modality
   The choice of transport modality is largely determined by the distance between hospitals, weather, condition of the patient, and equipment available in the vehicle to support the patient during transfer. The guidelines highlighted in this subsection are designed to assist the health care providers in selecting the appropriate transport modality.

5. Transport Equipment
   A safe perinatal transport entails availability of adequate equipment for monitoring,

resuscitation, and support of mother and / or neonate. In addition to the equipment in the transport vehicle, essential supplies should be portable and continuously available during the transport. The equipment needs highlighted in this subsection are designed to assist the health care providers in selecting appropriate transport equipment.

6. Referral Documentation

An essential component of communication between care facilities is clear documentation and transfer of medical information. The guidelines highlighted in this subsection are designed to clarify the responsibilities of both referring and receiving facilities with respect to medical documentation.

7. Evaluation of Referral Process

The success of a regionalized perinatal care system depends on an ongoing evaluation of various aspects of the program including transport of the perinatal patient. This subsection highlights the need for evaluation of the referral process.

8. Return Transport

Optimal utilization of a regionalized perinatal care system entails early planning and return transport of patients from the referral centers to the original or local hospitals for further care. This manual ends with a section on return transport in which various aspects of this activity are summarized.

LEVEL I FACILITIES

MATERNAL TRANSPORT

Level I

Level I units provide basic care for maternal and neonatal patients who are at low risk. All high-risk mothers and neonates must be promptly identified for consultation and/or referral for more specialized care. In addition, Level I units 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).

Maternal patients with underlying disease processes should be referred for consultation and/or co-management in order to reduce the risk of long-term complications.

Planned deliveries at gestational ages less than 35 weeks should be referred to a Level II, III, or IV facility. Although it is not always possible to prenatally anticipate the need for pediatric subspecialty services, when antenatal ultrasound and/or genetic testing has identified a fetus with congenital anomalies, prenatal referral to an appropriate subspecialty provider or fetal assessment clinic to provide families with prognostic information and facilitate a coordinated plan for delivery in a facility with the needed services is recommended.

When transfer is deemed safe for the mother and fetus, transfer of mothers to a Level II, III, or IV unit with the specialized expertise required by the fetus after birth is recommended. The elective delivery of an infant in a hospital without the required pediatric sub-specialty services, thus requiring a planned neonatal transport, should be avoided.

INDICATIONS FOR MATERNAL CONSULTATION AND/OR TRANSPORT

I. ANTEPARTUM

A. Maternal History

1. previous preterm labor (<37 weeks) or low-birthweight neonate (<2500 gm)
2. previous neonate >4000 gm at term or any large-for-gestational age neonate
3. previous stillbirth, neonatal loss, or two or more abortions
4. suspected cervical insufficiency
5. diagnosed abnormality of the genital tract
6. medical indication for termination of previous pregnancy
7. neonate who required more than routine observation or care
8. neonate with known or suspected genetic disorder
9. severe emotional problems associated with previous pregnancy or delivery
10. previous vertical or classical uterine incision
11. age < 17 or advanced maternal age (≥35 years of age at delivery)
12. prepregnancy weight <45 kg or >90 kg
13. Body Mass Index (BMI) < 18 or > 30
14. height <150 cm

B. Medical/Surgical Conditions

1. diabetes mellitus/endocrine disorder
2. autoimmune disorder
3. cardiac disease
4. hypertension
5. pulmonary disease
6. renal disease
7. hematologic disorder
8. neurologic disorder
9. musculoskeletal disorder
10. infection
11. nutritional disorder
12. inborn errors of metabolism (e.g., phenylketonuria [PKU])
13. substance use
14. malignancy
15. psychiatric disorder
16. trauma
17. surgical emergency
18. morbid obesity (BMI > 40)
19. prior bariatric surgery

C. Obstetric Complications

1. glucose intolerance
2. urinary tract infection
3. sexually transmitted disease
4. positive fetal fibronectin test
5. suspected ectopic pregnancy

6. suspected missed abortion
7. hyperemesis
8. exposure to teratogen
9. isoimmunization
10. persistent anemia
11. vaginal bleeding
12. preeclampsia/eclampsia
13. suspected polyhydramnios or oligohydramnios
14. preterm cervical dilatation without uterine activity
15. preterm rupture of membranes with or without uterine activity
16. evidence of amnionitis or sepsis at any time
17. inappropriate fetal growth for gestational age
18. multiple gestation
19. postterm gestation (>42 weeks)
20. fetal demise
21. known or suspected fetal anomaly
22. abnormal maternal serum / genetic screen
23. morbid obesity (BMI > 40)
24. placental abnormalities

II. INTRAPARTUM

A. cervical dilatation with uterine contractions at < 35 weeks
B. evidence of amnionitis or sepsis at any time
C. abnormal bleeding
D. preeclampsia/eclampsia
E. multiple gestation
F. morbid obesity (BMI > 40)
G. any severe medical / surgical condition

III. POSTPARTUM

A. preeclampsia/eclampsia
B. sepsis
C. hemorrhage
D. thromboembolic disease
E. cardiopulmonary dysfunction
F. morbid obesity (BMI > 40)
G. neonatal transport

MATERNAL REFERRAL PROCESS

I. Maternal transport is initiated by the health care provider responsible for the patient's medical care. Maternal referral may lead to admission of the patient to the receiving hospital (inpatient transport) or to outpatient evaluation and management (outpatient transport). The guidelines for the referral process are outlined below.

II. INPATIENT TRANSPORT

A. Referring Center Responsibilities:

1. The decision by the referring care provider (physician, certified nurse midwife, nurse practitioner, physician assistant) to request consultation is the first step in the referral process.
2. Telephone consultation with the receiving care provider is necessary to initiate the referral process and to prepare the receiving provider. This consultation may aid the referring care provider in developing a treatment plan for stabilizing the patient before and during transport.
3. Personnel of the referring and receiving facilities must follow the COBRA/EMTALA guidelines (42USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix III.). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com. Regional Perinatal Centers shall not refuse to accept an appropriate transfer of an individual who requires such specialized care if the hospital has the capability and bed availability to treat the individual. All transfers should be based on medical need.
4. If the transport is done by the referring hospital, the referring care provider and hospital retain responsibility until the transport team arrives with the patient at the receiving hospital (most recent edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics).
5. A ground ambulance is the most appropriate vehicle for the majority of maternal transports. If an alternate form of transportation is being considered, the referring care provider should discuss this alternative with the receiving care provider at the time of consultation.
6. The medical record should be organized as the patient is prepared for transport and sent with the patient or to the receiving facility in a timely manner.
7. The composition of the transport team should be a joint decision between the referring and receiving care providers based on the condition of the mother and/or fetus.
8. To avoid unnecessary delays in the emergency room or admitting office, all referrals should be directly admitted to the receiving obstetric unit.

B. Receiving Center Responsibilities:

1. The receiving care provider is responsible for the decision to accept the referring care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance in

locating appropriate care should be provided to the referring care provider.

2. Personnel of the referring and receiving facilities must follow the COBRA/EMTALA guidelines (42USC 1395dd. Section 1867 of the Social Security Act; also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix III.). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com. Regional Perinatal Centers shall not refuse to accept an appropriate transfer of an individual who requires such specialized care if the hospital has the capability and bed availability to treat the individual. All transfers should be based on medical need.
3. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital (most recent edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics).
4. Every patient accepted by the receiving center should be seen by a care provider within 30 minutes of arrival.
5. Communication with the referring care provider should occur following admission.
6. If the patient is discharged undelivered, communication should occur prior to the time of discharge.
7. A summary of care of both mother and/or infant should be sent to the referring care provider.
8. Every effort should be made to return the patient to the care of the referring care provider as soon as possible.

III. OUTPATIENT REFERRAL

A. Referring Center Responsibilities:

1. Outpatient referral could begin with a phone call, but must be followed by a written request for consultation / co-management from the referring care provider or designee to the receiving care provider or designee.
2. An appointment for evaluation at the receiving center should be arranged.

B. Receiving Center Responsibilities:

1. The referring care provider should be contacted by either telephone or letter after the evaluation has been completed.
2. Whenever possible, patients should continue under the care of the referring care provider.

MATERNAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring and receiving care providers based on the condition of the mother and/or fetus.

II. The transport team members should be selected from appropriately trained, licensed health care providers. Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm.

III. Transport team members should have the collective expertise sufficient to provide the following, if necessary:

A. monitoring of vital signs, uterine contractions, deep tendon reflexes, and fetal heart rate

B. monitoring the administration of intravenous infusions and usage of tocolytic, antihypertensive, anticonvulsant, and other appropriate medications

C. care for a wide variety of emergency conditions including delivery and neonatal resuscitation.

IV. Transport team members should be oriented to the transport vehicle and usage of transport equipment. All transport team members should follow state and national standards. (See most recent edition of AAP *Guidelines for Transportation*.)

V. In instances such as advanced labor, unstable maternal condition, or severe illness, it may become necessary for the referring care provider or designee to accompany the patient during transport, if transport is still recommended by the receiving physician. (See Appendix III re EMTALA). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com.

MATERNAL TRANSPORT MODALITY

I. Selection of the transport modality should be a joint decision by the referring and receiving care providers based on the condition of the mother and fetus.

II. Maternal transport can be accomplished by private vehicle, ambulance, rotary wing aircraft (RWA), or fixed wing aircraft (FWA). The ambulance (land and air) must be licensed by the Office of Emergency Medical Services of the Tennessee Department of Health.

III. An Advanced Life Support (ALS) ambulance is required for maternal transport. The description of an ALS ambulance is defined by the Tennessee Department of Health and may be located in the latest edition of the *Tennessee Emergency Medical Services Statutes and Rules*, located at https://health.state.tn.us/ems/ (click on Rules and Regulations).

MATERNAL TRANSPORT EQUIPMENT

I. The referring health care provider should be aware of the availability of Advanced Life Support (ALS) ambulances in the area. The required equipment and supplies for maternal and neonatal care in an ALS ambulance are defined by the Tennessee Department of Health (See Appendix V).

II. Organization and maintenance of additional transport equipment is the responsibility of the transport team.

III. Additional equipment and supplies that may be necessary should be provided by the transporting team. These include:

A. doppler
B. reflex hammer
C. infusion pump
D. oxygen masks
E. neonatal resuscitation supplies and equipment (See Appendix IV)

IV. Additional medications (or therapeutic equivalents) that may be necessary should be provided by the transport team or referring facility after communication among providers. Such medications, including but not limited to those listed below, may be given when ordered by the referring care provider.

A. Antenatal corticosteroids to accelerate fetal lung maturity

1. Betamethasone for injection (12 mg IM is usual dose)
2. Dexamethasone for injection (6–10 mg IM is usual dose)

B. Eclampsia

1. Magnesium Sulfate 6 gram bolus IV, then 2 grams/hr IV. Additional dose of 2 grams over 5-10 minutes for persistent seizures (repeat x 1)
2. Calcium gluconate 1 gram IV to reverse magnesium overdose
3. Sodium amobarbital 250 mg IV over 3 minutes (can substitute another short-acting benzodiazepine)

C. Oxytocics

1. Oxytocin (Pitocin) 10 units per ampule / vial
2. Misoprostol (Cytotec) 100 mcg tablets
3. Methylergonovine (Methergine) 200 mcg ampules
4. Carboprost (Hemabate) 250 microgram ampule / vial

D. Tocolytics

1. Magnesium Sulfate (dosage same as for eclampsia)
2. Nifedipine (Procardia) 10 mg p.o. every 20 minutes. Maximum dosage is 100 mg.
3. Terbutaline Sulfate (Brethine) for injection (0.25 mg subcutaneously at 20

to 60 minute intervals is usual dose)

E. Antibiotics for Group B strep prophylaxis (ref: CDC MMWR, November 19, 2010 / Vol. 59 / No. RR-10)

1. Penicillin G 5,000,000 units IV
2. Ampicillin 2 grams IV
3. Cefazolin 2 grams IV
4. Vancomycin 1 gram IV

F. Antihypertensives

1. Labetalol (Trandate) IV. Dosage is repeated and/or adjusted at 20 minute intervals according to patient response. May sequentially give 20 mg, then 40 mg, then 80 mg, then an additional 80 mg, if insufficient response to the lower doses. Maximum dosage is 220 mg–300 mg.
2. Hydralazine (Apresoline) 5-10 mg IV every 20 minutes. Maximum dosage is 30 mg.
3. Nifedipine (Procardia) 10 mg p.o. every 20 minutes. Maximum dosage is 100 mg.

MATERNAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both the referring and receiving centers have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES

A. The following documents should be available to the receiving center for the transported patient:

1. complete prenatal record
2. current medical record (include the EMTALA form)
3. record of care during transport

B. The referring center should maintain a record regarding disposition of transported mothers.

III. RECEIVING CENTER RESPONSIBILITIES

A. Maintain a record regarding the disposition of the transported patient
B. Send a summary of care of both mother and/or infant to the referring care provider

EVALUATION OF MATERNAL REFERRAL PROCESS

I. Interhospital care of the high-risk perinatal patient requires the cooperation and coordination of many skilled health care personnel. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. Informing perinatal care and EMS providers in the region of specialized resources available through the perinatal network
B. Assisting perinatal care providers in developing their abilities to identify high-risk perinatal patients, anticipate complications, and stabilize those patients before transport
C. Continuing quality improvement through ongoing education of perinatal care and EMS providers.

III. Planning of the perinatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. Availability
B. Accessibility
C. Responsiveness
D. Effectiveness
E. Safety

IV. Referring facilities should periodically review their maternal referrals with or without the assistance of the receiving center.

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient, family, primary care provider, and regionalized perinatal care system. Early planning of return transports is desirable.

II. MATERNAL RETURN TRANSPORT

A. The hospital to which the maternal patient is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. The composition of the transport team should be based on the condition of the patient.

C. A ground ambulance is the most appropriate vehicle for the majority of maternal return transports. If an alternative form of transportation is being considered, the referring health care provider should discuss this alternative mode with the receiving physician.

D. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving center. This consultation may aid the care provider in developing a treatment plan.

E. The care provider directing the return transport is responsible for the patient during transport.

F. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained (COBRA, EMTALA; see Appendix III). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com .

G. A summary of care for the patient must be provided.

NEONATAL TRANSPORT

Level I

Level I units provide basic care for maternal and neonatal patients who are at low risk. All high-risk mothers and neonates must be promptly identified for consultation and/or referral for more specialized care. In addition, Level I units 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).

Planned deliveries at gestational ages less than 35 weeks should be referred to a Level II, III, or IV facility. Although it is not always possible to prenatally anticipate the need for pediatric subspecialty services, when antenatal ultrasound and/or genetic testing has identified a fetus with congenital anomalies, prenatal referral to an appropriate subspecialty provider or fetal assessment clinic to provide families with prognostic information and facilitate a coordinated plan for delivery in a facility with the needed services is recommended.

When transfer is deemed safe for the mother and fetus, transfer of mothers to a Level II, III, or IV unit with the specialized expertise required by the fetus after birth is recommended. The elective delivery of an infant in a hospital without the required pediatric sub-specialty services, thus requiring a planned neonatal transport, should be avoided.

INDICATIONS FOR NEONATAL CONSULTATION AND/OR TRANSPORT

I. Requirement for more than routine care as prescribed for normal neonates as published in the most recent edition of *Guidelines for Perinatal Care* (American Academy of Pediatrics and American College of Obstetricians and Gynecologists)

II. Gestational age <35 weeks

III. Apgar score <3 at 1 minute, <5 at 5 minutes, and/or <7 at 10 minutes

IV. Need for oxygen therapy after initial resuscitation

V. Abnormal respirations with or without need for supplemental oxygen

VI. Requirement for continuous intravenous therapy >24 hours

VII. Suspected sepsis

VIII. Suspected congenital heart disease

IX. Neurologic disorder

X. Gastrointestinal disorder

XI. Genitourinary disorder

XII. Hematologic disorder

XIII. Musculoskeletal disorder

XIV. Endocrine or metabolic disorder

XV. Congenital malformation or suspected genetic disorder requiring further evaluation

NEONATAL REFERRAL PROCESS

I. Neonatal transport is initiated by the health care provider (physician, certified nurse midwife, nurse practitioner, physician assistant) responsible for the patient's medical care. Guidelines for the referral process are outlined below.

II. REFERRING CENTER RESPONSIBILITIES

A. The referring health care provider's decision to request consultation is the first step in the referral process.

B. Telephone consultation with the receiving care provider is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the referring health care provider in developing a treatment plan for stabilizing the patient before transport.

C. A discussion between the referring health care provider and receiving care provider regarding the neonate will result in one of three possible dispositions:

1. Required neonatal care can be provided at the referring center. The receiving care provider under these circumstances has only a consultative role.
2. The neonate requires further observation, investigation, or other preparation before possible transport. Continued contact between the providers is necessary.
3. Transport of the neonate is necessary. The optimal time, mode of transfer, transport personnel, and additional information regarding the neonate should be discussed. The process of stabilization of the neonate at the referring center should be reviewed and documented.

D. If the neonate is transported by the referring center, the referring health care provider is responsible for the patient until arrival at the receiving center.

E. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital. It should be emphasized that during the preparation for transport by the transport team, the referring physician and hospital retain responsibility for the patient unless there have been other prior agreements which determine this responsibility. Transport services should work with the referring hospital to clearly delineate the primary medical responsibility for the patient when the patient is still within the referring hospital but is being cared for by the transport team (7th edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics, 2012, p. 80).

F. The medical record should be organized as the patient is prepared for transport and sent with the patient.

G. Consent forms to authorize transfer must be obtained.

H. Parents should be encouraged to see and touch the infant.

I. Appropriate maternal/neonatal identification should be in place before transport.

J. All referrals should be directly admitted to the receiving unit to avoid unnecessary delays in the emergency department.

