TENNESSEE PERINATAL CARE SYSTEM

GUIDELINES ON EQUIPMENT, SUPPLIES AND TRAINING FOR EMERGENCY MEDICAL SERVICES AND EMERGENCY DEPARTMENT STAFF

(First Edition)

2020

Tennessee Department of Health
Division of Family Health and Wellness

TENNESSEE PERINATAL CARE SYSTEM

GUIDELINES ON EQUIPMENT, SUPPLIES AND TRAINING FOR EMERGENCY MEDICAL SERVICES AND EMERGENCY DEPARTMENT STAFF

(First Edition)

Prepared by the
Workgroup on Development of Emergency Medical Services and Emergency Department Staff Guidelines
and the
Perinatal Advisory Committee

2020

This document may be accessed electronically at the following:
https://www.tn.gov/content/tn/health/health-program-areas/mch/mch-prp.html
(Scroll down then click on Publications)

PERINATAL REGIONALIZATION IN TENNESSEE

Background/History

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

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

Perinatal Regions

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

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

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

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

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

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

Purpose and Responsibilities of Tennessee's Regionalization System

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

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

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

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

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

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

Perinatal Advisory Committee

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

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

Funding

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

Resources

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

EMS AND EMERGENCY DEPARTMENT STAFF GUIDELINES WORKGROUP

March 2019, December 2019

<u>Members</u>

David Adair, MD, Chattanooga

Jona Bandyopadhyay, MD, Nashville

Kitty Cashion, RN-BC, MSN, Memphis

Joel Dishroon, EMT-P, IC, Chattanooga

Susan Drummond, RN, MSN, C-EFM, Nashville

Holly Engelsted, MD, Nashville

James Gore, BA, CCEMT-P, Knoxville

Sarah Harmon, BSN, RN, CCRN, Nashville

Joseph Holley, MD, FACEP, FAEMS-JEMS, Memphis

Patti Jacobs, RNC, BSN, Johnson City

Mary Lee Lemley, RN, MSN, Nashville

Randall Kirby, BS/EMT-P, PCC, I/C, Nashville

Beth Pettit, RNC, BSN, Johnson City

Jill Rimmer, RNC, NIC, Chattanooga

Nancy Ruch, RN, MSN, NNP, Memphis

Patti A. Scott, DNP, APRN, NNP-BC, C-NPT, Nashville

Jennifer Shelton, RNC-OB, MSN, Chattanooga

Craig Towers, MD, Knoxville

Nicole Z. Watson, RN, BSN, CLC, Knoxville

Zachary Young-Lutz, RN, BSN, C-EFM, Knoxville

PERINATAL ADVISORY COMMITTEE

January 2020

Members

Morgan McDonald, MD, Chair

David Adair, MD, Chattanooga

Sherry Bailey, MSN, RN, FNP, Gallatin

Timothy Canavan, MD, MSc, Johnson City

Kitty Cashion, RN-BC, MSN, Memphis

Etoi Garrison, MD, Nashville

Mark Gaylord, MD, Knoxville

Susan Hall Guttentag, MD, Nashville

Shawn Hollinger, MD, Johnson City

Paul Korth, Cookeville

Mary Lee Lemley, RN, MSN, Nashville

Giancarlo Mari, MD, Memphis

Amber Price, DNP, CNM, Nashville

Marilyn Robinson, MD, Memphis

Anuj Sinha, DO, Chattanooga

Grant Studebaker, MD, Jackson

Ajay Talati, MD, Memphis

Lenita Thibault, MD, Kingsport

Craig Towers, MD, Knoxville

Kevin Visconti, MD, Johnson City

Leah Williamson, Cordova

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TENNESSEE PERINATAL CARE SYSTEM

GUIDELINES ON EQUIPMENT, SUPPLIES AND TRAINING FOR EMERGENCY MEDICAL SERVICES & EMERGENCY DEPARTMENT STAFF

PREFACE

Following a recommendation from the Perinatal Advisory Committee, the *EMS and Emergency Department Guidelines Workgroup* was formed*.* This workgroup developed guidelines intended to prepare Emergency Medical Services (EMS) and Emergency Department (ED) staff for deliveries and the care of neonates in emergent situations. The guidelines include recommended trainings and educational resources for EMS and ED staff to become better equipped to provide obstetric and neonatal care in emergent situations. This document also includes the supplies and equipment that should be readily available in these situations. It is recommended that physicians, nurses, EMS personnel, and other health care providers in these healthcare settings follow these guidelines as this will improve perinatal outcomes in Tennessee by providing quality care to every mother and newborn.

