Obstetric & Neonatal Emergency Reference Guide

S - Stabilizing OB/Neo Patients;
T - Training for OB/Neo emergencies;
O - Outcome improvements;
R - Resource sharing;
K - Kind care for vulnerable families
<table>
<thead>
<tr>
<th>Page</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 8</td>
<td>Assessing a Pregnant Patient</td>
</tr>
<tr>
<td>9 - 14</td>
<td>Preterm Labor</td>
</tr>
<tr>
<td>15 - 24</td>
<td>Hypertension &amp; Preeclampsia</td>
</tr>
<tr>
<td>25 - 36</td>
<td>Obstetric Hemorrhage</td>
</tr>
<tr>
<td>37 - 50</td>
<td>Emergency Delivery</td>
</tr>
<tr>
<td>51 - 56</td>
<td>Neonatal Resuscitation &amp; Stabilization</td>
</tr>
</tbody>
</table>
About the STORK Program:

The **STORK Program** is designed to help improve the outcomes of pregnant and newborn patients in rural hospitals. **STORK** includes didactic and simulation training to better prepare emergency healthcare professionals to recognize and manage common obstetric and neonatal emergencies while critical care transport teams are en route.

- Stabilizing obstetric & neonatal patients
- Training for obstetric & neonatal emergencies
- Outcome improvements
- Resources and supplies
- Kind care for vulnerable families

**STORK** was developed by a team of University of Mississippi Medical Center physicians, educators, critical care nurses & paramedics, emergency communication professionals and researchers dedicated to improving the mortality and morbidity of vulnerable mothers and babies in underserved communities.

---

*The information in this reference guide is intended as a guideline. Clinical situations exist in which alternative approaches to care are in the patient’s best interest.*

This program is made possible through generous funding from the WK Kellogg Foundation.
Call MedCom to arrange critical care transport, or for emergency obstetric or neonatal assistance

888-862-2345

Children’s Transport Services, AirCare and Mississippi MedCom are divisions of the Mississippi Center for Emergency Services at the University of Mississippi Medical Center.

To inquire about other educational opportunities, or to provide feedback about this program, email us at ChildrensTransport@umc.edu
Assessing the Pregnant Patient

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
Assessing a Pregnant Patient

*Pregnancy changes many ‘normal’ assessments and vital signs. Use this information to help assess pregnant patients.*

How far along is the pregnancy in weeks?
- Ask if a medical provider has given a due date.
- Ask when the patient had their last menstrual period.

You may use fundal height to estimate gestational age. Fundal height is determined by measuring the distance from the pubic bone to the top of the uterus (fundus). If the top of the uterus is below the navel, the pregnancy is most likely less than 20 weeks. If it is above the navel, the pregnancy is likely greater than 20 weeks.

[Image of fundal height measurements]
Once you have estimated the gestational age of the fetus, refer to the chart on pages 6-7 to determine the appropriate maternal vital signs.

Along with gestational age, obtain the following additional information (NOTE: patients <17 or >35 years are considered to be at a higher risk)

- Past medical history
- Number of previous pregnancies and outcomes
- Any prior abdominal surgeries

Along with a baseline health history, gather the following information about this pregnancy:

- Weight gain during this pregnancy
- Smoking status
- Alcohol use
- Use of street drugs or abuse of prescription drugs
- Level of stress
- Experienced recent domestic violence
- Long work hours or prolonged time spent standing

*If you do not see or feel signs of fetal movement, or if the patient reports that fetal movement has slowed or ceased, be sure to determine the presence of a fetal heart beat.*

*Normal fetal heart rate is 110 to 160 bpm*

*Make sure to differentiate between maternal and fetal heart rate.*
Assessing a Pregnant Patient

Pregnancy changes many vital signs. Use this chart to help assess expected vital signs for a pregnant patient.

<table>
<thead>
<tr>
<th>Vital Signs</th>
<th>Not Pregnant</th>
<th>1st Trimester (1-13 weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systolic Blood Pressure</strong></td>
<td>90 to 120</td>
<td>95 to 138</td>
</tr>
<tr>
<td><strong>mmHg</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diastolic Blood Pressure</strong></td>
<td>60 to 80</td>
<td>56 to 87</td>
</tr>
<tr>
<td><strong>mmHg</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heart Rate</strong></td>
<td>60 to 100</td>
<td>63 to 105</td>
</tr>
<tr>
<td><strong>Beats Per Minute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Respiratory Rate</strong></td>
<td>12 to 20</td>
<td>8 to 24</td>
</tr>
<tr>
<td><strong>Breaths Per Minute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oxygen saturation</strong></td>
<td>95 to 100</td>
<td>94 to 99</td>
</tr>
<tr>
<td><strong>SaO2 (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>36 to 37</td>
<td>36 to 38</td>
</tr>
<tr>
<td><strong>Celsius</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fahrenheit</strong></td>
<td>98 to 99</td>
<td>96 to 100</td>
</tr>
<tr>
<td><strong>Fahrenheit</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assessing a Pregnant Patient

If blood pressure is higher than these ranges, refer to the Hypertension & Pre-eclampsia section (pages 15-24).