III. RECEIVING CENTER RESPONSIBILITIES

A. The receiving care provider is responsible for the decision to accept the referring health care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance in locating appropriate care should be provided to the referring health care provider.

B. If the neonate is transported by the referring center, full responsibility begins with admission to the receiving center.

C. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital. It should be emphasized that during the preparation for transport by the transport team, the referring physician and hospital retain responsibility for the patient unless there have been other prior agreements which determine this responsibility. Transport services should work with the referring hospital to clearly delineate the primary medical responsibility for the patient when the patient is still within the referring hospital but is being cared for by the transport team (7th edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics, 2012, p. 80).

D. If a delay in transport occurs, a repeat telephone call should be made for further assessment and advice.

E. On arrival of the transport team, assessment and further stabilization of the neonate should be done in collaboration with the referring staff.

F. The transport team must verify proper identification of the neonate before transport.

G. Following stabilization of the neonate, the transport team should communicate with the parents about the infant's condition, possible course, and therapeutic intervention that has been undertaken or is anticipated. Written information about the receiving center should be provided to the parents.

H. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained.

I. Parents should be encouraged to see and touch the infant before departure.

J. Before departure, the transport team should communicate with the receiving center care provider regarding the neonate's history, current status, and planned management during transport.

K. Before arrival at the receiving center, the transport team should communicate the status of the neonate and anticipated needs on admission.

L. A telephone call should be made to the parents shortly following admission of the neonate.

M. Within 24 hours of admission, communication with the referring care provider regarding events during transport and since admission should occur.

N. Periodic communication with appropriate health care providers from the referring facility should be maintained.

O. Consideration should be given to returning the care of the patient to the referring health care provider or primary care physician when practical and medically appropriate.

P. Upon discharge of the infant, a discharge summary should be sent to the referring perinatal health care providers.

NEONATAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring and receiving health care providers based on the condition of the neonate. Transport by a Level I unit should be a rare event, done only after consultation with a Level II, III, or IV unit.

II. Transport team members should be selected from appropriately trained physicians, neonatal nurse practitioners, registered nurses, respiratory therapists, emergency medical technicians, advanced emergency medical technicians, and paramedics. Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm. The minimum number of transport team members should be three, of which one is the operator of the transport vehicle. The other team members should be comprised of a neonatologist, neonatal fellow, neonatal nurse practitioner, neonatal specialty trained registered nurse, or neonatal specialty trained respiratory therapist.

III. Transport team members should have the collective expertise sufficient to provide the following, if necessary:

A. Observation of the newborn throughout the transport
B. Monitoring of body temperature, respiratory status, and cardiovascular status
C. Delivery and monitoring of oxygen therapy
D. Initiation and maintenance of IV access and therapy
E. Supportive care for a wide variety of emergency conditions, including advanced neonatal resuscitation

IV. At least one member of the transport team should be a current Neonatal Resuscitation Program (American Academy of Pediatrics and American Heart Association) provider.

V. Transport team members should be oriented to the transport vehicle and use of transport equipment. All transport team members should follow state and national standards.

VI. The knowledge and skills required for a nurse to perform neonatal transport are listed in the most current edition of the *Educational Objectives for Nurses, Levels I, II, III, IV, Neonatal Transport Nurses*, Tennessee Perinatal Care System, Tennessee Department of Health (Appendix I). Other suggested supplemental education includes the AAP/AHA Neonatal Resuscitation Program and The S.T.A.B.L.E. Program©, endorsed by the American Academy of Pediatrics and the March of Dimes.

NEONATAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both referring and receiving center personnel have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES

A. The following documents should accompany the transported neonate:

1. Complete maternal prenatal record
2. Current maternal medical record
3. Current neonatal medical record
4. Any images in a format that can be reviewed by the receiving care team
5. Record of care during transport

B. The referring center should maintain a record regarding disposition of transferred neonates.

III. RECEIVING CENTER RESPONSIBILITIES

A. Maintain a record regarding the disposition of the transported neonate
B. Send a summary of care to the referring perinatal health care providers

EVALUATION OF NEONATAL REFERRAL PROCESS

I. Interhospital care of the high-risk neonate requires the cooperation and coordination of many skilled health care personnel. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. Informing perinatal care and EMS providers in the region of specialized resources available to them through the perinatal network.
B. Assisting neonatal care providers in developing their abilities to identify high-risk neonatal patients, anticipate complications, and stabilize those patients before transport.

III. Continuing quality improvement through ongoing education of neonatal care and EMS providers (See Appendix I). Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm.

IV. Planning of the neonatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. Availability
B. Accessibility
C. Responsiveness
D. Effectiveness
E. Safety

V. Referring facilities should periodically review their neonatal referrals, with or without the assistance of the receiving center.

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient, family, primary care provider, and regionalized perinatal care system. Early planning of return transports is desirable.

II. NEONATAL RETURN TRANSPORT

A. The hospital to which the neonate is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving hospital. This consultation may aid the health care provider and nursing staff in developing a treatment plan. In the event the neonate is returned to a hospital other than the original referring hospital, the original referring health care provider must be notified.

C. The mode of transport, composition of the transport team, and equipment needs should be based on the condition of the neonate and other factors such as distance and weather conditions.

D. The physician directing the return transport is responsible for the patient during transport.

E. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

F. The parents should be encouraged to visit and become familiar with the receiving center nursery prior to the return transport.

G. The transport team should communicate with receiving center personnel regarding the estimated time of arrival.

H. On admission of the neonate to the receiving center, the transport team should communicate with receiving center personnel regarding the neonate's history, events during transport, and current status.

I. A summary of care should accompany the patient.

J. Periodic communication between referring and receiving hospitals should be maintained.

LEVEL II FACILITIES

MATERNAL TRANSPORT

Level II

Level II obstetric units have the capability to provide a broad range of maternal-fetal services for normal patients and for those with mild or moderate obstetric illnesses or complications. 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.

Maternal patients with underlying disease processes should be referred for consultation and / or co-management in order to reduce the risk of long-term complications.

Planned deliveries at gestational ages < 32 weeks should be referred to a Level III or IV facility. Although it is not always possible to prenatally anticipate the need for pediatric subspecialty services, when antenatal ultrasound and/or genetic testing has identified a fetus with congenital anomalies, prenatal referral to an appropriate subspecialty provider or fetal assessment clinic to provide families with prognostic information and facilitate a coordinated plan for delivery in a facility with the needed services is recommended.

When transfer is deemed safe for the mother and fetus, transfer of mothers to a Level III or IV unit with the specialized expertise required by the fetus after birth is recommended. The elective delivery of an infant in a hospital without the required pediatric sub-specialty services, thus requiring a planned neonatal transport, should be avoided.

INDICATIONS FOR MATERNAL CONSULTATION AND/OR TRANSPORT

I. ANTEPARTUM

A. Maternal History

1. previous preterm labor (<37 weeks) or low-birthweight neonate (<2500 gm)
2. previous neonate >4000 gm at term or any large-for-gestational age neonate
3. previous stillbirth, neonatal loss, or two or more abortions
4. suspected cervical insufficiency
5. diagnosed abnormality of the genital tract
6. medical indication for termination of previous pregnancy
7. neonate who required more than routine observation or care
8. neonate with known or suspected genetic disorder
9. severe emotional problems associated with previous pregnancy or delivery
10. previous vertical or classical uterine incision
11. age < 17 or advanced maternal age (≥35 years of age at delivery)
12. prepregnancy weight <45 kg or >90 kg
13. Body Mass Index (BMI) < 18 or > 30
14. height <150 cm

B. Medical/Surgical Conditions

1 diabetes mellitus/endocrine disorder
2 autoimmune disorder
3 cardiac disease
4 hypertension
5 pulmonary disease
6 renal disease
7 hematologic disorder
8 neurologic disorder
9 musculoskeletal disorder
10 infection
11 nutritional disorder
12 inborn errors of metabolism (e.g., phenylketonuria [PKU])
13 substance use
14 malignancy
15 psychiatric disorder
16 trauma
17 surgical emergency
18 morbid obesity (BMI > 40)
19 prior bariatric surgery

C. Obstetric Complications

1. glucose intolerance
2. urinary tract infection
3. sexually transmitted disease

4. positive fetal fibronectin test
5. suspected ectopic pregnancy
6. suspected missed abortion
7. hyperemesis
8. exposure to teratogen
9. isoimmunization
10. persistent anemia
11. vaginal bleeding
12. preeclampsia/eclampsia
13. suspected polyhydramnios or oligohydramnios
14. preterm cervical dilatation without uterine activity
15. preterm rupture of membranes with or without uterine activity
16. evidence of amnionitis or sepsis at any time
17. inappropriate fetal growth for gestational age
18. multiple gestation
19. postterm gestation (>42 weeks)
20. fetal demise
21. known or suspected fetal anomaly
22. abnormal maternal serum / genetic screen
23. morbid obesity (BMI > 40)
24. placental abnormalities

II. INTRAPARTUM

A. Cervical dilatation with uterine contractions at < 32 weeks
B. Evidence of amnionitis or sepsis at any time
C. Abnormal bleeding
D. Preeclampsia/eclampsia
E. Multiple gestation
F. Morbid obesity (BMI > 40)
G. Any severe medical / surgical condition

III. POSTPARTUM

A. Preeclampsia/eclampsia
B. Sepsis
C. Hemorrhage
D. Thromboembolic disease
E. Cardiopulmonary dysfunction
F. Morbid obesity (BMI > 40)
G. Neonatal transport

MATERNAL REFERRAL PROCESS

I. Maternal transport is initiated by the health care provider responsible for the patient's medical care. Maternal referral may lead to admission of the patient to the receiving hospital (inpatient transport) or to outpatient evaluation and management (outpatient transport). The guidelines for the referral process are outlined below.

II. INPATIENT TRANSPORT

A. Referring Center Responsibilities:

1. The decision by the referring care provider (physician, certified nurse midwife, nurse practitioner, physician assistant) to request consultation is the first step in the referral process.
2. Telephone consultation with the receiving care provider is necessary to initiate the referral process and to prepare the receiving provider. This consultation may aid the referring care provider in developing a treatment plan for stabilizing the patient before and during transport.
3. Personnel of the referring and receiving facilities must follow the COBRA/EMTALA guidelines (42USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix III.). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com. Regional Perinatal Centers shall not refuse to accept an appropriate transfer of an individual who requires such specialized care if the hospital has the capability and bed availability to treat the individual. All transfers should be based on medical need.
4. If the transport is done by the referring hospital, the referring care provider and hospital retain responsibility until the transport team arrives with the patient at the receiving hospital (most recent edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics).
5. A ground ambulance is the most appropriate vehicle for the majority of maternal transports. If an alternate form of transportation is being considered, the referring care provider should discuss this alternative with the receiving care provider at the time of consultation.
6. The medical record should be organized as the patient is prepared for transport and sent with the patient or to the receiving facility in a timely manner.
7. The composition of the transport team should be a joint decision between the referring and receiving care providers based on the condition of the mother and/or fetus.
8. To avoid unnecessary delays in the emergency room or admitting office, all referrals should be directly admitted to the receiving obstetric unit.

B. Receiving Center Responsibilities:

1. The receiving care provider is responsible for the decision to accept the referring care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance in

locating appropriate care should be provided to the referring care provider.

2. Personnel of the referring and receiving facilities must follow the COBRA/EMTALA guidelines (42USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix III). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com. Regional Perinatal Centers shall not refuse to accept an appropriate transfer of an individual who requires such specialized care if the hospital has the capability and bed availability to treat the individual. All transfers should be based on medical need.
3. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital (most recent edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics).
4. Every patient accepted by the receiving center should be seen by a care provider within 30 minutes of arrival.
5. Communication with the referring care provider should occur following admission.
6. If the patient is discharged undelivered, communication should occur prior to the time of discharge.
7. A summary of care of both mother and/or infant should be sent to the referring care provider.
8. Every effort should be made to return the patient to the care of the referring care provider as soon as possible.

III. OUTPATIENT REFERRAL

A. Referring Center Responsibilities:

1. Outpatient referral could begin with a phone call but must be followed by a written request for consultation / co-management from the referring care provider or designee to the receiving care provider or designee.
2. An appointment for evaluation at the receiving center should be arranged.

B. Receiving Center Responsibilities:

1. The referring care provider should be contacted by either telephone or letter after the evaluation has been completed.
2. Whenever possible, patients should continue under the care of the referring care provider.

MATERNAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring and receiving care providers based on the condition of the mother and/or fetus.

II. The transport team members should be selected from appropriately trained, licensed health care providers. Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm.

III. Transport team members should have the collective expertise sufficient to provide the following, if necessary:

A. Monitoring of vital signs, uterine contractions, deep tendon reflexes, and fetal heart rate
B. Monitoring the administration of intravenous infusions and usage of tocolytic, antihypertensive, anticonvulsant, and other appropriate medications
C. Care for a wide variety of emergency conditions including delivery and neonatal resuscitation.

IV. Transport team members should be oriented to the transport vehicle and usage of transport equipment. All transport team members should follow state and national standards.

V. In instances such as advanced labor, unstable maternal condition, or severe illness, it may become necessary for the referring care provider or designee to accompany the patient during transport, if transport is still recommended by the receiving physician. (See Appendix III re EMTALA). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com.

MATERNAL TRANSPORT MODALITY

I. Selection of the transport modality should be a joint decision by the referring and receiving care providers based on the condition of the mother and fetus.

II. Maternal transport can be accomplished by private vehicle, ambulance, rotary wing aircraft (RWA), or fixed wing aircraft (FWA). The ambulance (land and air) must be licensed by the Office of Emergency Medical Services of the Tennessee Department of Health.

III. An Advanced Life Support (ALS) ambulance is required for maternal transport. The description of an ALS ambulance is defined by the Tennessee Department of Health and may be located in the latest edition of the *Tennessee Emergency Medical Services Statutes and Rules*, located at https://health.state.tn.us/ems/ (Click on Rules and Regulations).

MATERNAL TRANSPORT EQUIPMENT

I. The referring health care provider should be aware of the availability of Advanced Life Support (ALS) ambulances in the area. The required equipment and supplies for maternal and neonatal care in an ALS ambulance are defined by the Tennessee Department of Health.

II. Organization and maintenance of additional transport equipment is the responsibility of the transport team.

III. Additional equipment and supplies that may be necessary should be provided by the transporting team. These include:

A. doppler
B. reflex hammer
C. infusion pump
D. oxygen masks
E. neonatal resuscitation supplies and equipment (See Appendix V)

IV. Additional medications (or therapeutic equivalents) that may be necessary should be provided by the transport team or referring facility after communication among providers. Such medications, including but not limited to those listed below, may be given when ordered by the referring care provider.

A. Antenatal corticosteroids to accelerate fetal lung maturity

1. Betamethasone for injection (12 mg IM is usual dose)
2. Dexamethasone for injection (6–10 mg IM is usual dose)

B. Eclampsia

1. Magnesium Sulfate 6 gram bolus IV, then 2 grams/hr IV. Additional dose of 2 grams over 5-10 minutes for persistent seizures (repeat x 1)
2. Calcium gluconate 1 gram IV to reverse magnesium overdose
3. Sodium amobarbital 250 mg IV over 3 minutes (can substitute another short-acting benzodiazepine)

C. Oxytocics

1. Oxytocin (Pitocin) 10 units per ampule / vial
2. Misoprostol (Cytotec) 100 mcg tablets
3. Methylergonovine (Methergine) 200 mcg ampules
4. Carboprost (Hemabate) 250 microgram ampule / vial

D. Tocolytics

1. Magnesium Sulfate (dosage same as for eclampsia)
2. Nifedipine (Procardia) 10 mg p.o. every 20 minutes. Maximum dosage is 100 mg.
3. Terbutaline Sulfate (Brethine) for injection (0.25 mg subcutaneously at 20 to 60 minute intervals is usual dose)

E. Antibiotics for Group B strep prophylaxis (ref: CDC MMWR, November 19, 2010, / Vol. 59 / No. RR-10)

1. Penicillin G 5,000,000 units IV
2. Ampicillin 2 grams IV
3. Cefazolin 2 grams IV
4. Vancomycin 1 gram IV

F. Antihypertensives

1. Labetalol (Trandate) IV. Dosage is repeated and/or adjusted at 20 minute intervals according to patient response. May sequentially give 20 mg, then 40 mg, then 80 mg, then an additional 80 mg, if insufficient response to the lower doses. Maximum dosage is 220 mg–300 mg.
2. Hydralazine (Apresoline) 5-10 mg IV every 20 minutes. Maximum dosage is 30 mg.
3. Nifedipine (Procardia) 10 mg p.o. every 20 minutes. Maximum dosage is 100 mg.

MATERNAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both the referring and receiving centers have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES

B. The following documents should be available to the receiving center for the transported patient:

1. complete prenatal record
2. current medical record (include the EMTALA form)
3. record of care during transport

B. The referring center should maintain a record regarding disposition of transported mothers.

III. RECEIVING CENTER RESPONSIBILITIES

A. maintain a record regarding the disposition of the transported patient
B. send a summary of care of both mother and/or infant to the referring care provider

EVALUATION OF MATERNAL REFERRAL PROCESS

I. Interhospital care of the high-risk perinatal patient requires the cooperation and coordination of many skilled health care personnel. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available through the perinatal network
B. assisting perinatal care providers in developing their abilities to identify high-risk perinatal patients, anticipate complications, and stabilize those patients before transport
C. continuing quality improvement through ongoing education of perinatal care and EMS providers

III. Planning of the perinatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness
E. safety

IV. Referring facilities should periodically review their maternal referrals with or without the assistance of the receiving center.

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient, family, primary care provider, and regionalized perinatal care system. Early planning of return transports is desirable.