These guidelines have been carefully reviewed by representatives from various disciplines in perinatal medicine across the state. To ensure that these guidelines remain up-to-date, the Perinatal Advisory Committee has approved these guidelines for up to five years from the date of approval by the Commissioner of the Department of Health. A reassessment of these guidelines will be required at that time or sooner, if needed.

INTRODUCTION

Across Tennessee and the nation, an increasing number of women living in rural counties do not have access to obstetric services. More than 50 of Tennessee's 95 counties do not have hospital maternity services. As rural counties continue to lose obstetric services, the number of deliveries occurring in emergency departments or en route to the emergency department (by EMS personnel) may increase. The availability of trained staff and proper medical supplies and equipment to assist in the care of pregnant women in labor and the safe delivery of newborn infants is an essential component of high quality perinatal care. Emergency departments do not always have appropriate equipment to care for low birth weight or premature babies. Furthermore, current perinatal guidelines do not address training needs for ED or EMS staff or equipment that should routinely be available to safely care for neonates. To that end, a workgroup was created to provide guidance to EMS and ED staff on recommended training, supplies, and equipment.

REGIONAL PERINATAL CENTERS

There are five perinatal regions in Tennessee: Northeast, East, Southeast, Middle and West. Each region is comprised of a group of contiguous counties. The perinatal regions and counties are listed on page 16 of this document. Each region contains one Regional Perinatal Center, which has been so designated by the Commissioner of the Tennessee Department of Health, and is capable of providing Level III or Level IV obstetric and neonatal care. The Regional Perinatal Centers are:

Northeast Tennessee Regional Perinatal Center

Johnson City Medical Center Hospital
Johnson City, Tennessee

Perinatal Center office: (423) 431-6640

Obstetric Education/Training Requests: Patti Jacobs, RN-C, BSN (423) 431-5352

Neonatal Education/Training Requests: Vicki Davis, RN, BSN (423) 431-5646

L&D: (423) 431-6436

Referrals: 1-800-365-5262

Neonatal Consult/Transport: (423) 952-3720

General Hospital Operator: (423) 431-6111

East Tennessee Regional Perinatal Center

The University of Tennessee Medical Center at Knoxville
Knoxville, Tennessee

Obstetric Education/Training Requests: Lauren Lake, APRN, FNP-C

Phone: (865) 305-9300 E-mail: llake@utmck.edu

Neonatal Education/Training Requests: Nicole Watson, RN, BSN, CLC

Phone: (865) 305-9300 E-mail: nwatson@utmck.edu

L&D: (865) 305-9830

Maternal Referrals: 1-800-422-9301 or 865-305-9300

Neonatal Consult/Transport: 1-800-732-7295 or (865) 305-9834

NICU: (865) 305-9834

General Hospital Operator: (865) 305-9000

Southeast Tennessee Regional Perinatal Center

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

Obstetric Education/Training Requests: Jennifer Shelton, RNC-OB, MSN
Phone: (423) 778-3547 E-mail: jennifer.shelton@erlanger.org

Neonatal Education/Training Requests: Jill Rimmer, RNC, NIC
Phone: (423) 778-5096 E-mail: elizabeth.rimmer@erlanger.org

L&D: (423) 778-7956

OB Consults / Referrals: (423) 778-8100 or 1-866-4HI-RISK

Neonatal Consult/Transport: (423) 778-6438

NICU: (423) 778-6438

General Hospital Operator (Erlanger): (423) 778-7000

General Hospital Operator (Children's Hospital): (423) 778-6011

Middle Tennessee Regional Perinatal Center

Vanderbilt University Medical Center/Monroe Carell, Jr. Children's Hospital at Vanderbilt
Nashville, Tennessee

Obstetric Education/Training Requests: Susan Drummond, RN, MSN, C-EFM
Phone: (615) 343-9930 E-mail: susan.drummond@vumc.org

Neonatal Education/Training Requests: Mary Lee Lemley RNC, MSN
Phone: (615) 343-8686 Email: mary.lemley@vumc.org

L&D: (615) 322-2555

OB Consults/Referrals: 1-888-636-8863 (1-888-MFM-VUMC)

Neonatal Consult / Transport: 1-855-322-9111

NICU: (615) 322-0963

General Hospital Operator (Vanderbilt): (615) 322-5000

General Hospital Operator (Children's Hospital): (615) 936-1000

West Tennessee Regional Perinatal Center

Regional Medical Center at Regional One Health
Memphis, Tennessee

Obstetric Education/Training Requests: Kitty Cashion, RN-BC, MSN
Phone: (901) 448-4794 Email: mcashion@uthsc.edu