<table>
<thead>
<tr>
<th>Vital Signs</th>
<th>2nd Trimester (14-27 weeks)</th>
<th>3rd Trimester (28-40 weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Blood Pressure mmHg</td>
<td>96 to 136</td>
<td>102 to 139</td>
</tr>
<tr>
<td>Diastolic Blood Pressure mmHg</td>
<td>57 to 87</td>
<td>62 to 89</td>
</tr>
<tr>
<td>Heart Rate Beats Per Minute</td>
<td>67 to 113</td>
<td>65 to 114</td>
</tr>
<tr>
<td>Respiratory Rate Breaths Per Minute</td>
<td>8 to 24</td>
<td>8 to 24</td>
</tr>
<tr>
<td>Oxygen saturation SpO2 (%)</td>
<td>93 to 99</td>
<td>93 to 99</td>
</tr>
<tr>
<td>Temperature Celsius</td>
<td>35 to 37</td>
<td>35 to 37</td>
</tr>
<tr>
<td>Fahrenheit</td>
<td>96 to 99</td>
<td>96 to 99</td>
</tr>
</tbody>
</table>
These signs/symptoms could point toward complications:

**Consider Preterm Labor** (pages 9-14) if:
- Mild abdominal cramps, with or without diarrhea
- A change in the amount and/or type of vaginal discharge - watery, bloody, or with mucus
- Pelvic or lower abdominal pressure or constant low dull backache
- Regular or frequent contractions or uterine tightening, often painless
- Ruptured membranes (water breaks with a gush or a trickle of fluid)

**Consider Hypertension, Preeclampsia or Eclampsia** (pages 15-24) if:
- Higher than expected pregnancy blood pressure
- New-onset headache unresponsive to medication
- Visual disturbances
- Seizures

**Consider Obstetric Hemorrhage** (pages 25-36) if:
- Bright red vaginal bleeding
- Dark red vaginal bleeding with or without pain

**Consider Emergency Delivery & Neonatal Stabilization** (pages 37-56) if:
- Pelvic or lower abdominal pressure or constant low dull backache
- Regular or frequent contractions or uterine tightening
- Ruptured membranes (water breaks with a gush or a trickle of fluid)
- Dilated to 6 cm or more
Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
Preterm Labor

Preterm labor is labor that starts before 37 weeks of pregnancy. Going into preterm labor does not automatically mean that a woman will have a preterm birth, but preterm labor needs medical attention right away.

Use the pregnancy blood pressure chart on page 6-7 to rule out hypertension and/or preeclampsia.

Signs and symptoms of Preterm labor:
- Mild abdominal cramps, with or without diarrhea
- A change in type of vaginal discharge - watery, bloody, or with mucus
- An increase in the amount of discharge
- Pelvic or lower abdominal pressure
- Constant low, dull backache
- Regular or frequent contractions or uterine tightening (often painless)
- Ruptured membranes (water breaks with a gush or a trickle of fluid)
- **More than 4 uterine contractions in 20 minutes**
- **More than 6 uterine contractions in 1 hour**

Preterm labor lead to changes in the cervix. These changes include effacement (thinning of the cervix) and dilation (opening of the cervix).

Cervical changes indicating preterm labor:
- Dilation between 1-4 cm
- Advanced dilation between 5-6 cm
- Cervical effacement (thinning) >50%
- Effacement and dilation

Perform a digital/vaginal exam to determine the extent of effacement and dilation. Refer to pages 10-11 for details.
Dilation refers to the opening of the cervix and is measured from 0cm (closed) to 10cm (completely open). Effacement is the gradual thinning and shortening (drawing up) of the cervix and is measured in percentages (0% to 100%). Perform a pelvic exam, including digital (finger) cervical exam (as described below), to determine dilation and effacement.

**Digital/Vaginal Examination**
- Insert gloved index finger into vaginal canal, then slowly insert middle finger to gently palpate cervix
- Use left hand to gently palpate uterus abdominally
- See page 11 for details on measuring the extent of dilation

**Effacement**
If the cervix feels thick and hard then effacement is closer to 0 cm. When the cervix is fully dilated to 10 cm, it will feel as thin as paper.