II. MATERNAL RETURN TRANSPORT

A. The hospital to which the maternal patient is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. The composition of the transport team should be based on the condition of the patient.

C. A ground ambulance is the most appropriate vehicle for the majority of maternal return transports. If an alternative form of transportation is being considered, the referring health care provider should discuss this alternative mode with the receiving physician.

D. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving center. This consultation may aid the care provider in developing a treatment plan.

E. The care provider directing the return transport is responsible for the patient during transport.

F. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained (COBRA, EMTALA; see Appendix III).

G. A summary of care for the patient must be provided.

NEONATAL TRANSPORT

Level II

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 or continuous positive airway pressure, or both, 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.

When antenatal ultrasound and/or genetic testing has identified a fetus with congenital anomalies, prenatal referral to an appropriate subspecialty provider or fetal assessment clinic to provide families with prognostic information and facilitate a coordinated plan for deliver in a facility with the needed services is encouraged.

When transport is deemed safe for the mother and fetus, transfer of mothers to a Level III or Level IV unit with the specialized services required by the fetus after birth is encouraged. The elective delivery of an infant in a hospital without the required pediatric sub-specialty services resulting in a planned neonatal transport should be avoided.

The obstetric co-director is board certified in that specialty. The pediatric co-director is board certified in neonatal-perinatal medicine.

INDICATIONS FOR NEONATAL CONSULTATION AND/OR TRANSPORT

I. Gestational age ≤ 32 weeks

II. Birth weight <1500 grams

III. Severity of illness requiring a level of care that exceeds the capacity of the Level II facility

NEONATAL REFERRAL PROCESS

I. Neonatal transport is initiated by the health care provider (physician, certified nurse midwife, nurse practitioner, physician assistant) responsible for the patient's medical care. Guidelines for the referral process are outlined below.

II. REFERRING CENTER RESPONSIBILITIES

A. The referring health care provider's decision to request consultation is the first step in the referral process.

B. Telephone consultation with the receiving care provider is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the referring health care provider in developing a treatment plan for stabilizing the patient before transport.

C. A discussion between the referring health care provider and receiving care provider regarding the neonate will result in one of three possible dispositions:

1. Required neonatal care can be provided at the referring center. The receiving care provider under these circumstances has only a consultative role.
2. The neonate requires further observation, investigation, or other preparation before possible transport. Continued contact between the providers is necessary.
3. Transport of the neonate is necessary. The optimal time, mode of transfer, transport personnel, and additional information regarding the neonate should be discussed. The process of stabilization of the neonate at the referring center should be reviewed and documented.

D. If the neonate is transported by the referring center, the referring health care provider is responsible for the patient until arrival at the receiving center.

E. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital. It should be emphasized that during the preparation for transport by the transport team, the referring physician and hospital retain responsibility for the patient unless there have been other prior agreements which determine this responsibility. Transport services should work with the referring hospital to clearly delineate the primary medical responsibility for the patient when the patient is still within the referring hospital but is being cared for by the transport team (7th edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics, 2012, p. 80).

F. The medical record should be organized as the patient is prepared for transport and sent with the patient.

G. Consent forms to authorize transfer must be obtained.

H. Parents should be encouraged to see and touch the infant.

I. Appropriate maternal/neonatal identification should be in place before transport.

J. All referrals should be directly admitted to the receiving unit to avoid unnecessary delays in the emergency department.

III. RECEIVING CENTER RESPONSIBILITIES

A. The receiving care provider is responsible for the decision to accept the referring health care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance should be provided to the referring health care provider in locating appropriate care.

B. If the neonate is transported by the referring center, full responsibility begins with admission to the receiving center.

C. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital. It should be emphasized that during the preparation for transport by the transport team, the referring physician and hospital retain responsibility for the patient unless there have been other prior agreements which determine this responsibility. Transport services should work with the referring hospital to clearly delineate the primary medical responsibility for the patient when the patient is still within the referring hospital but is being cared for by the transport team (7th edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics, 2012, p. 80).

D. If a delay in transport occurs, a repeat telephone call should be made for further assessment and advice.

E. On arrival of the transport team, assessment and further stabilization of the neonate should be done in collaboration with the referring staff.

F. The transport team must verify proper identification of the neonate before transport.

G. Following stabilization of the neonate, the transport team should communicate with the parents about the infant's condition, possible course, and therapeutic intervention that has been undertaken or is anticipated. Written information about the receiving center should be provided to the parents.

H. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained.

I. Parents should be encouraged to see and touch the infant before departure.

J. Before departure, the transport team should communicate with the receiving center care provider regarding the neonate's history, current status, and planned management during transport.

K. Before arrival at the receiving center, the transport team should communicate the status of the neonate and anticipated needs on admission.

L. A telephone call should be made to the parents shortly following admission of the neonate.

M. Within 24 hours of admission, communication with the referring care provider regarding events during transport and since admission should occur.

N. Periodic communication with appropriate health care providers from the referring facility should be maintained.

O. Consideration should be given to returning the care of the patient to the referring health care provider or primary care physician when practical and medically appropriate.

P. Upon discharge of the infant, a discharge summary should be sent to the referring perinatal health care providers.

NEONATAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring health care provider and receiving care provider based on the condition of the neonate.

II. Transport team members should be selected from appropriately trained physicians, neonatal nurse practitioners, registered nurses, respiratory therapists, emergency medical technicians, advanced emergency medical technicians, and paramedics. Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm. The minimum number of transport team members should be three, of which one is the operator of the transport vehicle. The other team members should be comprised of a neonatologist, neonatal fellow, neonatal nurse practitioner, neonatal specialty trained registered nurse, or neonatal specialty trained respiratory therapist.

III. Transport team members should have the collective expertise sufficient to provide the following, if necessary:

A. observation of the newborn throughout the transport
B. monitoring of body temperature, respiratory status, and cardiovascular status
C. delivery and monitoring of oxygen therapy
D. initiation and maintenance of IV access and therapy
E. supportive care for a wide variety of emergency conditions, including advanced neonatal resuscitation.

IV. At least two members of the transport team should be current Neonatal Resuscitation Program (American Academy of Pediatrics and American Heart Association) providers.

V. Transport team members should be oriented to the transport vehicle and use of transport equipment. All transport team members should follow state and national standards.

VI. The knowledge and skills required for a nurse to perform neonatal transport are listed in the most current edition of the *Educational Objectives for Nurses, Levels I, II, III, IV, Neonatal Transport Nurses*, Tennessee Perinatal Care System, Tennessee Department of Health (Appendix I). Other suggested supplemental education includes the AAP/AHA Neonatal Resuscitation Program and The S.T.A.B.L.E. Program©, endorsed by the American Academy of Pediatrics and the March of Dimes.

NEONATAL SPECIALTY TRANSPORT MODALITY

I. Selection of the mobile neonatal intensive care unit should be based on the condition of the neonate.

II. The vehicle used for the provision of neonatal intensive care and transportation may be owned and operated by the transporting hospital or, alternatively, by a commercial source.

III. The vehicle used for the provision of neonatal intensive care and transportation between medical facilities shall conform with the following standards for design and construction as defined by the Office of EMS of the Tennessee Department of Health (Tennessee Emergency Medical Services Statutes and Rules, Rule 1200-12-1-.02[4] Special Vehicle Requirements).

A. Exterior surfaces, emblems, and markings shall conform to Tennessee EMS Board-approved specifications.

B. Additional markings, legends, or logos may be used to identify the provider and purpose for specific vehicles, except that no letter shall exceed 14 inches in height. Legends such as "neonatal intensive care" or "critical care transport" may be substituted for the "Ambulance" in exterior markings.

C. Warning lights and siren shall be furnished in accordance with Tennessee EMS Board-approved specifications except that side floodlights shall not be required.

D. Vehicle crashworthiness shall be assured with roll-cage construction evidenced by compliance with the Ambulance Manufacturer's Division Standards of the Truck Body and Equipment Association.

E. Doors shall provide access to the rear and curbside of the patient compartment. Where the vertical lift distance of the patient loading area exceeds 28 inches, a ramp or electrical-hydraulic lift shall be furnished to facilitate patient loading.

F. Environmental systems on the unit shall meet heating/air-conditioning standards as specified in Tennessee EMS Board-approved specifications.

G. Vehicle electrical systems shall be provided to furnish 110 volt AC power incorporated with a ground fault interrupter device for protection against electrical hazards. The neonatal transport unit or neonatal ambulance shall be equipped with a back-up power or battery system sufficient to operate patient care equipment in the event of failure of the main power systems.

H. Patient compartment shall be so designed to provide the following:

1. a properly secured transport incubator allowing observation from at least two sides
2. compartments for appropriate storage of materials
3. illumination at the primary patient care area of at least 75 foot candles
4. safety features such as sculpted, padded, or recessed cabinet corners and latches to prevent undue injury during sudden deceleration
5. all ancillary equipment and supplies secured in the ambulance
6. safety devices such as a grab rail or hand strap, secured according to Federal Motor Vehicle Safety Standards for safety restraints, safety belts provided at all attendant seats, and safety restraint devices for neonates

I. An oxygen system with sufficient capacity to deliver a minimum continuous flow of 10 liters per minute for at least four hours must be available. The installed

oxygen system shall be capable of delivering specific monitored blended oxygen concentrations.

J. The vehicle shall provide environmental conditions for the neonate that minimize the risk of temperature instability and excessive noise and vibration.

IV. In the event a RWA or FWA is used for neonatal transport, the following additional precautions should be observed:

A. use of a licensed air medical transport program with appropriately credentialed neonatal care providers
B. secure fastening of transport equipment
C. an independent power source to allow uninterrupted and fail-safe operation of the incubator and other supporting equipment
D. environmental conditions for the neonate that minimize the risk of temperature instability, noise and vibration
E. protective headgear for crew use during transport
F. system for easy communication among the members of the transport team and medical control at receiving center
G. seat belts
H. seating arrangement that permits close observation and handling of the patient

V. Latex free equipment and supplies must be provided.

NEONATAL TRANSPORT EQUIPMENT

I. Organization and maintenance of neonatal transport equipment is the responsibility of the transporting facility. (See Appendix V)

II. Equipment to maintain a neutral thermal environment for the neonate should include:

A. transport incubator
B. thermometer
C. blanket, insulating blanket, chemically-activated heat pack (appropriate for neonatal use), or plastic wraps

III. The transport incubator should meet the following requirements:

A. approved by the manufacturer for use during transport and installed in the transport vehicle with crashworthy restraints.
B. if used in RWA and FWA it shall meet FAA requirements for crashworthiness and flammability of materials. The transport incubator and monitoring equipment should be tested by an FAA certified mechanic to assure equipment does not interfere with navigational instruments.
C. a heat source that requires minimal time for preheating and should maintain ambient temperature within the desired range of 29^{o} to 36^{o} C. The control for temperature setting should be readily accessible and easy to operate, and there should be provision for easy determination of ambient temperature. It is essential to have a fail-safe alarm system that will recognize overheating or underheating.
D. provide an environment in which the oxygen supply is constant and controllable.
E. provide unrestricted visibility of the neonate with a functional independent light source for general illumination provided in or on the incubator.
F. easy accessibility to the neonate resulting in minimal interference with thermal protection and oxygen supply.
G. safety restraint devices to secure the neonate inside the incubator.

IV. Equipment for oxygen delivery and monitoring should include:

A. oxygen tanks
B. air tanks
C. pressure gauges
D. flowmeters (needle control valve preferred)
E. oxygen analyzer
F. oxygen blender
G. oxygen tubing and adapters
H. oxygen hood or nasal cannulas (preterm and term)
I. neonatal oxygen masks (preterm and term)
J. neonatal resuscitation manual bag and mask with manometer or T-piece resuscitator
K. continuous positive airway pressure apparatus
L. mechanical ventilator

V. The following guidelines are related to the use of oxygen during transport:

A. a portable supply of oxygen and compressed air in cylinders adequate to last the entire journey with surplus to cover unexpected needs and delays should be carried. Proper restraint of these cylinders is mandatory throughout the transport. An oxygen cylinder usage chart may be used in determining the number and type of oxygen cylinders necessary during transport (Appendix II).
B. oxygen cylinders in use should be provided with pressure gauges and flow meters.
C. the ambient oxygen concentration must be monitored continuously by an oxygen analyzer, if appropriate.

VI. Devices to maintain the patency of the airway and gastric decompression must be readily available and should include:

A. bulb syringe
B. regulated suction with gauge
C. suction catheters (#6, 8, 10 Fr)
D. feeding tube (#6, 8 Fr) with a 20 mL syringe
E. Replogle tube (#6, 8, 10 Fr)

VII. Equipment for vital sign monitoring should include:

A. a continuous heart rate monitor
B. neonatal stethoscope
C. body temperature monitor
D. noninvasive and invasive blood pressure monitoring devices
E. pulse oximeter for noninvasive monitoring of oxygen saturation

VIII. Equipment for monitoring blood glucose must be available.

IX. Equipment for monitoring blood gases should be available.

X. If intravenous therapy is required, an infusion pump that is portable, battery-powered, fail-safe, and calibrated to ensure accurate delivery of calculated fluid microvolumes must be used. Critical neonates may require multiple intravenous lines requiring additional infusion pumps.

XI. The equipment and supplies required for resuscitation of a neonate must be available, portable and should include:

A. Endotracheal intubation

1. laryngoscope handle with blades (#00, 0, 1)
2. laryngoscope spare bulbs (if necessary)
3. laryngoscope spare batteries
4. endotracheal tubes (#2.5, 3.0, 3.5, 4.0 mmID)
5. laryngeal mask airway (LMA) (size 1)
6. oral airways (sizes 00 and 0)
7. neonatal resuscitation manual bag and masks or T-piece resuscitator
8. pressure manometer (to monitor PIP and PEEP if manual ventilation is

necessary)
9. disposable stylet (#6 Fr)
10. adhesive tape or commercial endotracheal tube holders
11. scissors
12. end tidal carbon dioxide (CO_2) detector

B. Intravenous infusion

1. intravenous needles and catheters (#22, 23, 24, 25, 26 gauge)
2. syringes (1, 3, 6, 12, 20, 35 mL)
3. intravenous armboard
4. intravenous tubing and T connector
5. infusion device
6. tape or site dressing
7. site preps
8. 3-way stopcock
9. umbilical catheterization equipment
10. invasive blood pressure transducer (for use with umbilical arterial line)

C. Medications should include the following drugs or an approved therapeutic equivalent based on local program protocols. Weight-based administration guides including both milligrams and milliliters should be available for the medications used.

1. naloxone hydrochloride
2. normal saline
3. phenobarbital
4. prostaglandin E_1 (requires refrigeration)
5. sodium bicarbonate (4.2%)
6. adenosine
7. ampicillin
8. atropine
9. calcium gluconate
10. dextrose solution (D5W)
11. dextrose solution D10W)
12. epinephrine (1:10,000)
13. fentanyl
14. gentamicin
15. midazolam
16. morphine sulfate
17. sterile water
18. surfactant (needs refrigeration)

XII. Equipment for diagnosis and management of air leak syndrome should be considered

A. transilluminator
B. chest tubes (8, 10, 12 Fr)
C. chest tube kit
D. 18 to 20 gauge over the needle catheters
E. drain with one-way check valve
F. 3-way stopcock
G. luer lock and slip tip syringe (35/60cc)

XIII. Equipment for handwashing and personal protection

A. antiseptic solution or towelettes
B. gloves
C. full face protection or goggles and masks
D. fluid-retardant and fluid-resistant gowns
E. infectious waste disposal bags
F. soiled linen disposal bags
G. sharps box

XIV. Latex free equipment and supplies must be provided.

NEONATAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both referring and receiving center personnel have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES

A. The following documents should accompany the transported neonate:

1. complete maternal prenatal record
2. current maternal medical record
3. current neonatal medical record
4. any images in a format that can be reviewed by the receiving care team
5. record of care during transport

B. The referring center should maintain a record regarding disposition of transported neonates.

III. RECEIVING CENTER RESPONSIBILITIES

A. maintain a record regarding the disposition of the transported neonate
B. send a summary of care to the referring perinatal health care providers

EVALUATION OF NEONATAL REFERRAL PROCESS

I. Interhospital care of the high-risk neonate requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available to them through the perinatal network.
B. assisting neonatal care providers in developing their abilities to identify high-risk neonatal patients, anticipate complications, and stabilize those patients before transport.

III. Continuing quality improvement through ongoing education of neonatal care and EMS providers (See Appendix I). Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm.

IV. Planning of the neonatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness
E. safety

V. Referring facilities should periodically review their neonatal referrals, with or without the assistance of the receiving center.

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient, family, primary care provider, and regionalized perinatal care system. Early planning of return transports is desirable.

II. NEONATAL RETURN TRANSPORT

A. The hospital to which the neonate is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving hospital. This consultation may aid the health care provider and nursing staff in developing a treatment plan. In the event the neonate is returned to a hospital other than the original referring hospital, the original referring health care provider must be notified.

C. The mode of transport, composition of the transport team, and equipment needs should be based on the condition of the neonate and other factors such as distance and weather conditions.

D. The physician directing the return transport is responsible for the patient during transport.

E. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

F. The parents should be encouraged to visit and become familiar with the receiving center nursery prior to the return transport.

G. The transport team should communicate with receiving center personnel regarding the estimated time of arrival.

H. On admission of the neonate to the receiving center, the transport team should communicate with receiving center personnel regarding the neonate's history, events during transport, and current status.

I. A summary of care should accompany the patient.

J. Periodic communication between referring and receiving hospitals should be maintained.

LEVEL III FACILITIES

MATERNAL TRANSPORT

Level III

Level III obstetric units have the capability to provide a broad range of maternal-fetal services for normal patients as well as for those requiring intensive care services. These units provide planned delivery services for women with infants of all gestational ages.