Neonatal Education/Training Requests: Nancy Ruch, RN, MSN, NNP
Phone: (901) 448-6717) Email: nruch@uthsc.edu

L&D: (901) 545-7345

OB Inpatient Transport: (901) 545-8181

Neonatal Consult/Transport: (901) 545-7366

NICU: (901) 545-7366

General Hospital Operator: (901) 545-7100

EMS REGIONAL OFFICES

There are eight EMS regions in Tennessee: Northeast, East, Southeast, Upper-Cumberland, Mid-Cumberland, South Central, West and Memphis-Delta. Each region is comprised of a group of contiguous counties. The EMS regions and counties are listed on page 17 of this document. The EMS Regional Offices are:

Northeast Tennessee Regional Office
Office of Emergency Medical Services
185 Treasure Lane
Johnson City, TN 37604
Telephone: (423) 737-1992
Fax: (423) 346-2349

East TN Regional Office
Office of Emergency Medical Services
PO Box 343
1103 Knoxville Hwy
Wartburg, TN 37887
Telephone: (865) 235-6360
Fax: (423) 346-2349

Southeast Tennessee Regional Office
Office of Emergency Medical Services
1301 Riverfront Pkwy, Suite 2019
Chattanooga, TN 37402
Telephone: (423) 737-4112
Fax: (423) 634-3186

Upper-Cumberland Regional Office
Office of Emergency Medical Services
1100 England Drive
Cookeville, TN 38501
Telephone: (931) 216-3999
Fax: (731) 512-0063

Mid-Cumberland Regional Office
Office of Emergency Medical Services
665 Mainstream Drive
Nashville, TN 37243
Telephone: (615) 828-5206
Fax: (615) 741-4217

South Central Tennessee Regional Office
Office of Emergency Medical Services
1216 Trotwood Avenue
Columbia, TN 38401
Telephone: (931) 542-8461
Fax: (931) 380-3364

West Tennessee Regional Office
Office of Emergency Medical Services
295 Summar Drive, 2nd Floor
Jackson, TN 38301
Telephone: (731) 267-1111
Fax: (731) 512-0063

Memphis-Delta Regional Office
Office of Emergency Medical Services
295 Summar Drive, 2nd Floor
Jackson, TN 38301
Telephone: (901) 212-4444
Fax: (731) 512-0063

COMPRESHENSIVE REGIONAL PEDIATRIC CENTERS

Tennessee has four Comprehensive Regional Pediatric Centers (CRPC). Children's hospitals that have received this designation from the State are capable of providing comprehensive, specialized pediatric medical and surgical care to all acutely ill and injured children. The centers work with referring hospitals within their region to improve pediatric care through establishing pediatric transfer and education agreements with referring hospitals, providing pediatric educational opportunities for healthcare providers, and monitoring pediatric patient outcomes and implementing quality improvement projects. The Comprehensive Regional Pediatric Centers are:

East Tennessee Children's Hospital

Oseana Bratton, RN, BSN, CPEN
(865) 541-8523
ombratton@etch.com

LeBonheur Children's Hospital

John Wright, BSN, RN, EMTP
(901) 287-5326
john.wright@lebonheur.org

Children's Hospital at Erlanger

Marisa Moyers, RN
(423) 778-7262
marisa.moyers@erlanger.org

Joel Dishroon, EMT-P, IC
(423) 778-6617
joel.dishroon@erlanger.org

Monroe Carrell, Jr. Children's Hospital at Vanderbilt

Lee Blair, RN, CEN, EMT-P, IC
(615) 875-4650
lee.blair@vumc.org

Jennifer Dindo, RN, CPEN
(615) 875-9591
jennifer.dindo@vumc.org

Katie S. Judd, RN, MSN, CCRN
Neonatal Education
615 322-6798
katie.s.judd@vumc.org

RECOMMENDED OBSTETRIC SUPPLIES FOR EMS TRANSPORT

I. EQUIPMENT

A. Infusion pump

II. SUPPLIES

A. Obstetrical Emergency Kit (standard on an ALS ambulance)
B. Add 2 extra cord clamps if necessary so there are a total of 4 cord clamps available.

III. MEDICATIONS (Not routinely available on an ALS Ambulance) – A call to your Regional Perinatal Center should be made for consultation in management of any of these cases and in any other cases of concern.

A. *Antenatal Corticosteroids*

Indicated for pregnancies at <34 weeks gestation.