Preterm Labor

Use this digital measurement to determine the extent of dilation:

Dilation is measured by how far two fingers can separate in the cervix.
Remember the basics for patients in preterm labor:

- Obtain IV access
- 1-2 liters of crystalloids
- Administer terbutaline (0.25 mg SC q20 minutes up to 2 doses)
- Insert Foley catheter
- Obtain labs: CBC, urinalysis, GC/Chlamydia (urine or vaginal swab)
- Tylenol PRN
- Benadryl PRN
- Refer to page 13 for Tocolysis medications
- Consider left lateral positioning to displace uterus off vena cava

If patient presents at 6cm dilation or greater, plan for delivery.

If the pregnancy is between 23 weeks and 36 weeks/6 days, and delivery seems imminent, see lung maturation and neonate development medication guide (page 14).

**Contraindications to Tocolysis***
(*stopping preterm labor*)

- Intrauterine fetal demise
- Lethal fetal anomaly
- Non-reassuring fetal status
- Severe preeclampsia or eclampsia
- Maternal bleeding with hemodynamic instability
- Chorioamnionitis
- Premature rupture of membranes
Preterm Labor

Medication Flowchart for Tocolysis

- Patient is between 23-36 weeks pregnant
- Cervical changes identified (see page 10-11)
- Contraindications reviewed (see page 12)

Indomethacin
50 mg rectal suppository
USE ONLY if patient is less than 32 weeks

Then change to 25 mg orally every 6 hours for up to 8 doses (48 hours)

Nifedipine
30 mg orally now, then change to 10 or 20 mg orally every 6 hrs
Nifedipine tablets should be swallowed with water. NOT chewed, crushed or given sublingually.

Repeat Nifedipine 10 mg orally every 20 minutes for up to 4 doses

NOTE: Nifedipine must be accompanied with frequent BP checks to monitor for hypotension

May use Magnesium Sulfate with Indomethacin (but not with Nifedipine)

Magnesium Sulfate
20g/500 ml Sterile Water
4 g IV load over 30 minutes; then 2 g/hr IV maintenance.
Continue to monitor fetal heart rate every 15 minutes

Tocolysis protocol should be continued until contractions space to 1 in 10 minutes or < 6/hr.
If Tocolysis is unsuccessful see page 14 for neonate development medications.
If the pregnancy is between 23 weeks and 36 weeks/6 days, and delivery seems imminent, follow this medication guide for neonate development:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Indications / Notes</th>
</tr>
</thead>
</table>
| Bethamethasone  | 12 mg IM q24 hours x2 doses               | Between 23 weeks and 36 weeks/6 days, and delivery is imminent  
For lung development |
| - OR - Dexamethasone | 6 mg IM q12 hours x4 doses               | Between 23 weeks and 36 weeks/6 days, and delivery is imminent  
For lung development |
| Magnesium Sulfate | IV 4 g load over 30 minutes then 2 g/hr continuously | Between 23 weeks and 31 weeks/6 days  
For neuroprophylaxis (cerebral palsy) |
| Penicillin      | 5 million units IV initial dose then 3 million units IV every 4 hours until delivery | Is patient allergic to penicillin?  
NO: Follow Penicillin dosage  
YES: Vancomycin 1 g IV every 12 hours |
| - OR - Ampicillin | 2 g IV initial dose then 1 g every 4 hours until delivery | |

CAUTION: If patient is >34 weeks AND diabetic, DO NOT give steroids for FLM
Hypertension & Preeclampsia in Pregnancy

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
Hypertension in Pregnancy

High blood pressure in pregnancy is defined as \(>140/90\) on two or more occasions, or four hours apart.

Hypertensive (HTN) disorders in pregnancy constitute one of the leading causes of maternal and perinatal mortality worldwide. It has been estimated that preeclampsia complicates 2-8% of pregnancies globally.

**Chronic HTN** = elevated blood pressure before pregnancy or < 20 weeks gestation

**Gestational Hypertension** = elevated blood pressure \(>140/90\) without proteinuria or severe features

**Preeclampsia** = new-onset hypertension (after 20 weeks gestation) accompanied by new-onset proteinuria, and other signs or symptoms of preeclampsia (see pages 18-20)

**RISK FACTORS for HTN and preeclampsia:**

- History of preeclampsia
- Multifetal gestation
- Chronic hypertension
- Type 1 or 2 diabetes, pre-pregnancy
- Kidney disease
- Autoimmune disease (ie, systemic lupus erythematosus, antiphospholipid syndrome)
- First pregnancy
- Obesity
- Family history of preeclampsia
- African American race
- Lower income
- Age 35 years or older
- Personal history factors (e.g., low birth weight or small for gestational age, previous adverse pregnancy outcome, >10-year pregnancy interval)
- In vitro fertilization