Maternal patients with underlying disease processes should be referred for consultation and / or co-management in order to reduce the risk of long-term complications. Patients who may need critical care services should be assessed for possible transport based on available hospital capabilities.

Although it is not always possible to prenatally anticipate the need for pediatric subspecialty services, when antenatal ultrasound and/or genetic testing has identified a fetus with congenital anomalies, prenatal referral to an appropriate subspecialty provider or fetal assessment clinic to provide families with prognostic information and facilitate a coordinated plan for delivery in a facility with the needed services is encouraged.

The elective and/or planned delivery of a fetus with a condition(s) that require immediate neonatal transport should be avoided.

The Level III facility is responsible for delivery of a formal ongoing program of education in obstetrics and neonatal-perinatal medicine for its staff.

The obstetric co-director must be board-certified in maternal-fetal medicine. The pediatric co-director must be board-certified in neonatal-perinatal medicine.

REGIONAL PERINATAL CENTERS

Each of Tennessee's five Regional Perinatal Centers (Northeast Tennessee Regional Perinatal Center in Johnson City; East Tennessee Regional Perinatal Center in Knoxville; Southeast Regional Perinatal Center in Chattanooga; Middle Tennessee Regional Perinatal Center in Nashville; and West Tennessee Regional Perinatal Center in Memphis) is capable of providing Level III or Level IV obstetric and neonatal care.

In addition, each Regional Perinatal Center must provide the services of consultation/referral, professional education, maternal-fetal and neonatal transport, site visits upon request, post-neonatal follow-up, and data collection.

INDICATIONS FOR MATERNAL CONSULTATION AND/OR TRANSPORT

I. Maternal or fetal conditions requiring or potentially requiring specific medical or surgical services unavailable at the Level III facility. This may require consult / transfer to a Level IV in state or an out of state facility.

MATERNAL REFERRAL PROCESS

I. Maternal transport is initiated by the health care provider responsible for the patient's medical care. Maternal referral may lead to admission of the patient to the receiving hospital (inpatient transport) or to outpatient evaluation and management (outpatient transport). The guidelines for the referral process are outlined below.

II. INPATIENT TRANSPORT

A. Referring Center Responsibilities:

1. The decision by the referring care provider (physician, certified nurse midwife, nurse practitioner, physician assistant) to request consultation is the first step in the referral process.
2. Telephone consultation with the receiving care provider is necessary to initiate the referral process and to prepare the receiving provider. This consultation may aid the care provider in developing a treatment plan for stabilizing the patient before and during transport.
3. Personnel of the referring and receiving facilities must follow the COBRA/EMTALA guidelines (42USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix III.). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com. Regional Perinatal Centers shall not refuse to accept an appropriate transfer of an individual who requires such specialized care if the hospital has the capability and bed availability to treat the individual. All transfers should be based on medical need.
4. If the transport is done by the referring hospital, the referring care provider and hospital retain responsibility until the transport team arrives with the patient at the receiving hospital (most recent edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics).
5. A ground ambulance is the most appropriate vehicle for the majority of maternal transports. If an alternate form of transportation is being considered, the referring care provider should discuss this alternative with the receiving care provider at the time of consultation.
6. The medical record should be organized as the patient is prepared for transport and sent with the patient or to the receiving facility in a timely manner.
7. The composition of the transport team should be a joint decision between the referring and receiving care providers based on the condition of the mother and/or fetus.
8. To avoid unnecessary delays in the emergency room or admitting office, all referrals should be directly admitted to the receiving obstetric unit.

B. Receiving Center Responsibilities:

1. The receiving care provider is responsible for the decision to accept the referring care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance should

be provided to the referring care provider in locating appropriate care.

2. Personnel of the referring and receiving facilities must follow the COBRA/EMTALA guidelines (42USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix III). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com. Regional Perinatal Centers shall not refuse to accept an appropriate transfer of an individual who requires such specialized care if the hospital has the capability and bed availability to treat the individual. All transfers should be based on medical need.
3. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital (most recent edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics).
4. Every patient accepted by the receiving center should be seen by a care provider within 30 minutes of arrival.
5. Communication with the referring care provider should occur following admission.
6. If the patient is discharged undelivered, communication should occur prior to the time of discharge.
7. A summary of care of mother and/or infant should be sent to the referring care provider.
8. Every effort should be made to return the patient to the care of the referring care provider as soon as possible.

III. OUTPATIENT REFERRAL

A. Referring Center Responsibilities:

1. Outpatient referral could begin with a phone call but must be followed by a written request for consultation / co-management from the referring care provider or designee to the receiving care provider or designee.
2. An appointment for evaluation at the receiving center should be arranged.

B. Receiving Center Responsibilities:

1. The referring care provider should be contacted by either telephone or letter after the evaluation has been completed.
2. Whenever possible, patients should continue under the care of the referring care provider.

MATERNAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring and receiving care providers based on the condition of the mother and/or fetus.

II. The transport team members should be selected from appropriately trained, licensed health care providers. Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm.

III. Transport team members should have the collective expertise sufficient to provide the following, if necessary:

A. monitoring of vital signs, uterine contractions, deep tendon reflexes, and fetal heart ate
B. monitoring the administration of intravenous infusions and usage of tocolytic, antihypertensive, anticonvulsant, and other appropriate medications
C. care for a wide variety of emergency conditions including delivery and neonatal resuscitation.

IV. Transport team members shoIuld be oriented to the transport vehicle and usage of transport equipment. All transport team members should follow state and national standards.

V. In instances such as advanced labor, unstable maternal condition, or severe illness, it may become necessary for the referring care provider or designee to accompany the patient during transport, if transport is still recommended by the receiving physician. (See Appendix III re EMTALA). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com.

MATERNAL TRANSPORT MODALITY

I. Selection of the transport modality should be a joint decision by the referring care provider and receiving care provider based on the condition of the mother and fetus.

II. Maternal transport can be accomplished by private vehicle, ambulance, rotary wing aircraft (RWA), or fixed wing aircraft (FWA). The ambulance (land and air) must be licensed by the Office of Emergency Medical Services of the Tennessee Department of Health.

IV. An Advanced Life Support (ALS) ambulance is required for maternal transport. The description of an ALS ambulance is defined by the Tennessee Department of Health and may be located in the latest edition of the *Tennessee Emergency Medical Services Statutes and Rules*, located at https://health.state.tn.us/ems/

MATERNAL TRANSPORT EQUIPMENT

I. The referring health care provider should be aware of the availability of Advanced Life Support (ALS) ambulances in the area. The required equipment and supplies for maternal and neonatal care in an ALS ambulance are defined by the Tennessee Department of Health.

II. Organization and maintenance of additional transport equipment is the responsibility of the transport team.

III. Additional equipment and supplies that may be necessary should be provided by the transporting team. These include:

A. doppler
B. reflex hammer
C. infusion pump
D. oxygen masks
E. neonatal resuscitation supplies and equipment (See Appendix V).

IV. Additional medications (or therapeutic equivalents) that may be necessary should be provided by the transport team or referring facility after communication among providers. Such medications, including but not limited to those listed below, may be given when ordered by the referring care provider.

A. Antenatal corticosteroids to accelerate fetal lung maturity

1. Betamethasone for injection (12 mg IM is usual dose)
2. Dexamethasone for injection (6–10 mg IM is usual dose)

B. Eclampsia

1. Magnesium Sulfate 6 gram bolus IV, then 2 grams/hr IV. Additional dose of 2 grams over 5-10 minutes for persistent seizures (repeat x 1)
2. Calcium gluconate 1 gram IV to reverse magnesium overdose
3. Sodium amobarbital 250 mg IV over 3 minutes (can substitute another short-acting benzodiazepine)

C. Oxytocics

1. Oxytocin (Pitocin) 10 units per ampule / vial
2. Misoprostol (Cytotec) 100 mcg tablets
3. Methylergonovine (Methergine) 200 mcg ampules
4. Carboprost (Hemabate) 250 microgram ampule / vial

D. Tocolytics

1. Magnesium Sulfate (dosage same as for eclampsia)
2. Nifedipine (Procardia) 10 mg p.o. every 20 minutes. Maximum dosage is 100 mg.
3. Terbutaline Sulfate (Brethine) for injection (0.25 mg subcutaneously at 20 to 60 minute intervals is usual dose)

E. Antibiotics for Group B strep prophylaxis (ref: CDC MMWR, November 19, 2010, / Vol. 59 / No. RR-10)

1. Penicillin G 5,000,000 units IV
2. Ampicillin 2 grams IV
3. Cefazolin 2 grams IV
4. Vancomycin 1 gram IV

F. Antihypertensives

1. Labetalol (Trandate) IV. Dosage is repeated and/or adjusted at 20 minute intervals according to patient response. May sequentially give 20 mg, then 40 mg, then 80 mg, then an additional 80 mg, if insufficient response to the lower doses. Maximum dosage is 220 mg–300 mg.
2. Hydralazine (Apresoline) 5-10 mg IV every 20 minutes. Maximum dosage is 30 mg.
3. Nifedipine (Procardia) 10 mg p.o. every 20 minutes. Maximum dosage is 100 mg.

MATERNAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both the referring and receiving centers have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES

A. The following documents should be available to the receiving center for the transported patient:

1. complete prenatal record
2. current medical record (include the EMTALA form)
3. record of care during transport

B. The referring center should maintain a record regarding disposition of transported mothers.

III. RECEIVING CENTER RESPONSIBILITIES

A. maintain a record regarding the disposition of the transported patient
B. send a summary of care of both mother and/or infant to the referring care provider

EVALUATION OF MATERNAL REFERRAL PROCESS

I. Interhospital care of the high-risk perinatal patient requires the cooperation and coordination of many skilled health care personnel. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available through the perinatal network
B. assisting perinatal care providers in developing their abilities to identify high-risk perinatal patients, anticipate complications, and stabilize those patients before transport
C. continuing quality improvement through ongoing education of perinatal care and EMS providers.

III. Planning of the perinatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness
E. safety

IV. Referring facilities should periodically review their maternal referrals with or without the assistance of the receiving center.

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient, family, primary care provider, and regionalized perinatal care system. Early planning of return transports is desirable.

ii. MATERNAL RETURN TRANSPORT

A. The hospital to which the maternal patient is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. The composition of the transport team should be based on the condition of the patient.

C. A ground ambulance is the most appropriate vehicle for the majority of maternal return transports. If an alternative form of transportation is being considered, the referring health care provider should discuss this alternative mode with the receiving physician.

D. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving center. This consultation may aid the care provider in developing a treatment plan.

E. The care provider directing the return transport is responsible for the patient during transport.

F. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained (COBRA, EMTALA; see Appendix III).

G. A summary of care for the patient must be provided.

NEONATAL TRANSPORT

Level III

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).

Although it is not always possible to prenatally anticipate the need for pediatric subspecialty services, when antenatal ultrasound and/or genetic testing has identified a fetus with congenital anomalies, prenatal referral to an appropriate subspecialty provider or fetal assessment clinic to provide families with prognostic information and facilitate a coordinated plan for delivery in a facility with the needed services is recommended.

The Level III unit, if it so chooses, is responsible for providing equipment and qualified staff to transport sick infants from other referring hospitals.

The Level III facility is responsible for delivery of a formal ongoing program of education in obstetrics and neonatal-perinatal medicine for its staff.

The obstetric co-director must be board-certified in maternal-fetal medicine. The pediatric co-director must be board-certified in neonatal-perinatal medicine.

REGIONAL PERINATAL CENTERS

Each of Tennessee's five Regional Perinatal Centers (Northeast Tennessee Regional Perinatal Center in Johnson City; East Tennessee Regional Perinatal Center in Knoxville; Southeast Tennessee Regional Perinatal Center in Chattanooga; Middle Tennessee Regional Perinatal Center in Nashville; and West Tennessee Regional Perinatal Center in Memphis) is capable of providing Level III or Level IV obstetric and neonatal care.

In addition, each Regional Perinatal Center must provide the services of consultation/referral; professional education; maternal-fetal and neonatal transport; site visits upon request; post-neonatal follow-up; and data collection.

INDICATIONS FOR NEONATAL CONSULTATION AND/OR TRANSPORT

I. Neonatal conditions requiring or potentially requiring specific medical or surgical services unavailable at the Level III facility. This may require consult / transfer to a Level IV in state or an out of state facility.

NEONATAL REFERRAL PROCESS

I. Neonatal transport is initiated by the health care provider (physician, certified nurse midwife, nurse practitioner, physician assistant) responsible for the patient's medical care. Guidelines for the referral process are outlined below.

II. REFERRING CENTER RESPONSIBILITIES

A. The referring health care provider's decision to request consultation is the first step in the referral process.

B. Telephone consultation with the receiving care provider is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the referring health care provider in developing a treatment plan for stabilizing the patient before transport.

C. A discussion between the referring health care provider and receiving care provider regarding the neonate will result in one of three possible dispositions:

1. Required neonatal care can be provided at the referring center. The receiving care provider under these circumstances has only a consultative role.
2. The neonate requires further observation, investigation, or other preparation before possible transport. Continued contact between the providers is necessary.
3. Transport of the neonate is necessary. The optimal time, mode of transfer, transport personnel, and additional information regarding the neonate should be discussed. The process of stabilization of the neonate at the referring center should be reviewed and documented.

D. If the neonate is transported by the referring center, the referring health care provider is responsible for the patient until arrival at the receiving center.

E. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital. It should be emphasized that during the preparation for transport by the transport team, the referring physician and hospital retain responsibility for the patient unless there have been other prior agreements which determine this responsibility. Transport services should work with the referring hospital to clearly delineate the primary medical responsibility for the patient when the patient is still within the referring hospital but is being cared for by the transport team (7th edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics, 2012, p. 80).

F. The medical record should be organized as the patient is prepared for transport and sent with the patient.

G. Consent forms to authorize transfer must be obtained.

H. Parents should be encouraged to see and touch the infant.

I. Appropriate maternal/neonatal identification should be in place before transport.

J. All referrals should be directly admitted to the receiving unit to avoid unnecessary delays in the emergency department.

III. RECEIVING CENTER RESPONSIBILITIES

A. The receiving care provider is responsible for the decision to accept the referring health care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance should be provided to the referring health care provider in locating appropriate care.

B. If the neonate is transported by the referring center, full responsibility begins with admission to the receiving center.

C. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital. It should be emphasized that during the preparation for transport by the transport team, the referring physician and hospital retain responsibility for the patient unless there have been other prior agreements which determine this responsibility. Transport services should work with the referring hospital to clearly delineate the primary medical responsibility for the patient when the patient is still within the referring hospital but is being cared for by the transport team (7th edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics, 2012, p. 80).

D. If a delay in transport occurs, a repeat telephone call should be made for further assessment and advice.

E. On arrival of the transport team, assessment and further stabilization of the neonate should be done in collaboration with the referring staff.

F. The transport team must verify proper identification of the neonate before transport.

G. Following stabilization of the neonate, the transport team should communicate with the parents about the infant's condition, possible course, and therapeutic intervention that has been undertaken or is anticipated. Written information about the receiving center should be provided to the parents.

H. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained.

I. Parents should be encouraged to see and touch the infant before departure.

J. Before departure, the transport team should communicate with the receiving center care provider regarding the neonate's history, current status, and planned management during transport.

K. Before arrival at the receiving center, the transport team should communicate the status of the neonate and anticipated needs on admission.

L. A telephone call should be made to the parents shortly following admission of the neonate.

M. Within 24 hours of admission, communication with the referring care provider regarding events during transport and since admission should occur.

N. Periodic communication with appropriate health care providers from the referring facility should be maintained.

O. Consideration should be given to returning the care of the patient to the referring health care provider or primary care physician when practical and medically appropriate.

P. Upon discharge of the infant, a discharge summary should be sent to the referring perinatal health care providers.

NEONATAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring health care provider and receiving care provider based on the condition of the neonate.

II. Transport team members should be selected from appropriately trained physicians, neonatal nurse practitioners, registered nurses, respiratory therapists, emergency medical technicians, advanced emergency medical technicians, and paramedics. Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm. The minimum number of transport team members should be three, of which one is the operator of the transport vehicle. The other team members should be comprised of a neonatologist, neonatal fellow, neonatal nurse practitioner, neonatal specialty trained registered nurse, or neonatal specialty trained respiratory therapist.

III. Transport team members should have the collective expertise sufficient to provide the following, if necessary:

A. observation of the newborn throughout the transport
B. monitoring of body temperature, respiratory status, and cardiovascular status
C. delivery and monitoring of oxygen therapy
D. initiation and maintenance of IV access and therapy
E. supportive care for a wide variety of emergency conditions, including advanced neonatal resuscitation.

IV. At least two members of the transport team should be current Neonatal Resuscitation Program (American Academy of Pediatrics and American Heart Association) providers.

V. Transport team members should be oriented to the transport vehicle and use of transport equipment. All transport team members should follow state and national standards.

VI. The knowledge and skills required for a nurse to perform neonatal transport are listed in the most current edition of the *Educational Objectives for Nurses, Levels I, II, III, IV, Neonatal Transport Nurses*, Tennessee Perinatal Care System, Tennessee Department of Health (Appendix I). Other suggested supplemental education includes the AAP/AHA Neonatal Resuscitation Program and The S.T.A.B.L.E. Program©, endorsed by the American Academy of Pediatrics and the March of Dimes.

NEONATAL SPECIALTY TRANSPORT MODALITY

i. Selection of the mobile neonatal intensive care unit should be based on the condition of the neonate.

II. The vehicle used for the provision of neonatal intensive care and transportation may be owned and operated by the transporting hospital or, alternatively, by a commercial source.

III. The vehicle used for the provision of neonatal intensive care and transportation between medical facilities shall conform with the following standards for design and construction as defined by the Office of EMS of the Tennessee Department of Health (*Tennessee Emergency Medical Services Statutes and Rules*, Rule 1200-12-1-.02[4] Special Vehicle Requirements).