- Betamethasone for injection – 12 mg IM is usual dose

B. *Eclampsia (seizures) Medications*

Option 1 – Magnesium sulfate

a. If patient is **not currently seizing**, administer Magnesium sulfate – 6 g bolus IV over 30 minutes, then 2 g/hr IV. The 2 g/hr **MUST be on a pump and not free flow.**

b. If patient is **actively seizing**, administer Magnesium Sulfate – 6 g bolus IV over 5 minutes, then 2 g/hr IV. The 2 g/hr IV **MUST be on a pump and not free flow.** Additional dose of 2 g IV over 5 to 10 minutes for persistent seizures (repeat x 1 only). First choice medication.

(Calcium gluconate – 1 g IV to reverse magnesium overdose (i.e. profound respiratory depression/compromise))

Option 2 – Diazepam (Valium) – 2-10 mg IV
Option 3 – Midazolam (Versed) – 5 mg SLOW IV push

C. *Oxytocics for postpartum hemorrhage*

Give **after every delivery**:

- Oxytocin (Pitocin) – 10 units per ampule/vial IM if no IV access *or* 30-40 units in 1,000 ml of lactated ringers to be given free flow.

Indicated only **for true postpartum hemorrhage**:

Option 1 – Methergine – 0.2 mg IM x 1 dose only. **Do not give** if BP >160 systolic or >110 diastolic
Option 2 – Misoprostol (Cytotec) – 400 mcg buccal and 400 mcg rectal. Give both simultaneously.

D. *Tocolytics for preterm labor*

Indicated for suspected or confirmed preterm labor:

Option 1 – Nifedipine (Procardia) – 10 mg PO x 1 dose only.
Option 2 – Magnesium sulfate – 6 g bolus IV over 30 minutes, then 2 g/hr IV. The 2 g/hr **MUST be on a pump and not free flow.**
Option 3 – Terbutaline sulfate (Brethine) for injection (0.25 mg subcutaneously) x 1 dose only. Contraindicated if maternal heart rate is >120 beats/minute.

E. *Antihypertensives**
Indicated for BP ≥160 systolic or ≥110 diastolic
Hold if BP is ≤140 systolic or ≤90 diastolic

Option 1 – Initial first line management with **Labetalol** (Trandate) IV if pressure remains elevated for 15 minutes or more:

- o Labetalol – 20 mg IV over 2 minutes.
- o Measure BP in 10 minutes and record results.

- If either BP threshold is still elevated, then:
  - o Labetalol – 40 mg IV over 2 minutes. If BP is below threshold, continue close monitoring.
  - o Measure BP in 10 minutes and record results.
- If either BP threshold is still elevated, then:
  - o Labetalol – 80 mg IV over 2 minutes. If BP is below threshold, continue close monitoring.
  - o Measure BP in 10 minutes and record results.
- If either BP threshold is still elevated, then:
  - o Hydralazine – 10 mg IV over 2 minutes. Then obtain emergency consultation from maternal-fetal medicine, internal medicine, anesthesia, or critical care subspecialist.

Option 2 – Initial first line management with **Hydralazine** (Apresoline) IV if pressure remains elevated for 15 minutes or more:

- o Hydralazine – 5-10 mg IV over 2 minutes.
- o Measure BP in 20 minutes and record results.

- If either BP threshold is still elevated, then:
  - o Hydralazine – 10 mg IV over 2 minutes. If BP is below threshold, continue close monitoring.
  - o Measure BP in 20 minutes and record results.
- If either BP threshold is still elevated, then:
  - o Labetalol – 20 mg IV over 2 minutes. Then obtain emergency consultation from maternal-fetal medicine, internal medicine, anesthesia, or critical care subspecialist.

Option 3 – Initial first line management with **Immediate-Release Oral Nifedipine** if pressure remains elevated for 15 minutes or more:

- o Immediate-release Nifedipine – 10 mg PO.
- o Measure BP in 20 minutes and record results.

- If either BP threshold is still elevated, then:
  - o Immediate-release Nifedipine – 20 mg PO. If BP is below threshold, continue close monitoring.
  - o Measure BP in 20 minutes and record results.
- If either BP threshold is still elevated, then:
  - Labetalol – 20 mg IV over 2 minutes. Then obtain emergency consultation from maternal-fetal medicine, internal medicine, anesthesia, or critical care subspecialist.

*Emergent therapy for acute-onset, severe hypertension during pregnancy and the postpartum period. ACOG Committee Opinion No. 767. American College of Obstetricians and Gynecologists. Obstet Gynecol 2019; 133:e174-180.

RECOMMENDED OBSTETRIC SUPPLIES FOR EMERGENCY DEPARTMENT

I. EQUIPMENT

A. Doppler
B. Infusion pump

II. SUPPLIES

A. Obstetrical Emergency Kit (standard on an ALS ambulance)
B. Add 2 extra cord clamps if necessary so there are a total of 4 cord clamps available.
C. Apgar scoring chart (continue scoring every 5 minutes until a score of ≥7 is achieved)

III. MEDICATIONS – A call to your Regional Perinatal Center should be made for consultation in management of any of these cases and in any other cases of concern.

A. *Antenatal Corticosteroids*
Indicated for pregnancies at <34 weeks gestation:

- Betamethasone for injection – 12 mg IM

B. *Eclampsia (seizures) Medications*
Option 1 – Magnesium sulfate

a. If patient is **not currently seizing**, administer Magnesium sulfate – 6 g bolus IV over 30 minutes, then 2 g/hr IV. The 2 g/hr **MUST be on a pump and not free flow.**

b. If patient is **actively seizing**, administer Magnesium Sulfate – 6 g bolus IV over 5 minutes, then 2 g/hr IV. The 2 g/hr IV **MUST be on a pump and not free flow.** Additional dose of 2 g IV over 5 to 10 minutes for persistent seizures (repeat x 1 only). First choice medication.

(Calcium gluconate – 1 g IV to reverse magnesium overdose (i.e. profound respiratory depression/compromise))

Option 2 – Diazepam (Valium) – 2-10 mg IV
Option 3 – Midazolam (Versed) – 5 mg SLOW IV push

C. *Oxytocics for postpartum hemorrhage*
Give **after every delivery**:

- Oxytocin (Pitocin) – 10 units per ampule/vial IM if no IV access *or* 30-40 units in 1,000 ml of lactated ringers to be given free flow.

Indicated only for **true postpartum hemorrhage**:
Option 1 – Methergine – 0.2 mg IM x 1 dose only. **Do not give** if BP >160 systolic or >110 diastolic
Option 2 – Misoprostol (Cytotec) – 400 mcg buccal and 400 mcg rectal. Give both simultaneously.

D. *Tocolytics for preterm labor*
Indicated for suspected or confirmed preterm labor:
Option 1 – Nifefipine (Procardia) – 10 mg PO x 1 dose only.
Option 2 – Magnesium sulfate – 6 g bolus IV over 30 minutes, then 2 g/hr IV. The 2 g/hr **MUST be on a pump and not free flow.**
Option 3 – Terbutaline sulfate (Brethine) for injection (0.25 mg subcutaneously) x 1 dose only. Contraindicated if maternal heart rate is >120 beats/minute.

Women should be prepared for transport immediately if they do not respond to these first line measures.

E. *Antihypertensives**
Indicated for BP ≥160 systolic or ≥110 diastolic
Hold if BP is ≤140 systolic or ≤90 diastolic

Option 1 – Initial first line management with **Labetalol** (Trandate) IV if pressure remains elevated for 15 minutes or more:

    - Labetalol – 20 mg IV over 2 minutes.
    - Measure BP in 10 minutes and record results.
- If either BP threshold is still elevated, then:
    - Labetalol – 40 mg IV over 2 minutes. If BP is below threshold, continue close monitoring.
    - Measure BP in 10 minutes and record results.
- If either BP threshold is still elevated, then:
    - Labetalol – 80 mg IV over 2 minutes. If BP is below threshold, continue close monitoring.
    - Measure BP in 10 minutes and record results.
- If either BP threshold is still elevated, then:
    - Hydralazine – 10 mg IV over 2 minutes. Then obtain emergency consultation from maternal-fetal medicine, internal medicine, anesthesia, or critical care subspecialist.

Option 2 – Initial first line management with **Hydralazine** (Apresoline) IV if pressure remains elevated for 15 minutes or more:

    - Hydralazine – 5-10 mg IV over 2 minutes.
    - Measure BP in 20 minutes and record results.
- If either BP threshold is still elevated, then:
    - Hydralazine – 10 mg IV over 2 minutes. If BP is below threshold, continue close monitoring.
    - Measure BP in 20 minutes and record results.
- If either BP threshold is still elevated, then:
    - Labetalol – 20 mg IV over 2 minutes. Then obtain emergency consultation from maternal-fetal medicine, internal medicine, anesthesia, or critical care subspecialist.