A. Exterior surfaces, emblems, and markings shall conform to Tennessee EMS Board-approved specifications.

B. Additional markings, legends, or logos may be used to identify the provider and purpose for specific vehicles, except that no letter shall exceed 14 inches in height. Legends such as "neonatal intensive care" or "critical care transport" may be substituted for the "Ambulance" in exterior markings.

C. Warning lights and siren shall be furnished in accordance with Tennessee EMS Board-approved specifications except that side floodlights shall not be required.

D. Vehicle crashworthiness shall be assured with roll-cage construction evidenced by compliance with the Ambulance Manufacturer's Division Standards of the Truck Body and Equipment Association.

E. Doors shall provide access to the rear and curbside of the patient compartment. Where the vertical lift distance of the patient loading area exceeds 28 inches, a ramp or electrical-hydraulic lift shall be furnished to facilitate patient loading.

F. Environmental systems on the unit shall meet heating/air-conditioning standards as specified in Tennessee EMS Board-approved specifications.

G. Vehicle electrical systems shall be provided to furnish 110 volt AC power incorporated with a ground fault interrupter device for protection against electrical hazards. The neonatal transport unit or neonatal ambulance shall be equipped with a back-up power or battery system sufficient to operate patient care equipment in the event of failure of the main power systems.

H. Patient compartment shall be so designed to provide the following:

1. a properly secured transport incubator allowing observation from at least two sides
2. compartments for appropriate storage of materials
3. illumination at the primary patient care area of at least 75 foot candles
4. safety features such as sculpted, padded, or recessed cabinet corners and latches to prevent undue injury during sudden deceleration
5. all ancillary equipment and supplies secured in the ambulance
6. safety devices such as a grab rail or hand strap, secured according to Federal Motor Vehicle Safety Standards for safety restraints, safety belts provided at all attendant seats, and safety restraint devices for neonates

I. An oxygen system with sufficient capacity to deliver a minimum continuous flow of 10 liters per minute for at least four hours must be available. The installed

oxygen system shall be capable of delivering specific monitored blended oxygen concentrations.

J. The vehicle shall provide environmental conditions for the neonate that minimize the risk of temperature instability and excessive noise and vibration.

IV. In the event a RWA or FWA is used for neonatal transport, the following additional precautions should be observed:

A. use of a licensed air medical transport program with appropriately credentialed neonatal care providers
B. secure fastening of transport equipment
C. an independent power source to allow uninterrupted and fail-safe operation of the incubator and other supporting equipment
D. environmental conditions for the neonate that minimize the risk of temperature instability, noise and vibration
E. protective headgear for crew use during transport
F. system for easy communication among the members of the transport team and medical control at receiving center
G. seat belts
H. seating arrangement that permits close observation and handling of the patient

V. Latex free equipment and supplies must be provided.

NEONATAL TRANSPORT EQUIPMENT

I. Organization and maintenance of neonatal transport equipment is the responsibility of the transporting facility. (See Appendix V)

II. Equipment to maintain a neutral thermal environment for the neonate should include:

A. transport incubator
B. thermometer
C. blanket, insulating blanket, chemically-activated heat pack (appropriate for neonatal use), or plastic wraps

III. The transport incubator should meet the following requirements:

A. approved by the manufacturer for use during transport and installed in the transport vehicle with crashworthy restraints.
B. if used in RWA and FWA it shall meet FAA requirements for crashworthiness and flammability of materials. The transport incubator and monitoring equipment should be tested by an FAA certified mechanic to assure equipment does not interfere with navigational instruments.
C. a heat source that requires minimal time for preheating and should maintain ambient temperature within the desired range of 29^{o} to 36^{o} C. The control for temperature setting should be readily accessible and easy to operate, and there should be provision for easy determination of ambient temperature. It is essential to have a fail-safe alarm system that will recognize overheating or underheating.
D. provide an environment in which the oxygen supply is constant and controllable.
E. provide unrestricted visibility of the neonate with a functional independent light source for general illumination provided in or on the incubator.
F. easy accessibility to the neonate resulting in minimal interference with thermal protection and oxygen supply.
G. safety restraint devices to secure the neonate inside the incubator.

IV. Equipment for oxygen delivery and monitoring should include:

A. oxygen tanks
B. air tanks
C. pressure gauges
D. flowmeters (needle control valve preferred)
E. oxygen analyzer
F. oxygen blender
G. oxygen tubing and adapters
H. oxygen hood or nasal cannulas (preterm and term)
I. neonatal oxygen masks (preterm and term)
J. neonatal resuscitation manual bag and mask with manometer or T-piece resuscitator
K. continuous positive airway pressure apparatus
L. mechanical ventilator

V. The following guidelines are related to the use of oxygen during transport:

A. a portable supply of oxygen and compressed air in cylinders adequate to last the

entire journey with surplus to cover unexpected needs and delays should be carried. Proper restraint of these cylinders is mandatory throughout the transport. An oxygen cylinder usage chart may be used in determining the number and type of oxygen cylinders necessary during transport (Appendix II).

B. oxygen cylinders in use should be provided with pressure gauges and flow meters.

C. the ambient oxygen concentration must be monitored continuously by an oxygen analyzer, if appropriate.

VI. Devices to maintain the patency of the airway and gastric decompression must be readily available and should include:

A. bulb syringe
B. regulated suction with gauge
C. suction catheters (#6, 8, 10 Fr)
D. feeding tube (#6, 8 Fr) with a 20 mL syringe
E. Replogle tube (#6, 8, 10 Fr)

VII. Equipment for vital sign monitoring should include:

A. a continuous heart rate monitor
B. neonatal stethoscope
C. body temperature monitor
D. noninvasive and invasive blood pressure monitoring devices
E. pulse oximeter for noninvasive monitoring of oxygen saturation

VIII. Equipment for monitoring blood glucose must be available.

IX. Equipment for monitoring blood gases should be available.

X. If intravenous therapy is required, an infusion pump that is portable, battery-powered, fail-safe, and calibrated to ensure accurate delivery of calculated fluid microvolumes must be used. Critical neonates may require multiple intravenous lines requiring additional infusion pumps.

XI. The equipment and supplies required for resuscitation of a neonate must be available, portable and should include:

A. Endotracheal intubation

1 laryngoscope handle with blades (#00, 0, 1)
2 laryngoscope spare bulbs (if necessary)
3 laryngoscope spare batteries
4 endotracheal tubes (#2.5, 3.0, 3.5, 4.0 mmID)
5 laryngeal mask airway (LMA) (size 1)
6 oral airways (sizes 00 and 0)
7 neonatal resuscitation manual bag and masks or T-piece resuscitator
8 pressure manometer (to monitor PIP and PEEP if manual ventilation is necessary)
9 disposable stylet (#6 Fr)

10 adhesive tape or commercial endotracheal tube holders
11 scissors
12 end tidal carbon dioxide (CO_2) detector

B. Intravenous infusion

1. intravenous needles and catheters (#22, 23, 24, 25, 26 gauge)
2. syringes (1, 3, 6, 12, 20, 35 mL)
3. intravenous armboard
4. intravenous tubing and T connector
5. infusion device
6. tape or site dressing
7. site preps
8. 3-way stopcock
9. umbilical catheterization equipment
10. invasive blood pressure transducer (for use with umbilical arterial line)

C. Medications should include the following drugs or an approved therapeutic equivalent based on local program protocols. Weight-based administration guides including both milligrams and milliliters should be available for the medications used.

1. adenosine
2. ampicillin
3. atropine
4. calcium gluconate
5. dextrose solution (D5W)
6. dextrose solution D10W)
7. epinephrine (1:10,000)
8. fentanyl
9. gentamicin
10. midazolam
11. morphine sulfate
12. naloxone hydrochloride
13. normal saline
14. phenobarbital
15. prostaglandin E_1 (requires refrigeration)
16. sodium bicarbonate (4.2%)
17. sterile water
18. surfactant (needs refrigeration)

XII. Equipment for diagnosis and management of air leak syndrome should be considered

A. transilluminator
B. chest tubes (8, 10, 12 Fr)
C. chest tube kit
D. 18 to 20 gauge over the needle catheters
E. drain with one-way check valve
F. 3-way stopcock
G. luer lock and slip tip syringe (35/60cc)

XIII. Equipment for handwashing and personal protect

A. antiseptic solution or towelettes
B. gloves
C. full face protection or goggles and masks
D. fluid-retardant and fluid-resistant gowns
E. infectious waste disposal bags
F. soiled linen disposal bags
G. sharps box

XIV. Latex free equipment and supplies must be provided.

NEONATAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both referring and receiving center personnel have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES

A. The following documents should accompany the transported neonate:

1. complete maternal prenatal record
2. current maternal medical record
3. current neonatal medical record
4. any images in a format that can be reviewed by the receiving care team
5. record of care during transport

B. The referring center should maintain a record regarding disposition of transported neonates.

III. RECEIVING CENTER RESPONSIBILITIES

A. maintain a record regarding the disposition of the transported neonate
B. send a summary of care to the referring perinatal health care providers

EVALUATION OF NEONATAL REFERRAL PROCESS

I. Interhospital care of the high-risk neonate requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available to them through the perinatal network.
B. assisting neonatal care providers in developing their abilities to identify high-risk neonatal patients, anticipate complications, and stabilize those patients before transport.

III. Continuing quality improvement through ongoing education of neonatal care and EMS providers (See Appendix I). Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm.

IV. Planning of the neonatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness
E. safety

V. Referring facilities should periodically review their neonatal referrals, with or without the assistance of the receiving center.

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient, family, primary care provider, and regionalized perinatal care system. Early planning of return transports is desirable.

II. NEONATAL RETURN TRANSPORT

A. The hospital to which the neonate is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving hospital. This consultation may aid the health care provider and nursing staff in developing a treatment plan. In the event the neonate is returned to a hospital other than the original referring hospital, the original referring health care provider must be notified.

C. The mode of transport, composition of the transport team, and equipment needs should be based on the condition of the neonate and other factors such as distance and weather conditions.

D. The physician directing the return transport is responsible for the patient during transport.

E. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

F. The parents should be encouraged to visit and become familiar with the receiving center nursery prior to the return transport.

G. The transport team should communicate with receiving center personnel regarding the estimated time of arrival.

H. On admission of the neonate to the receiving center, the transport team should communicate with receiving center personnel regarding the neonate's history, events during transport, and current status.

I. A summary of care should accompany the patient.

J. Periodic communication between referring and receiving hospitals should be maintained.

LEVEL IV FACILITIES

MATERNAL TRANSPORT

Level IV

Level IV obstetric units have the capability to provide a broad range of maternal-fetal services for normal patients as well as for those requiring intensive care services, including the ability to provide massive blood component replacement. These units provide planned delivery services for women with infants of all gestational ages.

The elective and/or planned delivery of a fetus with a condition(s) that require immediate neonatal transport should be avoided.

The Level IV facility is responsible for delivery of a formal ongoing program of education in obstetrics and neonatal-perinatal medicine for its staff.

The obstetric co-director must be board-certified in maternal-fetal medicine. The pediatric co-director must be board-certified in neonatal-perinatal medicine.

INDICATIONS FOR MATERNAL CONSULTATION AND/OR TRANSPORT

I. Maternal or fetal conditions requiring or potentially requiring specific medical or surgical services unavailable at the Level IV facility. This may require consult / transfer to an out of state facility.

MATERNAL REFERRAL PROCESS

I. Maternal transport is initiated by the health care provider responsible for the patient's medical care. Maternal referral may lead to admission of the patient to the receiving hospital (inpatient transport) or to outpatient evaluation and management (outpatient transport). The guidelines for the referral process are outlined below.

II. INPATIENT TRANSPORT

A. Referring Center Responsibilities:

1. The decision by the referring care provider (physician, certified nurse midwife, nurse practitioner, physician assistant) to request consultation is the first step in the referral process.
2. Telephone consultation with the receiving care provider is necessary to initiate the referral process and to prepare the receiving provider. This consultation may aid the care provider in developing a treatment plan for stabilizing the patient before and during transport.
3. Personnel of the referring and receiving facilities must follow the COBRA/EMTALA guidelines (42USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix III.). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com. Regional Perinatal Centers shall not refuse to accept an appropriate transfer of an individual who requires such specialized care if the hospital has the capability and bed availability to treat the individual. All transfers should be based on medical need.
4. If the transport is done by the referring hospital, the referring care provider and hospital retain responsibility until the transport team arrives with the patient at the receiving hospital (most recent edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics).
5. A ground ambulance is the most appropriate vehicle for the majority of maternal transports. If an alternate form of transportation is being considered, the referring care provider should discuss this alternative with the receiving care provider at the time of consultation.
6. The medical record should be organized as the patient is prepared for transport and sent with the patient or to the receiving facility in a timely manner.
7. The composition of the transport team should be a joint decision between the referring and receiving care providers based on the condition of the mother and/or fetus.
8. To avoid unnecessary delays in the emergency room or admitting office, all referrals should be directly admitted to the receiving obstetric unit.

B. Receiving Center Responsibilities:

1. The receiving care provider is responsible for the decision to accept the referring care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance should be provided to the referring care provider in locating appropriate care.

2. Personnel of the referring and receiving facilities must follow the COBRA/EMTALA guidelines (42USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix III). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com. Regional Perinatal Centers shall not refuse to accept an appropriate transfer of an individual who requires such specialized care if the hospital has the capability and bed availability to treat the individual. All transfers should be based on medical need.
3. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital (most recent edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics).
4. Every patient accepted by the receiving center should be seen by a care provider within 30 minutes of arrival.
5. Communication with the referring care provider should occur following admission.
6. If the patient is discharged undelivered, communication should occur prior to the time of discharge.
7. A summary of care of both mother and/or infant should be sent to the referring care provider.
8. Every effort should be made to return the patient to the care of the referring care provider as soon as possible.

III. OUTPATIENT REFERRAL

A. Referring Center Responsibilities:

1. Outpatient referral could begin with a phone call but must be followed by a written request for consultation / co-management from the referring care provider or designee to the receiving care provider or designee.
2. An appointment for evaluation at the receiving center should be arranged.

B. Receiving Center Responsibilities:

1. The referring care provider should be contacted by either telephone or letter after the evaluation has been completed.
2. Whenever possible, patients should continue under the care of the referring care provider.

MATERNAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring and receiving care providers based on the condition of the mother and/or fetus.

II. The transport team members should be selected from appropriately trained, licensed health care providers. Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm.

III. Transport team members should have the collective expertise sufficient to provide the following, if necessary:

A. monitoring of vital signs, uterine contractions, deep tendon reflexes, and fetal heart rate

B. monitoring the administration of intravenous infusions and usage of tocolytic, antihypertensive, anticonvulsant, and other appropriate medications

C. care for a wide variety of emergency conditions including delivery and neonatal resuscitation.

IV. Transport team members should be oriented to the transport vehicle and usage of transport equipment. All transport team members should follow state and national standards.

V. In instances such as advanced labor, unstable maternal condition, or severe illness, it may become necessary for the referring care provider or designee to accompany the patient during transport, if transport is still recommended by the receiving physician (See Appendix III re EMTALA). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com.

MATERNAL TRANSPORT MODALITY

I. Selection of the transport modality should be a joint decision by the referring care provider and receiving care provider based on the condition of the mother and fetus.

II. Maternal transport can be accomplished by private vehicle, ambulance, rotary wing aircraft (RWA), or fixed wing aircraft (FWA). The ambulance (land and air) must be licensed by the Office of Emergency Medical Services of the Tennessee Department of Health.

III. An Advanced Life Support (ALS) ambulance is required for maternal transport. The description of an ALS ambulance is defined by the Tennessee Department of Health and may be located in the latest edition of the *Tennessee Emergency Medical Services Statutes and Rules*, located at www.tn.gov/health.

MATERNAL TRANSPORT EQUIPMENT

I. The referring health care provider should be aware of the availability of Advanced Life Support (ALS) ambulances in the area. The required equipment and supplies for maternal and neonatal care in an ALS ambulance are defined by the Tennessee Department of Health.

II. Organization and maintenance of additional transport equipment is the responsibility of the transport team.

III. Additional equipment and supplies that may be necessary should be provided by the transporting team. These include:

A. doppler
B. reflex hammer
C. infusion pump
D. oxygen masks
E. neonatal resuscitation supplies and equipment (See Appendix IV)

IV. Additional medications (or therapeutic equivalents) that may be necessary should be provided by the transport team or referring facility after communication among providers. Such medications, including but not limited to those listed below, may be given when ordered by the referring care provider.

A. Antenatal corticosteroids to accelerate fetal lung maturity

1. Betamethasone for injection (12 mg IM is usual dose)
2. Dexamethasone for injection (6–10 mg IM is usual dose)

B. Eclampsia

1. Magnesium Sulfate 6 gram bolus IV, then 2 grams/hr IV. Additional dose of 2 grams over 5-10 minutes for persistent seizures (repeat x 1)
2. Calcium gluconate 1 gram IV to reverse magnesium overdose
3. Sodium amobarbital 250 mg IV over 3 minutes (can substitute another short-acting benzodiazepine)

C. Oxytocics

1. Oxytocin (Pitocin) 10 units per ampule / vial
2. Misoprostol (Cytotec) 100 mcg tablets
3. Methylergonovine (Methergine) 200 mcg ampules
4. Carboprost (Hemabate) 250 microgram ampule / vial

D. Tocolytics

1. Magnesium Sulfate (dosage same as for eclampsia)
2. Nifedipine (Procardia) 10 mg p.o. every 20 minutes. Maximum dosage is 100 mg.
3. Terbutaline Sulfate (Brethine) for injection (0.25 mg subcutaneously at 20 to 60 minute intervals is usual dose)

E. Antibiotics for Group B strep prophylaxis (ref: CDC MMWR, November 19, 2010, / Vol. 59 / No. RR-10)

1. Penicillin G 5,000,000 units IV
2. Ampicillin 2 grams IV
3. Cefazolin 2 grams IV
4. Vancomycin 1 gram IV

F. Antihypertensives

1. Labetalol (Trandate) IV. Dosage is repeated and/or adjusted at 20 minute intervals according to patient response. May sequentially give 20 mg, then 40 mg, then 80 mg, then an additional 80 mg, if insufficient response to the lower doses. Maximum dosage is 220 mg–300 mg.
2. Hydralazine (Apresoline) 5-10 mg IV every 20 minutes. Maximum dosage is 30 mg.
3. Nifedipine (Procardia) 10 mg p.o. every 20 minutes. Maximum dosage is 100 mg.

MATERNAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both the referring and receiving centers have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES

A. The following documents should be available to the receiving center for the transported patient:

1. complete prenatal record
2. current medical record (include the EMTALA form)
3. record of care during transport

B. The referring center should maintain a record regarding disposition of transported mothers.

III. RECEIVING CENTER RESPONSIBILITIES

A. maintain a record regarding the disposition of the transported patient
B. send a summary of care of both mother and/or infant to the referring care provider

EVALUATION OF MATERNAL REFERRAL PROCESS

I. Interhospital care of the high-risk perinatal patient requires the cooperation and coordination of many skilled health care personnel. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available through the perinatal network
B. assisting perinatal care providers in developing their abilities to identify high-risk perinatal patients, anticipate complications, and stabilize those patients before transport
C. continuing quality improvement through ongoing education of perinatal care and EMS providers.

IV. Planning of the perinatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness
E. safety

V. Referring facilities should periodically review their maternal referrals with or without the assistance of the receiving center.

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient, family, primary care provider, and regionalized perinatal care system. Early planning of return transports is desirable.

II. MATERNAL RETURN TRANSPORT

A. The hospital to which the maternal patient is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. The composition of the transport team should be based on the condition of the patient.

C. A ground ambulance is the most appropriate vehicle for the majority of maternal return transports. If an alternative form of transportation is being considered, the referring health care provider should discuss this alternative mode with the receiving physician.

D. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving center. This consultation may aid the care provider in developing a treatment plan.

E. The care provider directing the return transport is responsible for the patient during transport.

F. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained (COBRA, EMTALA; see Appendix IIII). There are a variety of sources for accessing the COBRA/EMTALA Statute in its entirety. One resource is www.medlaw.com.

G. A summary of care for the patient must be provided.

NEONATAL TRANSPORT

Level IV

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 should be continuously available 24 hours per day. Level IV facilities also must include 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).

The Level IV unit, if it so chooses, is responsible for providing equipment and qualified staff to transport sick infants from other referring hospitals.

The Level IV facility is responsible for delivery of a formal ongoing program of education in obstetrics and neonatal-perinatal medicine for its staff.

The obstetric co-director must be board-certified in maternal-fetal medicine. The pediatric co-director must be board-certified in neonatal-perinatal medicine.

INDICATIONS FOR NEONATAL CONSULTATION AND/OR TRANSPORTS

I. Neonatal conditions requiring or potentially requiring specific medical or surgical services unavailable at the Level IV facility. This may require consult / transfer to an out of state facility.

NEONATAL REFERRAL PROCESS

I. Neonatal transport is initiated by the health care provider responsible for the patient's medical care. Guidelines for the referral process are outlined below.

II. REFERRING CENTER RESPONSIBILITIES

A. The referring health care provider's decision to request consultation is the first step in the referral process.

B. Telephone consultation with the receiving physician is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the referring health care provider in developing a treatment plan for stabilizing the patient before transport.

C. A discussion between the referring health care provider and receiving physician regarding the neonate will result in one of three possible dispositions.

1. Required neonatal care can be provided at the referring center. The receiving physician under these circumstances has only a consultative role.
2. The neonate requires further observation, investigation, or other preparation before possible transport. Continued contact between the providers is necessary.
3. Transport of the neonate is necessary. The optimal time, mode of transfer, transport personnel, and additional information regarding the neonate should be discussed. The process of stabilization of the neonate at the referring center should be reviewed and documented.

D. If the neonate is transported by the referring center, the referring health care provider is responsible for the patient until arrival at the receiving center.

E. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital. It should be emphasized that during the preparation for transport by the transport team, the referring physician and hospital retain responsibility for the patient unless there have been other prior agreements which determine this responsibility. Transport services should work with the referring hospital to clearly delineate the primary medical responsibility for the patient when the patient is still within the referring hospital but is being cared for by the transport team (7th edition*, Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics, 2012, p. 80).

F. The medical record should be organized as the patient is prepared for transport and sent with the patient.

G. Consent forms to authorize transfer must be obtained.

H. Parents should be encouraged to see and touch the infant.

I. Appropriate maternal/neonatal identification should be in place before transport.

J. All referrals should be directly admitted to the receiving unit to avoid unnecessary delays in the emergency room.

III. RECEIVING CENTER RESPONSIBILITIES

A. The receiving physician is responsible for the decision to accept the referring health care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance will be provided to the referring health care provider in locating appropriate care.

B. If the neonate is transported by the referring center, full responsibility begins with admission to the receiving center.

C. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. If the transport team is sent by the receiving hospital, the receiving physician or designee assumes responsibility for patient care from the time the patient leaves the referring hospital. It should be emphasized that during the preparation for transport by the transport team, the referring physician and hospital retain responsibility for the patient unless there have been other prior agreements which determine this responsibility. Transport services should work with the referring hospital to clearly delineate the primary medical responsibility for the patient when the patient is still within the referring hospital but is being cared for by the transport team (7th edition, *Guidelines for Perinatal Care*, published by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics, 2012, p. 80).

D. If a delay in transport occurs, a repeat telephone call should be made for further assessment and advice.

E. On arrival of the transport team, assessment and further stabilization of the neonate should be done in collaboration with the referring staff.

F. The transport team must verify proper identification of the neonate before transport.

G. Following stabilization of the neonate, the transport team should communicate with the parents to assure their understanding of the infant's condition, possible course, and therapeutic intervention that has been undertaken or anticipated. Information about the receiving center should be provided to the parents.

H. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained.

I. Parents should be encouraged to see and touch the infant before departure.

J. Before departure, the transport team should communicate with receiving center personnel regarding the neonate's history, current status, and planned management during transport.

K. Before arrival at the receiving center, the transport team should communicate the status of the neonate and anticipated needs on admission.

L. A telephone call should be made to the parents shortly following admission of the neonate.

M. Within 24 hours of admission, communication with referring center personnel regarding events during transport and since admission should occur.

N. Periodic communication with the referring health care provider should be maintained.

O. Consideration should be given to returning the care of the patient to the referring health care provider or primary care physician when practical and medically appropriate.

P. Upon discharge of the infant, a discharge summary should be sent to the referring health care provider.

NEONATAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring health care provider and receiving physician(s) based on the condition of the neonate.

II. Transport team members should be selected from appropriately trained physicians, neonatal nurse practitioners, registered nurses, respiratory therapists, emergency medical technicians, advanced emergency medical technicians, and paramedics. Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm. The minimum number of transport team members should be three, of which one is the operator of the transport vehicle. The other team members should be comprised of a neonatologist, neonatal fellow, neonatal nurse practitioner, neonatal specialty trained registered nurse, or neonatal specialty trained respiratory therapist.

III. Transport team members should have the collective expertise sufficient to provide, if necessary:

A. observation of the neonate throughout the transport
B. monitoring of body temperature, respiratory status, and cardiovascular status
C. delivery and monitoring of oxygen therapy
D. advanced airway management and mechanical ventilation
E. advanced intravascular access and management skills
F. recognition and management of a wide variety of emergency conditions
G. administration of rescue and stabilization medication.

IV. At least two members of the transport team should be current Neonatal Resuscitation Program (American Academy of Pediatrics and American Heart Association) providers. It is also recommended that team members maintain current S.T.A.B.L.E. training.

V. Transport team members should be oriented to the transport vehicle and use of transport equipment. All transport team members should follow state and national standards.

VI. The knowledge and skills required for a nurse to perform neonatal transport are listed in the most current edition of *Educational Objectives for Nurses, Levels I, II, III, IV Neonatal Transport Nurses*, Tennessee Perinatal Care System, Tennessee Department of Health (Appendix I).

NEONATAL SPECIALTY TRANSPORT MODALITY

I. Selection of the mobile neonatal intensive care unit should be based on the condition of the neonate.

II. The vehicle used for the provision of neonatal intensive care and transportation may be owned and operated by the transporting hospital or, alternatively, by a commercial source.

III. The vehicle used for the provision of neonatal intensive care and transportation between medical facilities shall conform with the following standards for design and construction as defined by the Office of EMS of the Tennessee Department of Health (Tennessee Emergency Medical Services Statutes and Rules, Rule 1200-12-1-.02[4] Special Vehicle Requirements).

A. Exterior surfaces, emblems, and markings shall conform to Tennessee EMS Board-approved specifications.

B. Additional markings, legends, or logos may be used to identify the provider and purpose for specific vehicles, except that no letter shall exceed 14 inches in height. Legends such as "neonatal intensive care" or "critical care transport" may be substituted for the "Ambulance" in exterior markings.

C. Warning lights and siren shall be furnished in accordance with Tennessee EMS Board-approved specifications except that side floodlights shall not be required.

D. Vehicle crashworthiness shall be assured with roll-cage construction evidenced by compliance with the Ambulance Manufacturer's Division Standards of the Truck Body and Equipment Association.

E. Doors shall provide access to the rear and curbside of the patient compartment. Where the vertical lift distance of the patient loading area exceeds 28 inches, a ramp or electrical-hydraulic lift shall be furnished to facilitate patient loading.

F. Environmental systems on the unit shall meet heating/air-conditioning standards as specified in Tennessee EMS Board-approved specifications.

G. Vehicle electrical systems shall be provided to furnish 110 volt AC power incorporated with a ground fault interrupter device for protection against electrical hazards. The neonatal transport unit or neonatal ambulance shall be equipped with a back-up power or battery system sufficient to operate patient care equipment in the event of failure of the main power systems.

H. Patient compartment shall be so designed to provide the following:

1. a properly secured transport incubator allowing observation from at least two sides
2. compartments for appropriate storage of materials
3. illumination at the primary patient care area of at least 75 foot candles
4. safety features such as sculpted, padded, or recessed cabinet corners and latches to prevent undue injury during sudden deceleration
5. all ancillary equipment and supplies secured in the ambulance
6. safety devices such as a grab rail or hand strap, secured according to Federal Motor Vehicle Safety Standards for safety restraints, safety belts provided at all attendant seats, and safety restraint devices for neonates

I. An oxygen system with sufficient capacity to deliver a minimum continuous flow of 10 liters per minute for at least four hours must be available. The installed oxygen system shall be capable of delivering specific monitored blended oxygen concentrations.

J. The vehicle shall provide environmental conditions for the neonate that minimize the risk of temperature instability and excessive noise and vibration.

IV. In the event a RWA or FWA is used for neonatal transport, the following additional precautions should be observed:

A. use of a licensed air medical transport program with appropriately credentialed neonatal care providers
B. secure fastening of transport equipment
C. an independent power source to allow uninterrupted and fail-safe operation of the incubator and other supporting equipment
D. environmental conditions for the neonate that minimize the risk of temperature instability, noise and vibration
E. protective headgear for crew use during transport
F. system for easy communication among the members of the transport team and medical control at receiving center
G. seat belts
H. seating arrangement that permits close observation and handling of the patient

V. Latex free equipment and supplies must be provided.

NEONATAL TRANSPORT EQUIPMENT

I. Organization and maintenance of neonatal transport equipment is the responsibility of the transporting facility. With the exception of conjoined twins, dual patient transport inside the same incubator is prohibited. (See Appendix V).

II. Equipment to maintain a neutral thermal environment for the neonate should include:

A. transport incubator
B. thermometer
C. blanket, insulating blanket or chemically activated heat pack (appropriate for neonatal use), plastic wraps

III. The transport incubator should meet the following requirements:

A. approved by the manufacturer for use during transport and installed in the transport vehicle with crashworthy restraints.
B. if used in RWA and FWA it shall meet FAA requirements for crashworthiness and flammability of materials. The transport incubator and monitoring equipment should be tested by an FAA certified mechanic to assure equipment does not interfere with navigational instruments.
C. a heat source that requires minimal time for preheating and should maintain ambient temperature within the desired range of 29^{o} to 36^{o} C. The control for temperature setting should be readily accessible and easy to operate, and there should be provision for easy determination of ambient temperature. It is essential to have a fail-safe alarm system that will recognize overheating or underheating.
D. provide an environment in which the oxygen supply is constant and controllable.
E. provide unrestricted visibility of the neonate with a functional independent light source for general illumination provided in or on the incubator.
F. easy accessibility to the neonate resulting in minimal interference with thermal protection and oxygen supply.
G. safety restraint devices to secure the neonate inside the incubator that conform to Federal Motor Vehicle Safety Standards and FAA Standards.

IV. Equipment for oxygen delivery and monitoring should include:

A. oxygen tanks
B. air tanks
C. pressure gauges
D. flowmeters (needle control valve preferred)
E. oxygen analyzer
F. oxygen blender
G. oxygen tubing and adapters
H. oxygen hood or nasal cannulas (preterm and term)
I. neonatal oxygen masks (preterm and term)
J. neonatal resuscitation manual bag and mask with manometer or T-piece resuscitator
K. continuous positive airway pressure apparatus
L. mechanical ventilator
M. inhaled nitric oxide delivery system

V. The following guidelines are related to the use of oxygen during transport:

A. a portable supply of oxygen and compressed air in cylinders adequate to last the entire journey with surplus to cover unexpected needs and delays should be carried. Proper restraint of these cylinders is mandatory throughout the transport. An oxygen cylinder usage chart may be used in determining the number and type of oxygen cylinders necessary during transport (Appendix II).
B. oxygen cylinders in use should be provided with pressure gauges and flow meters.
C. the ambient oxygen concentration must be monitored continuously by an oxygen analyzer, if appropriate.

VI. Devices to maintain the patency of the airway and gastric decompression must be readily available and should include:

A. bulb syringe
B. regulated suction with gauge
C. suction catheters (#6, 8, 10 Fr)
D. feeding tube (#6, 8 Fr) with a 20 mL syringe
E. Replogle tube (#6, 8, 10 Fr)

VII. Equipment for vital sign monitoring should include:

A. a continuous heart rate monitor
B. neonatal stethoscope
C. body temperature monitor
D. noninvasive and invasive blood pressure monitoring devices
E. pulse oximeter for noninvasive monitoring of oxygen saturation

VIII. Equipment for monitoring blood glucose levels must be available.

IX. Equipment for monitoring blood gases must be available.

X. If intravenous therapy is required, an infusion pump that is portable, battery-powered, fail-safe, and calibrated to ensure accurate delivery of calculated fluid microvolumes must be used. Critical neonates may require multiple intravenous lines requiring additional infusion pumps.

XI. The equipment and supplies required for resuscitation of a neonate must be available, portable and should include:

A. Endotracheal intubation

1. laryngoscope handle with blades (#00, 0, 1)
2. laryngoscope spare bulbs (if necessary)
3. laryngoscope spare batteries
4. endotracheal tubes (#2.5, 3.0, 3.5, 4.0 mmID)
5. laryngeal mask airway (LMA) (size 1)
6. oral airways (sizes 00 and 0)
7. neonatal resuscitation manual bag and masks or T-piece resuscitator
8. pressure manometer (to monitor PIP and PEEP if manual ventilation is

necessary)
9. disposable stylet (#6 Fr)
10. adhesive tape or commercial endotracheal tube holders
11. scissors
12. end tidal carbon dioxide (CO_2) detector

B. Intravenous infusion

1. intravenous needles and catheters (#22, 23, 24, 25, 26 gauge)
2. syringes (1, 3, 6, 12, 20, 35 mL)
3. intravenous armboard
4. intravenous tubing and T connector
5. infusion device
6. tape or site dressing
7. site preps
8. 3-way stopcock
9. umbilical catheterization equipment
10. invasive blood pressure transducer (for use with umbilical arterial line)

C. Medications should include the following drugs or an approved therapeutic equivalent based on local program protocols. Weight-based administration guides including both milligrams and milliliters should be available for the medications used.

1. adenosine
2. ampicillin
3. atropine
4. calcium gluconate
5. dextrose solution (D5W)
6. dextrose solution (D10W)
7. dobutamine
8. dopamine
9. epinephrine (1:10,000)
10. fentanyl
11. furosemide
12. gentamicin
13. heparin
14. midazolam
15. morphine sulfate
16. naloxone hydrochloride
17. normal saline
18. phenobarbital
19. prostaglandin E_1 (requires refrigeration)
20. sodium bicarbonate (4.2%)
21. sterile water
22. surfactant (requires refrigeration)

XI. Equipment for diagnosis and management of air leak syndrome

A. transilluminator
B. chest tubes (8, 10, 12 Fr)
C. chest tube kit
D. 18 to 20 gauge over the needle catheters
E. drain with one-way check valve
F. 3-way stopcock
G. luer lock and slip tip syringe (35/60cc)

XII. Equipment for handwashing and personal protection

A. antiseptic solution or towelettes
B. gloves
C. full face protection or goggles and masks
D. fluid-retardant and fluid-resistant gowns
E. infectious waste disposal bags
F. soiled linen disposal bags
G. sharps box

XIII. Latex free equipment and supplies must be provided.

NEONATAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both referring and receiving center personnel have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES

A. The following documents should accompany the transported neonate:

1. complete maternal prenatal record
2. current maternal medical record
3. current neonatal medical record
4. any images in a format that can be reviewed by the receiving care team
5. record of care during transport

B. The referring center should maintain a record regarding disposition of transported neonates.

III. RECEIVING CENTER RESPONSIBILITIES

A. maintain a record regarding the disposition of the transported neonate
B. send a summary of care to the referring perinatal health care providers

EVALUATION OF NEONATAL REFERRAL PROCESS

I. Interhospital care of the high-risk neonate requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available to them through the perinatal network.
B. assisting neonatal care providers in developing their abilities to identify high-risk neonatal patients, anticipate complications, and stabilize those patients before transport.