Option 3 – Initial first line management with **Immediate-Release Oral Nifedipine** if pressure remains elevated for 15 minutes or more:

    - Immediate-release Nifedipine – 10 mg PO.
    - Measure BP in 20 minutes and record results.
- If either BP threshold is still elevated, then:
    - Immediate-release Nifedipine – 20 mg PO. If BP is below threshold, continue close monitoring.
    - Measure BP in 20 minutes and record results.
- If either BP threshold is still elevated, then:
    - Labetalol – 20 mg IV over 2 minutes. Then obtain emergency consultation from maternal-fetal medicine, internal medicine, anesthesia, or critical care subspecialist.

*Emergent therapy for acute-onset, severe hypertension during pregnancy and the postpartum period. ACOG Committee Opinion No. 767. American College of Obstetricians and Gynecologists. Obstet Gynecol 2019; 133:e174-180.

RECOMMENDED NEONATAL RESUSCITATION SUPPLIES FOR EMS TRANSPORT

(Suggested quantities are in parenthesis)

I. THERMOREGULATION

A. Warm linens. May be towels or blankets. Linen **should not** be warmed in a microwave. (2)
B. Mylar (foil) blanket (2). Do not use a heat pack along with this. (2)
C. Hat (2)
D. Clear plastic bag or plastic wrap for < 32 week gestation infant. Does not need to be sterile. (1)
E. Neonatal chemical thermal mattress for <32 week gestation infant. Cover mattress with a single layer blanket before use. (1-2)
F. Thermometer or temperature strips
G. Increase temperature in ambulance. (recommended setting: 23.3° – 24.4°C, 74° – 76°F)

II. SUCTION EQUIPMENT

A. Bulb syringe (2)
B. 8Fr or 10Fr suction catheters attached to suction, set at 80-100mmHg (2)
C. 8Fr feeding tube and 10 mL syringe (2)
D. Meconium aspirator (2)

III. POSITIVE PRESSURE VENTILATION EQUIPMENT

A. Positive-pressure ventilation device – neonatal self-inflating bag; should have a reservoir, **not** a tail. (2)
B. Term sized mask (Mercury Medical,10-50505 [$92.93 per box/20])
C. Pre-term sized mask (Mercury Medical, 50610 [$60 per box /10])
D. Binasal cannula
E. T-piece resuscitator – Start with PIP of 20 cm H20 and PEEP of 5 cm H20. (2)
F. Equipment to give free-flow oxygen (2)
G. Flowmeter set to 10-15 L/min for A and E; and set to max 2 L/min for D and F. (2)
H. Pulse oximeter and neonatal sensor (2)
I. Target oxygen saturation table (refer to NRP Reference Chart)

IV. INTUBATION EQUIPMENT

A. Laryngoscope handle with Miller blade – sizes 1, 0 and 00 (2)
B. Stylet; use size to fit ET tubes ≤3.5. (2)
C. Endotracheal tube uncuffed size 2.5 (2)
D. Endotracheal tube uncuffed size 3.0 (2)
E. Endotracheal tube uncuffed size 3.5 (2)
F. Carbon dioxide (CO2) detector (2)
G. NRP Reference Chart for ETT insertion depth
H. Scissors (2)
I. Waterproof tape or tube-securing device (2)
J. Laryngeal mask airway (size 1) and 5 mL syringe; used for infants ≥1200 grams. (2)

V. MEDICATIONS, SUPPLIES AND EQUIPMENT

A. Epinephrine **0.1 mg/mL (do not confuse with the higher concentration)**
B. Normal saline (10 mL prefill syringes recommended)
C. D10W (250 mL bag) continuous infusion at 80 mL/kg/day **(wt in KG X 80 divided by 24 = rate)**. For blood glucose <40mg/dL give 2 mL/kg IV at 1mL/minute. Repeat blood glucose 15 to 30 minutes after bolus complete.
D. Glucose gel
E. Glucometer compatible with neonates
F. Supplies for starting an IV (24 g angiocath) or IO for infants ≥3kg (15 mm or 25 mm size)
G. Reference guide for administering medications (refer to NRP Reference Chart)
H. Stopcock or medication-transferring device and 5 mL syringe (have several)
I. ECG monitor with ECG leads compatible with neonates
J. Ambulance Child Restraint ≤4 lbs and above (name brand is Quantum EMS Baby ACR)

RECOMMENDED PERSONNEL AND SUPPLIES NEEDED FOR NEONATAL RESUSCITATION IN THE EMERGENCY DEPARTMENT

(Suggested quantities are in parenthesis)

I. PERSONNEL

A. Staff member with current NRP provider status present at every delivery
B. Staff member immediately available who can perform neonatal endotracheal intubation and administer medications

II. THERMOREGULATION

A. Incubator and/or radiant warmer for adequate thermal support (operate on servo controlled mode)
B. Temperature sensor with cover for radiant warmer; goal for baby's temperature: 36.5° – 37.5° C, 97.7° – 99.5° F. (2)
C. Warm linens. May be towels or blankets. Linen **should not** be warmed in a microwave. (2)
D. Mylar (foil) blanket. Do not use a heat pack along with this. (2)
E. Hat (2)
F. Clear plastic bag or plastic wrap for < 32 week gestation infant; does not need to be sterile. (1)
G. Neonatal chemical thermal mattress for <32 week gestation infant. Cover mattress with a single layer blanket before use. (1-2)
H. Thermometer or temperature strips
I. Increase temperature in the room (recommended setting: 23.3° – 25°C, 74° – 77°F)

III. SUCTION EQUIPMENT

A. Bulb syringe (2)
B. 8Fr or 10Fr suction catheters attached to suction set at 80-100mmHg (2)
C. 8Fr feeding tube and 10 mL syringe (2)
D. Meconium aspirator (2)

IV. POSITIVE PRESSURE VENTILATION EQUIPMENT

A. Positive-pressure ventilation device – neonatal self-inflating bag; should have a reservoir, **not** a tail. (2)
B. Term sized mask (Mercury Medical,10-50505 [$92.93 per box/20])
C. Pre-term sized mask (Mercury Medical, 50610 [$60 per box /10])
D. Binasal cannula (2)
E. T-piece resuscitator – Start with PIP of 20 cm H20 and PEEP of 5 cm H20. (2)
F. Equipment to give free-flow oxygen (2)
G. Flowmeter set to 10-15 L/min for A and E; and set to max 2 L/min for D and F. (2)
H. Pulse oximeter and neonatal sensor (2)
I. Target oxygen saturation table (refer to NRP Reference Chart)

V. INTUBATION EQUIPMENT

A. Laryngoscope handle with Miller blade – sizes 1, 0 and 00 (2)
B. Stylet; use size to fit ET tubes ≤3.5. (2)
C. Endotracheal tube uncuffed size 2.5 (2)
D. Endotracheal tube uncuffed size 3.0 (2)

E. Endotracheal tube uncuffed size 3.5 (2)
F. Carbon dioxide (CO_2) detector
G. NRP Reference Chart for ETT insertion depth
H. Scissors (2)
I. Waterproof tape or tube-securing device (2)
J. Laryngeal mask airway (size 1) and 5 mL syringe. Used for infants >1200 grams. (2)
K. Stopcock or medication-transferring device and 5 mL syringe (have several)

VI. MEDICATIONS

A. Epinephrine **0.1 mg/mL; do not confuse with the higher concentration** (refer to NRP Reference Chart).
B. Sterile water for reconstitution for infusion
C. Normal saline (10 mL prefill syringes recommended)
D. Glucose gel
E. D10W (250 mL bag) continuous infusion at 80 mL/kg/day **(wt in KG X 80 divided by 24 = rate)**. For blood glucose <40 mg/ dL give 2 mL/kg IV at 1 mL/minute. Repeat blood glucose 15 min to 30 minutes after bolus complete.
F. Reference guide for administering medications (refer to NRP Reference Chart)
G. Ampicillin 100 mg/kg per dose Q 12 hrs IV or 50-100 mg/kg IM
H. Gentamicin 4-5 mg/kg per dose Q 24 IV (give over 30 min) or IM
I. Acyclovir 20 mg/kg per dose Q 8 hrs IV
J. Vitamin K 1 mg IM for ≥1500 gram infants (0.5 mg IM for <1500 gram infants)
K. Erythromycin eye ointment

VII. SUPPLIES

A. Storage container for the following:
B. Supplies for starting an IV (24 g angiocath) or IO for infants ≥3kg (15 mm or 25 mm size)
C. Butterfly needle (23g or 25g) (keep several of each size on hand)
D. I-Stat for blood sampling (i.e. blood gases, glucose, hemoglobin, hematocrit)
E. 3-way stopcock or medication-transferring device (have several available)
F. Sterile gloves in various sizes; sterile gowns
G. Hats, masks, and shoe covers
H. Sterile UVC kit (to include: hemostats, Iris forceps, umbilical tape, a cleansing agent, scalpel, tegaderm dressing, drape, sterile saline; 3-0 silk suture, needle, needle driver, scissors, 2-3 mL syringes, 2-5 mL syringes, 3-way stopcock) for placing low-lying UVC lines
I. Umbilical catheters (single lumen) – size 3.5F or 5F
J. ECG monitor leads

VIII. EQUIPMENT

A. Scale, preferably with metric indicators
B. Infusion pump that can deliver appropriate volumes of continuous fluids and/or medications for newborns
C. Stethoscope with neonatal head
D. ECG monitor

TRAINING RECOMMENDATIONS

1) All Emergency Department staff members should be current NRP providers.
2) All Emergency Department staff members should be current S.T.A.B.L.E. providers.
3) At least one member of each ambulance crew should be a current NRP provider.