III. Continuing quality improvement through ongoing education of neonatal care and EMS providers (See Appendix I). Educational requirements for EMS personnel have been revised as the national EMS educational standards. They are available on the website www.ems.gov/EducationStandards.htm).

IV. Planning of the neonatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness
E. safety

V. Referring facilities should periodically review their neonatal referrals, with or without the assistance of the receiving center.

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient, family, primary care provider, and regionalized perinatal care system. Early planning of return transports is desirable.

II. NEONATAL RETURN TRANSPORT

A. The hospital to which the neonate is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving hospital. This consultation may aid the health care provider and nursing staff in developing a treatment plan. In the event the neonate is returned to a hospital other than the original referring hospital, the original referring health care provider must be notified.

C. The mode of transport, composition of the transport team, and equipment needs should be based on the condition of the neonate and other factors such as distance and weather conditions.

D. The physician directing the return transport is responsible for the patient during transport.

E. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

F. The parents should be encouraged to visit and become familiar with the receiving center nursery prior to the return transport.

G. The transport team should communicate with receiving center personnel regarding the estimated time of arrival.

H. On admission of the neonate to the receiving center, the transport team should communicate with receiving center personnel regarding the neonate's history, events during transport, and current status.

I. A summary of care should accompany the patient.

J. Periodic communication between referring and receiving hospitals should be maintained.

APPENDICES

APPENDIX I

EDUCATIONAL OBJECTIVES FOR NEONATAL TRANSPORT NURSES

Reference: This section is from the 5th edition (2014) of *Educational Objectives for Nurses, Levels I, II, III, IV, and Neonatal Transport Nurses,* Tennessee Perinatal Care System, Tennessee Department of Health.

The following educational objectives for transport nurses are in addition to the educational objectives for nurses working in a level I, II, III and IV facility.

The nurse caring for neonatal patients during transport should have experience in the care of critically ill neonatal patients in the inpatient setting, acute care setting or both, and should be able to meet the objectives listed for each of the following categories:

I. Problems of Pregnancy, Fetal Development, Labor and Delivery

- A. Obtain from a referring health care provider reports of all tests done to determine fetal gestational age and well-being.
- B. Utilize data from the maternal/neonatal history as a basis for anticipating problems, planning, and implementing care during transport.
- C. Provide for a receiving health care provider, maternal and neonatal data which give adequate history of problems resulting from pregnancy, labor, and delivery, as well as treatment provided.

II. Resuscitation of the Neonate

- A. Provide for a receiving health care provider an accurate record of necessary resuscitative procedures and the neonate's physiological responses.
- B. Perform appropriate resuscitation if needed during transport.

III. Physical Assessment of the Newborn

- A. Collaborate with other transport team members in obtaining a thorough physical assessment prior to transport.
- B. In consult with medical control physician (MCP), describe and initiate an assessment, monitoring, and intervention plan during transport that will address infant problems in a timely manner.
- C. Provide for a receiving care provider a complete record of physical assessment, which includes information from the referring care providers as well as the transport staff.

IV. Thermoregulation

A. Explain the effect of environmental factors; e.g., humidity, ambient temperature, and velocity of air flow on the thermal status of the neonate.

B. Describe safe methods of obtaining, maintaining, increasing, and/or decreasing a neonate's temperature in a transport situation.

C. Provide a receiving care provider with a thorough history of the infant's thermoregulation problems, treatment of these problems, and infant responses to intervention prior to and during transport.

D. Provide appropriate head/body cooling measures when indicated.

V. Nutritional Requirements of the Neonate

A. Describe the effects of speed, acceleration, and deceleration on gastrointestinal motility and sphincter control.

B. Describe safe means of providing infant nutrition (IV or enteral) in a variety of transport situations.

C. Obtain from a referring care provider an accurate nutritional record for the receiving care provider.

D. Provide lactation support, including safe transport of human milk to the receiving center.

VI. Intravascular Therapy

A. Describe and utilize safe, efficient measures to initiate and maintain appropriate intravascular therapy during transport.

B. Prepare and administer fluid and blood products that may be required during transport.

C. Record for a receiving care provider an accurate summary of fluid and blood products infused prior to and during transport.

VII. Medication Administration

A. Describe indications and utilize knowledge of neonatal pharmacology to appropriately prepare, administer, and then monitor the medication effects on the neonate.

B. Provide for a receiving care provider an accurate record of medications used prior to and during transport and the neonate's responses to these medications.

VIII. Fluid, Electrolyte, and Acid-Base Balance

A. Describe the effects of marked changes in humidity, velocity, and pressure on insensible fluid loss and measures to limit these effects.

B. Obtain and record an accurate summary of fluid, electrolyte, and acid-base status prior to and during transport.

IX. Respiratory Disorders of the Newborn

A. Describe the effects of altering atmospheric pressure, altitude, temperature, and humidity on neonatal respiratory function and discuss nursing measures to minimize these effects.

B. Select and utilize respiratory measures, pharmacologic agents, intravenous orders, and infant positioning to assist in lessening or preventing the possible environmental factors listed above.

C. Obtain an accurate history of respiratory status and respiratory support provided prior to transport and develop, in consultation with the medical control physician (MCP), an ongoing record of assessment, evaluation, and respiratory support for the receiving center.

X. Respiratory Support System

A. Set up and correctly utilize respiratory support and monitoring equipment used during transport.

B. Describe the settings to be used to appropriately ventilate the patient when transferring from one mode or device to another including manual ventilation.

C. List indications for initiation or continuance of inhaled nitric oxide (INO) during transport.

D. Utilize a portable blood gas instrument to assist in providing appropriate oxygen and ventilation support during transport when indicated.

XI. Hematologic Disorders of the Newborn

A. Collaborate with referring care providers and transport team members to obtain reports and/or specimens for a hematologic database. Include information on the treatment of these disorders prior to and during transport.

B. Collaborate with the receiving center or referral center in obtaining blood or blood products, which may be required during transport to the receiving center.

C. Provide for a receiving care provider an accurate hematologic history, including treatment prior to and during transport.

XII. Gastrointestinal Problems of the Newborn

A. Identify the special techniques and measures required to provide the necessary care and limit the side effects of gastrointestinal obstructions and/or abdominal wall defects during transport.

B. Provide for a receiving care provider a history of gastrointestinal function, treatment, and neonatal response prior to and during transport.

XIII. Perinatal Infection

A. Collaborate with team members in collecting the different components of a septic work-up in a safe and timely manner.

B. Develop and implement procedures, which will enhance prevention and management of infection in transport situations.

C. Obtain and communicate a history which identifies a neonate's risk of infection.

XIV. Cardiac Disorders of the Neonate

A. Design and implement a plan of care, in consultation with the medical control physician (MCP),that will provide maximum protection from hypoxic and/or circulatory damage for the infant who has cardiac disorders.

B. Provide for a receiving care provider a thorough report of cardiovascular problems, treatment, and neonatal condition prior to and during transport.

XV. Parent-Infant Relationships

A. Describe and utilize measures which will enhance a positive relationship between parents and health care personnel in the referring and receiving centers.

B. Describe the potential effects of transport on the development of a positive parent-infant relationship.

C. Describe and utilize measures that will minimize the negative effects of transport on parent-infant bonding.

D. Provide for the receiving care provider a report of significant parent, neonate, and staff interactions as well as appropriate cultural and social histories.

XVI. Referring-Receiving Care Provider Relationships

A. When given a report by the referring care provider, anticipate and rapidly request information necessary to provide continuous expert care.

B. Collaborate with other nurses in the perinatal region in developing transport plans, which provide comprehensive, continuous, and expert care.

C. Describe the general types of services available in Level I, II, III, and IV newborn facilities.

D. Identify and communicate effectively the attributes and limitations of Level I, II, III, and IV newborn facilities in the region.

E. Describe, utilize, and communicate to other health care providers appropriate procedures for initiating consultation, referral, and transport.

F. Describe and prepare the hospital records required prior to transport.

G. Identify and evaluate communication methods utilized in the transport region.

H. Seek and accept constructive evaluation of the referral process from nurses in referring and receiving facilities.

I. Utilize quality improvement methods for evaluation and improvement of care in the referring hospital, transport service, and receiving hospital.

XVII. Transport Safety (as required by state licensure)

A. Describe those factors, which must be considered in the selection of a vehicle and professional personnel for transport.

B. Describe and utilize required effective techniques for securing transport equipment and compressed medical gas tanks in transport vehicles.

C. Determine adequacy of illumination in transport vehicles.

D. Provide continuous visibility of the infant, support equipment, and monitors during transport.

E. Determine that space available in the transport vehicle is adequate for safe emergency intervention during transport.

F. Describe briefly the effects of vibration and sound level on the infant in transit and develop a plan to diminish these effects.

G. Determine the adequacy of power sources to assure uninterrupted power availability during transport.

H. State the potential hazards of vehicle acceleration, deceleration, and speed on the transported infant and take appropriate measures to limit their occurrence, including an appropriate restraint system.

I. Determine and provide an adequate supply of oxygen and air required for transport.

J. Describe and utilize effective methods for testing equipment function prior to transport.

K. Identify and provide the life support and monitoring equipment and supplies necessary for transport.

L. Implement a plan which provides for replacement, cleaning, and maintenance of transport vehicle, equipment, and supplies.

M. Communicate an infant assessment which will assure adequate professional support and equipment upon the arrival of the transported infant at the receiving center.

N. Describe to others and utilize appropriate steps for stabilizing the infant prior to transport.

O. Utilize appropriate communication methods to effectively obtain consultation from the medical control physician (MCP).

P. Maintain records which can be readily utilized to evaluate the effectiveness of the transport system.

Q. Assist in evaluation and implement measures to improve the transport process.

APPENDIX II

OXYGEN CYLINDER USAGE DURING TRANSPORT

OXYGEN CYLINDERS: DURATION OF FLOW

SIMPLE FORMULA:
Gauge pressure in psi (pounds per square inch) minus the safe residual pressure (always 200 psi) times the constant (see list below) divided by the flow rate in liters per minute = duration of flow in minutes.

CYLINDER CONSTANTS

D = 0.16	G = 2.41
E = 0.28	H = 3.14
M = 1.56	K = 3.14

EXAMPLE
Determine the life of an M cylinder that has a pressure of 2000 psi displayed on the pressure gauge and a flow rate of 10 liters per minute.

$$\frac{(2000-200) \times 1.56}{10} = \frac{2808}{10} = 280.8 \text{ minutes}$$

OXYGEN SUPPLY AND REGULATORS

Oxygen is supplied either as a compressed gas or as a liquid. Compressed gaseous oxygen is stored in an aluminum or steel tank in 400 liter (D), 660 liter (E), or 3,450 liter (M) volumes. To calculate how long the oxygen will last: For example, the calculation for an E cylinder would be:

Tank life in minutes = (tank pressure in psi X 0.28) ÷ liters per minute

APPENDIX III

COBRA/EMTALA STATUTE: 42 USC 1395

There are a variety of resources for obtaining the COBRA/EMTALA Statute in its entirety. This information was obtained from the web site www.medlaw.com.

The COBRA/EMTALA Statute was developed in response to actions construed as patient "dumping" related to reimbursement source. The EMTALA portion relates to the transfer and medical treatment of women in active labor. The components delineate the circumstances under which an individual may be transferred to another medical care facility and the steps to be undertaken for stabilization and treatment prior to transfer.

This federal law has been in effect for a number of years. All health care facilities have been made aware of these regulations and have programs in place to address these situations. Facilities that do not abide by these regulations are subject to significant monetary sanctions.

The *Guidelines for Transportation* have been written with the understanding that all facilities will abide by the federal regulations of COBRA/EMTALA. It is the intent of the subcommittee that all facilities will abide by COBRA/EMTALA regulations.

Appendix IV

Neonatal Resuscitation Equipment and Supplies

For a list of recommended equipment and supplies, refer to the current edition of the Neonatal Resuscitation Program textbook.

Appendix V

TENNESSEE EMERGENCY MEDICAL SERVICES EQUIPMENT AND SUPPLIES AMBULANCE REQUIREMENTS–2010 PER EMS RULE 1200-12-01-.03, EFFECTIVE AUGUST 24, 2010

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
OS OXYGEN SYSTEMS				
Bag Valve Resuscitator - Adult	bag-volume of 1,600 milliliters	-	1 + spare	Disposable preferred
Bag Valve Resuscitator-Pediatric	bag-volume of 450 milliliters	-	1 + spare	Disposable preferred
Resuscitation Mask - Adult			1 + spare	Disposable preferred
Resuscitation Mask - Child			1 + spare	Disposable preferred
Resuscitation Mask - Infant			1 + spare	Disposable preferred
Oropharyngeal airways	Guedel or Berman	Adult S. M. L Child, Infant	Adult S. M. L Child, Infant	Disposable
Nasopharyngeal airways		5 sizes		Non Latex- PVC preferred
Dual lumen airway device	Combi-tube or PTL	Adult	1	Single use device
End tidal CO_2 Detector	Colorimetric or Numeric	Adult and pediatric	1 each	Capnometry preferred; Spare disposables recommended
Oxygen Supply tubing	Minimum 48 inch lengths		2 sets	
Adult Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration	Tubing may be integrated or separate	2	
Pediatric Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration		2	
Infant Medium Concentration Oxygen Mask	For delivery of Oxygen at Medium Concentration		2	
Adult Nasal Cannula	For delivery of Oxygen at Low Concentration		2	
Minimum 2,000 liter on board Oxygen Supply			1	Cylinders restrained in approved manner
Regulator and flow meters; Two distribution outlets	Pressure reducer to 50 psi piped to at least two distribution outlets	Flow meter Minimum range of 2-15 lpm	2 flow meters in patient compartment	
Minimum 300 Liter D cylinder	Portable oxygen		1 + spare	
Portable Oxygen Regulator	Pressure reducer to 50 psi, flow valve or flow meter	Minimum range of 2-15 lpm	1	Non-gravity dependent
ADVANCED AIRWAY MANAGEMENT				

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
OS OXYGEN SYSTEMS				
Bag Valve Resuscitator - Adult	bag-volume of 1,600 milliliters	-	1 + spare	Disposable preferred
Bag Valve Resuscitator-Pediatric	bag-volume of 450 milliliters	-	1 + spare	Disposable preferred
Resuscitation Mask - Adult			1 + spare	Disposable preferred
Resuscitation Mask - Child			1 + spare	Disposable preferred
Resuscitation Mask - Infant			1 + spare	Disposable preferred
Oropharyngeal airways	Guedel or Berman	Adult S. M. L Child, Infant	Adult S. M. L Child, Infant	Disposable
Nasopharyngeal airways		5 sizes		Non Latex- PVC preferred
Dual lumen airway device	Combi-tube or PTL	Adult	1	Single use device
End tidal CO_2 Detector	Colorimetric or Numeric	Adult and pediatric	1 each	Capnometry preferred; Spare disposables recommended
Oxygen Supply tubing	Minimum 48 inch lengths		2 sets	
Adult Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration	Tubing may be integrated or separate	2	
Pediatric Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration		2	
Infant Medium Concentration Oxygen Mask	For delivery of Oxygen at Medium Concentration		2	
Adult Nasal Cannula	For delivery of Oxygen at Low Concentration		2	
Minimum 2,000 liter on board Oxygen Supply			1	Cylinders restrained in approved manner
Regulator and flow meters; Two distribution outlets	Pressure reducer to 50 psi piped to at least two distribution outlets	Flow meter Minimum range of 2-15 lpm	2 flow meters in patient compartment	
Minimum 300 Liter D cylinder	Portable oxygen		1 + spare	
Portable Oxygen Regulator	Pressure reducer to 50 psi, flow valve or flow meter	Minimum range of 2-15 lpm	1	Non-gravity dependent
Laryngoscope handle - Adult	With batteries		Spare batteries	
Laryngoscope handle - Pediatric	With batteries		Spare batteries	
Laryngoscope blade -infant	Straight Blade	0	1	
Laryngoscope blade - infant	Straight Blade	1	1	
Laryngoscope blade -child	Straight Blade	2	1	Note: Adds blades

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
OS OXYGEN SYSTEMS				
Bag Valve Resuscitator - Adult	bag-volume of 1,600 milliliters	-	1 + spare	Disposable preferred
Bag Valve Resuscitator-Pediatric	bag-volume of 450 milliliters	-	1 + spare	Disposable preferred
Resuscitation Mask - Adult			1 + spare	Disposable preferred
Resuscitation Mask - Child			1 + spare	Disposable preferred
Resuscitation Mask - Infant			1 + spare	Disposable preferred
Oropharyngeal airways	Guedel or Berman	Adult S. M. L Child, Infant	Adult S. M. L Child, Infant	Disposable
Nasopharyngeal airways		5 sizes		Non Latex- PVC preferred
Dual lumen airway device	Combi-tube or PTL	Adult	1	Single use device
End tidal CO_2 Detector	Colorimetric or Numeric	Adult and pediatric	1 each	Capnometry preferred; Spare disposables recommended
Oxygen Supply tubing	Minimum 48 inch lengths		2 sets	
Adult Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration	Tubing may be integrated or separate	2	
Pediatric Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration		2	
Infant Medium Concentration Oxygen Mask	For delivery of Oxygen at Medium Concentration		2	
Adult Nasal Cannula	For delivery of Oxygen at Low Concentration		2	
Minimum 2,000 liter on board Oxygen Supply			1	Cylinders restrained in approved manner
Regulator and flow meters; Two distribution outlets	Pressure reducer to 50 psi piped to at least two distribution outlets	Flow meter Minimum range of 2-15 lpm	2 flow meters in patient compartment	
Minimum 300 Liter D cylinder	Portable oxygen		1 + spare	
Portable Oxygen Regulator	Pressure reducer to 50 psi, flow valve or flow meter	Minimum range of 2-15 lpm	1	Non-gravity dependent
Laryngoscope blade - child	Curved Blade	2	1	
ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
Laryngoscope blade – adult	Straight Blade	3	1	
Laryngoscope blade- adult	Curved Blade	3	1	
Laryngoscope blade-adult	Straight Blade	4	1	
Laryngoscope blade	Curved Blade	4	1	

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
OS OXYGEN SYSTEMS				
Bag Valve Resuscitator - Adult	bag-volume of 1,600 milliliters	-	1 + spare	Disposable preferred
Bag Valve Resuscitator-Pediatric	bag-volume of 450 milliliters	-	1 + spare	Disposable preferred
Resuscitation Mask - Adult			1 + spare	Disposable preferred
Resuscitation Mask - Child			1 + spare	Disposable preferred
Resuscitation Mask - Infant			1 + spare	Disposable preferred
Oropharyngeal airways	Guedel or Berman	Adult S. M. L Child, Infant	Adult S. M. L Child, Infant	Disposable
Nasopharyngeal airways		5 sizes		Non Latex- PVC preferred
Dual lumen airway device	Combi-tube or PTL	Adult	1	Single use device
End tidal CO_2 Detector	Colorimetric or Numeric	Adult and pediatric	1 each	Capnometry preferred; Spare disposables recommended
Oxygen Supply tubing	Minimum 48 inch lengths		2 sets	
Adult Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration	Tubing may be integrated or separate	2	
Pediatric Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration		2	
Infant Medium Concentration Oxygen Mask	For delivery of Oxygen at Medium Concentration		2	
Adult Nasal Cannula	For delivery of Oxygen at Low Concentration		2	
Minimum 2,000 liter on board Oxygen Supply			1	Cylinders restrained in approved manner
Regulator and flow meters; Two distribution outlets	Pressure reducer to 50 psi piped to at least two distribution outlets	Flow meter Minimum range of 2-15 lpm	2 flow meters in patient compartment	
Minimum 300 Liter D cylinder	Portable oxygen		1 + spare	
Portable Oxygen Regulator	Pressure reducer to 50 psi, flow valve or flow meter	Minimum range of 2-15 lpm	1	Non-gravity dependent
Endotracheal tubes-	Uncuffed	2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0	8 (1 each size) Note: Increases inventory from previous rules	Sterile for Single patient use / disposable
Endotracheal tubes	Cuffed	6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5	7 (1 each size) Note: Increases	Sterile for Single patient use/disposable

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
OS OXYGEN SYSTEMS				
Bag Valve Resuscitator - Adult	bag-volume of 1,600 milliliters	-	1 + spare	Disposable preferred
Bag Valve Resuscitator-Pediatric	bag-volume of 450 milliliters	-	1 + spare	Disposable preferred
Resuscitation Mask - Adult			1 + spare	Disposable preferred
Resuscitation Mask - Child			1 + spare	Disposable preferred
Resuscitation Mask - Infant			1 + spare	Disposable preferred
Oropharyngeal airways	Guedel or Berman	Adult S. M. L Child, Infant	Adult S. M. L Child, Infant	Disposable
Nasopharyngeal airways		5 sizes		Non Latex- PVC preferred
Dual lumen airway device	Combi-tube or PTL	Adult	1	Single use device
End tidal CO_2 Detector	Colorimetric or Numeric	Adult and pediatric	1 each	Capnometry preferred; Spare disposables recommended
Oxygen Supply tubing	Minimum 48 inch lengths		2 sets	
Adult Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration	Tubing may be integrated or separate	2	
Pediatric Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration		2	
Infant Medium Concentration Oxygen Mask	For delivery of Oxygen at Medium Concentration		2	
Adult Nasal Cannula	For delivery of Oxygen at Low Concentration		2	
Minimum 2,000 liter on board Oxygen Supply			1	Cylinders restrained in approved manner
Regulator and flow meters; Two distribution outlets	Pressure reducer to 50 psi piped to at least two distribution outlets	Flow meter Minimum range of 2-15 lpm	2 flow meters in patient compartment	
Minimum 300 Liter D cylinder	Portable oxygen		1 + spare	
Portable Oxygen Regulator	Pressure reducer to 50 psi, flow valve or flow meter	Minimum range of 2-15 lpm	1	Non-gravity dependent
			inventory from previous rules	
Sterile surgical lubricant	Water soluble gel	≥ 2 mL each	6 packets	Or tube with QS.
Adult stylet			1	
Pediatric stylet			1	
Magill Forceps	Adult		1	
Magill Forceps	Pediatric		1	

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
OS OXYGEN SYSTEMS				
Bag Valve Resuscitator - Adult	bag-volume of 1,600 milliliters	-	1 + spare	Disposable preferred
Bag Valve Resuscitator-Pediatric	bag-volume of 450 milliliters	-	1 + spare	Disposable preferred
Resuscitation Mask - Adult			1 + spare	Disposable preferred
Resuscitation Mask - Child			1 + spare	Disposable preferred
Resuscitation Mask - Infant			1 + spare	Disposable preferred
Oropharyngeal airways	Guedel or Berman	Adult S. M. L Child, Infant	Adult S. M. L Child, Infant	Disposable
Nasopharyngeal airways		5 sizes		Non Latex- PVC preferred
Dual lumen airway device	Combi-tube or PTL	Adult	1	Single use device
End tidal CO_2 Detector	Colorimetric or Numeric	Adult and pediatric	1 each	Capnometry preferred; Spare disposables recommended
Oxygen Supply tubing	Minimum 48 inch lengths		2 sets	
Adult Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration	Tubing may be integrated or separate	2	
Pediatric Non-Rebreathing Oxygen Mask	For delivery of Oxygen at High Concentration		2	
Infant Medium Concentration Oxygen Mask	For delivery of Oxygen at Medium Concentration		2	
Adult Nasal Cannula	For delivery of Oxygen at Low Concentration		2	
Minimum 2,000 liter on board Oxygen Supply			1	Cylinders restrained in approved manner
Regulator and flow meters; Two distribution outlets	Pressure reducer to 50 psi piped to at least two distribution outlets	Flow meter Minimum range of 2-15 lpm	2 flow meters in patient compartment	
Minimum 300 Liter D cylinder	Portable oxygen		1 + spare	
Portable Oxygen Regulator	Pressure reducer to 50 psi, flow valve or flow meter	Minimum range of 2-15 lpm	1	Non-gravity dependent
Esophageal Detection Device			1	Bulb type preferred

SUCTION DEVICES				
Installed suction- with vacuum gauge, a control, and collection Per Federal Specification. 3.12.3	Minimum 1,00 mL Collection canister	≥ 300 mm/Hg vacuum	1	

Suction tubing	Six feet in length		2	
Meconium Aspirator	allowing direct connection of suction to the endotracheal tube			
Portable Suction Device w/powered pump Per Federal Specification 3.12.4	A collection bottle of at 500 milliliters shall be provided		1	disposable collection bottle preferred
Suction tubing	two feet or more in length	≥.375 I.D. preferred	2	Shorter tubing has faster draw down time
Suction catheters		6, 8, 10, 14 and 16 French ga.	2 each	Packaged; Sterile
Rigid Suction tips			2	Yankauer -type

DIAGNOSTIC AND ASSESSMENT DEVICES				
Sphygmomanometer with inflation bulb and gauge with			1	
Adult blood pressure cuff			1	
Pediatric blood pressure cuff			1	
Adult large/ thigh blood pressure cuff			1	
Stethoscope			1	may be personal equipment, per service policy
Bandage Shears			1	may be personal equipment, per service policy
ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
Pulse Oximeter	With adult and pediatric probes		1	Effective 3/1/2006

BANDAGES AND DRESSINGS				
Surgical adhesive tape	at least one inch in width		2 rolls	
Conforming gauze roller bandage	at least three inches in width	Comparable to Kerlix or Kling®	6 rolls	Clean or sterile supply allowed
Triangular Bandages	For slings, cravat bandages, or splint ties	base ≥ 42 inches	6	
Sterile gauze dressings 4” x 4”	Gauze dressing or sponges	4” by 4”	25 individual pads	Acceptable in packs of 2
Composite pad sterile compresses	Comparable to ABD pads	Typical sizes: 4” x 8” 8” x 10”; or 5” by 9”	8	
Sterile occlusive dressings	white petrolatum coated gauze or plastic membrane film	at least 3" by 3"	2	Aluminum foil or plastic bags not acceptable as substitute
Burn sheets	separately packaged, sterile or clean	at least 60 by 60 inches	2	Sterile cotton (cloth) sheets preferred

Irrigation fluids	Sterile Saline solution or sterile water	sufficient to supply 2000 milliliters		Plastic Containers required

IMMOBILIZATION DEVICES				
Long spinal immobilization devices or backboards	whole body splints, or approved devices capable of immobilizing a patient with suspected spinal injuries		2	
Straps or restraints	To immobilize a patient at or about the chest, pelvis, and knees		6 straps or 2 ≥ six point Spider-device	
Short spinal immobilization device	shall provide spinal immobilization for the seated patient		One device	with affixed padding and straps
Case or carrier bag for above	To maintain in clean condition		1	
C-Spine or Head Immobilizers	To prevent lateral head movement of the restrained patient.		2 sets or 4 blocks	With straps or restraint materials
Cervical Immobilization Collars	To prevent head and neck movement of the restrained patient.	Pediatric/Infant Small Adult Medium Adult Large Adult	at least two adult collars in each size range and two pediatric/infant collars	Combinations of adjustable-type collars are acceptable to provide at least two adult and two pediatric/infant collars
Upper extremity splints	Fabricated splints for immobilization of arm injuries	≥ 15" in length	2 splints or two sets of board splints	Capability to immobilize simultaneously two arms

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
Lower extremity splints	Fabricated splints for immobilization of leg injuries	Fabricated splints in assorted sizes; for board splints ≥ 36" in length	at least two devices or two sets of board splints	Capability to immobilize simultaneously two legs
Lower extremity traction splints	Fabricated splints for immobilization of femoral fractures	Commercial devices	At least two devices or one device designed to immobilize both legs	Capability to immobilize simultaneously two legs

PATIENT CARE SUPPLIES				
Emesis basin or suitable substitute	Containers for human waste and emesis		1	
Bedpan	Containers for human waste and emesis	Fracture-type acceptable	1	Disposable or sanitized device
Urinal	Containers for human waste and emesis		1	Disposable or sanitized device
Blankets – Adult	covers with thermal insulating capabilities		2	Acrylic, wool, quilted or similar fabric
Baby Blanket with Head Covering	covers with thermal insulating capabilities		1	Flannel or fleece preferred Silver Swaddler® not acceptable as a substitute
Sheets	For cot and patient covers		4	Cotton, linen or disposable material

OBSTETRICAL EMERGENCIES PACK	Prepared package or kit: with Drape towel or under pad; Gauze dressings, Sterile gloves; Bulb syringe or aspirator; Cord clamps and/or umbilical ties; Plastic bags and ties for placental tissues; Infant receiving blanket or swaddling materials with a head covering.		1 Pack	

INFECTION CONTROL SUPPLIES	Personal protective equipment to include: Disposable gloves sized for the crew; Fluid proof gowns or		Boxes of non-latex gloves sized for crew members; At least two each	

	lab coats; Two face masks (NIOSH approved to at least N-95 standards); Eye shields or protective face shields; and Protective footwear or shoe covers.		of other supplies or two commercial packages of isolation items	
ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
Red plastic bags or trash bags labeled for biohazard	For infectious or biologically contaminated trash	at least 24" by 30"	2 bags	
Sharps disposal supplies	A puncture resistant container shall be supplied for sharps disposal in a locking-style bracket or in a locked compartment within the ambulance; a sheath style shall be supplied for on-scene use		1 installed 1 portable	See Rule text and TOSHA /CDC Requirements for Blood-borne Pathogens

INTRAVENOUS THERAPY SUPPLIES				
Macrodrip fluid adm. sets	ten to twenty drops per milliliter		3	
Microdrip fluid adm. sets	sixty drops per milliliter		3	
Antiseptic wipes	Alcohol or approved antiseptic		12	
I.V. Catheters	over-the-needle type	14, 16,18,20,22 and 24 gauge	4 sets in each size (24)	
Intravenous solutions	Three liters of intravenous solutions, two liters of which will be crystalloid fluids	Containers May be in increments of 250, 500, or 1,000 mL	3,000 mL	Minimum of 2,000 mL of saline or LRS; Plastic containers required
Venous tourniquets	Disposable (non-latex) venous tourniquets, sufficient for adult and pediatric use.		2	
Intraosseous infusion needles		minimum 18 gauge	2	May be incorporated in Board approved devices

CARDIAC DEFIBRILLATOR/MONITORS				
Cardiac monitor, electrocardiographic recorder,		The ALS defibrillator shall	1 Device Cardiac	A biphasic waveform shall be required on any

and defibrillator shall be provided for each ALS Ambulance		provide a minimum setting of ten (10) joules.	monitoring leads: electrodes Six for adults; Six for pediatric patients; Spare batteries	cardiac monitor/ defibrillator purchased for ambulances after the effective date of this rule
AUTOMATED EXTERNAL DEFIBRILLATOR	An AED shall be provided on each staffed ambulance, except those otherwise staffed and equipped to provide advanced life support		1 Device; 2 sets adult pads, and pediatric pads where capable with device. Spare batteries as per manufacturer	A biphasic waveform shall be required on any defibrillator purchased for ambulances after the effective date of this rule.

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
MEDICATIONS AND DRUGS For Basic Ambulances				
For treatment of Anaphylaxis	Epinephrine 1:1,000 preloaded syringe of or a Tuberculin syringe with a minimum 5/8 inch, 25 gauge needle	0.3 mL per dose, sufficient quantity of Epinephrine 1:1,000 to administer two (2) doses to two patients	4 doses	
For treatment of Suspected Cardiac Patients	Aspirin, U.S.P.	81 mg or 325 mg	Sufficient for two doses	As indicated by service standing orders or protocol
For treatment of acute pulmonary distress	Beta-adrenergic agonist (albuterol,etc.)	Quantity sufficient for two repeated treatments	Nebulized treatments with appropriate administration devices	Or therapeutic equivalent identified by medical director for acute pulmonary distress.
For treatment of Chest Pain or Suspected Cardiac Event	Nitroglycerine	1/150 grain (0.4 mg)	bottle of thirty (30) tablets or sublingual spray	Or therapeutic equivalent identified by medical director

MEDICATIONS AND DRUGS For Advanced Life Support Ambulances	Medications used on advanced level ambulances shall be compatible with current standards as indicated by the American Heart Association's Emergency Cardiovascular Care Committee			
Cardiovascular medications	Adenosine	6 mg/2mL	Sufficient for doses up to 18 milligrams	Or therapeutic equivalent identified by medical director
	Atropine sulfate	1.0mg/10mL	four (4)	

			prefilled syringes	
	Antiarrhythmic agents			
	Amiodarone	150 to 300 mg	to total at least 450 mg	
	Or Lidocaine	100 mg. in 5 mL	at least four prefilled syringes	Admixtures or premixed solutions shall be provided for maintenance drips
	Magnesium Sulfate	1 gram	Sufficient to administer 2 gm	
Bacteriostatic water and sodium chloride	For injection and dilution of medications			
Analgesics	Morphine, meperidine hydrochloride, nalbuphine (Nubain), butorphanol (Stadol), Nitrous oxide	As identified by EMS Medical Director and consigned to unit		Or therapeutic equivalent identified by medical director
Benzodiazepine anticonvulsant	Diazepam or other benzodiazepine in equivalent amounts sufficient to administer two successive maximum doses	Ten (10) milligrams/2mL	2 vials or prefilled syringes	Or therapeutic equivalent identified by medical director

ITEM	ITEM DESCRIPTION	MINIMUM SIZE/DOSE	NUMBER	COMMENTS Interpretive Guidance
Vasopressor agents	Epinephrine	1:10,000 of 1.0 mg/mL	4 prefilled syringes	Or therapeutic equivalent identified by medical director
Hypoglycemic countermeasures	Glucose testing devices for semi-quantitative blood glucose determinations		With device, media, calibration strips, and lancets	
Dextrose 50% in water		25 grams in 50 milliliters	2 prefilled syringes	Or therapeutic equivalent identified by medical director
Dextrose 25% in water		12.5 grams in 50 milliliters	2 prefilled syringes	Or therapeutic equivalent identified by medical director
Narcotic antagonist	Narcan (naloxone)	1mg/mL	2 ampules or prefilled syringes	Or therapeutic equivalent identified by medical director
Alkalinizing agents	Sodium Bicarbonate	50 mEq in 50 milliliters	2 ampules or prefilled syringes	Or therapeutic equivalent identified by medical director
Systemic diuretics	Furosemide	10 mg/mL	ampules, vials, or prefilled syringes to total 80 milligrams	Or therapeutic equivalent identified by medical director
Antinauseant	Promethazine IM Inject able	25mg/mL		Or therapeutic equivalent identified by medical director
Antihistamine	Diphenhydramine IM Inject able	50/mg		Or therapeutic equivalent identified by medical director
Syringes	for drug administration	1 mL, 3 mL, and 10 mL sizes	Assorted	With needles for administration
Pediatric Length - Based Resuscitation Tape	2002 Broselow ™ or successor edition		1	