RESOURCES

Outreach educators from Tennessee's Regional Perinatal Centers can provide NRP and S.T.A.B.L.E. courses as well as OB classes on precipitous delivery and OB emergencies upon request. They are also available for consultation in the development of educational programs. Refer to pages 3-4 for contact information.

- The American Academy of Pediatrics (AAP) / American Heart Association (AHA) Neonatal Resuscitation Program (NRP): https://shop.aap.org/product-list/?q=nrp
- The S.T.A.B.L.E. Program and S.T.A.B.L.E. cardiac module: https://stableprogram.org/
- The AAP Perinatal Continuing Education Program (PCEP): https://shop.aap.org/complete-pcep-package/
- The Association of Women's Health, Obstetrics and Neonatal Nurses (AWHONN) Perinatal Orientation Education Program (POEP): https://www.awhonn.org/page/POEP

Guidelines for Regionalization, Hospital Care Levels, Staffing and Facilities (2017)

Educational Objectives for Nurses, Levels I, II, III, IV & Neonatal Transport Nurses (2017)
Guidelines for Transportation (2014) This document is currently under review. The latest edition will be posted on the Perinatal Regionalization website once it has been approved.

FOR EMERGENCY MEDICAL SERVICES

Tennessee Department of Health, Office of Emergency Medical Services

Tennessee Emergency Medical Services Equipment and Supplies Specifications (2019)

Tennessee Emergency Medical Services Protocol Guidelines (2018)

Do's and Don'ts of Transporting Children in an Ambulance

Pediatric Education for Prehospital Professionals (peppsite.com)

- National program offered by the American Academy of Pediatrics Critical Care Transport (2nd edition). (2018). Jones & Bartlett Learning, LLC. (Includes both a textbook and PowerPoint slides.)

FOR EMERGENCY DEPARTMENTS

TCA §1200-08-30: Standards for Pediatric Emergency Care Facilities (2016)

OTHER RESOURCES

- Children's Emergency Care Alliance Tennessee (www.cecatn.org)

Appendix I: PERINATAL REGIONS

NORTHEAST TENNESSEE
(Johnson City)

Carter
Greene
Hancock
Hawkins
Johnson
Sullivan
Unicoi
Washington

EAST TENNESSEE
(Knoxville)

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

SOUTHEAST TENNESSEE
(Chattanooga)

Bledsoe
Bradley
Grundy
Hamilton
McMinn
Marion
Meigs
Polk
Rhea
Sequatchie

MIDDLE TENNESSEE
(Nashville)

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

WEST TENNESSEE
(Memphis)

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

Appendix II: EMS REGIONS

NORTHEAST TENNESSEE
(Johnson City)

Carter
Greene
Hancock
Hawkins
Johnson
Sullivan
Unicoi
Washington

EAST TENNESSEE
(Knoxville)

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

SOUTHEAST TENNESSEE
(Chattanooga)

Bledsoe
Bradley
Franklin
Grundy
Hamilton
McMinn
Marion
Meigs
Polk
Rhea
Sequatchie

UPPER-CUMBERLAND
(Nashville)

Cannon
Clay
Cumberland
DeKalb
Fentress
Macon
Overton
Pickett
Putnam
Smith
Van Buren
Warren
White

MID-CUMBERLAND
(Nashville)

Cheatham
Davidson
Dickson
Houston
Humphreys
Montgomery
Robertson
Rutherford
Stewart
Sumner
Trousdale
Williamson
Wilson

SOUTH CENTRAL
(Columbia)

Bedford
Coffee
Giles
Hickman
Lawrence
Lewis
Lincoln
Marshall
Maury
Moore
Perry
Wayne

WEST TENNESSEE
(Jackson)

Carroll
Chester
Crockett
Decatur
Dyer
Gibson
Hardeman
Hardin
Haywood
Henderson
Henry
Lake
Madison
McNairy
Obion
Weakley

MEMPHIS-DELTA
(Jackson)

Fayette
Lauderdale
Shelby
Tipton