*Available literature suggests that antihypertensive agents should be administered within 30 - 60 minutes of identifying hypertensive BP.*
Labetalol 20mg IV
Contraindications: Avoid in asthmatics, known heart disease (transient or chronic), heart block/bradycardia
Maximum IV dose: 300mg in 24 hours
Recheck BP in 20 min

Hydralazine 10mg IV
Side effects: HA, abnormal FHT, hypotension
Antepartum maximum dose: 20 mg in 24 hours Postpartum maximum dose: none
Recheck BP in 20 min

IR Nifedipine 10 mg PO
Side effects: HA
Maximum dose 180 mg in 24 hours
Recheck BP in 20 min

Persistent Severe Range Blood Pressures (≥160/110 for 15 minutes)
BP ≥160/110
Labetalol 40 mg IV, Repeat BP in 20 min
BP ≥160/110
Hydralazine 10 mg IV Repeat BP in 20 min
BP ≥160/110
IR Nifedipine 20 mg PO Repeat BP in 20 min

AND

Hypertension Medication Algorithm
Hypertension in Pregnancy
Hypertension in Pregnancy

**Hypertension Medication Algorithm**

- **IR Nifedipine 20 mg PO**
  - Repeat BP in 20 min
  - BP ≥160/110
- **Labetalol 20 mg IV**
  - Repeat BP in 20 min
  - BP ≥160/110
- **Labetalol 40 mg IV**
  - Repeat BP in 20 min
- **Labetalol 80 mg IV**
  - Repeat BP in 20 min
  - BP ≥160/110
- **Hydralazine 10 mg IV**
  - Repeat BP in 20 min
- **Magnesium Sulfate**

**Contraindications:** myasthenia gravis, allergy to magnesium. Use caution in acute/chronic renal disease (renally dose as necessary), magnesium levels q4 hours

**IV 20 g in 500 ml of sterile water for infusion and 2 g/hr continuously**

If no IV access and actively seizing,
5 g IM x 2

If magnesium toxic, calcium gluconate
1 g IV over 3 min

**NOTE: Eclampsia**

Seizures refractory to Magnesium:
Lorazepam 2 mg IV, repeat after 2 min if needed

Diazepam 5-10mg IV, may repeat q15 min for a max of 30 mg total.
Criteria for Preeclampsia

Blood Pressure:
- Greater than 140 systolic, or greater than 90 diastolic on two or more occasions, at least four hours apart, after 20 weeks gestation in a patient with previously normal BP
- Greater than 160 systolic, or greater than 110 diastolic (severe hypertension can be confirmed within minutes to facilitate timely antihypertensive therapy)
- See page 16-17 for antihypertensive agents for blood pressure control in pregnant patients

Proteinuria:
- 300 mg or more per 24 hour urine collection (or this amount extrapolated from a timed collection) - OR -
- Protein/creatinine ratio of 0.3 or more - OR -
- Dipstick reading of 2+ (used only if other quantitative methods are not available) - OR -
- In the absence of proteinuria, new-onset hypertension with new-onset of any of the following:
  - Platelet count 100 x 109/L
  - Renal insufficiency: Serum creatinine concentrations greater than 1.1 mg/dl or a doubling of the serum creatinine concentration in the absence of other renal disease
  - Impaired liver function
  - Pulmonary edema
  - New-onset headache unresponsive to medication and not accounted for by alternative diagnosis or visual symptoms

Although parenteral antihypertensive therapy may be needed initially for acute control of blood pressure, oral medications can be used as expectant management is continued. Oral labetalol 200 mg/PO q8 hrs - OR - Nifedipine XL 30 mg q day have been commonly used
Criteria for Preeclampsia with Severe Features

- Greater than 160 systolic, or greater than 110 diastolic on two or more occasions, at least 4 hours apart, unless antihypertensive therapy is initiated before this time
- Platelet count less than 100 x 109/L
- Impaired liver function that is not accounted for by alternative diagnosis and as indicated by abnormally elevated blood concentrations of liver enzymes - OR - by severe persistent right upper quadrant or epigastric pain unresponsive to medications
- Renal insufficiency: Serum creatinine concentrations greater than 1.1 mg/dl or a doubling of the serum creatinine concentration in the absence of other renal disease
- Pulmonary edema
- New-onset headache unresponsive to medication and not accounted for by alternative diagnoses
- Visual disturbances

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
**Preeclampsia Management**

Pregnant patient > 20 weeks gestation with new onset BP > 140/90
- IV access
- PE with lung exam (pulmonary edema and signs of CHF) and DTRs
- Insert Foley catheter
- Labs: CBC, BMP, LFTs, UA, UDS, Coags
- Steroids for fetal lung maturation. See medication chart of page 14 if gestation is between 23 weeks/0 days – 36 weeks/6 days
- Consider left lateral positioning to displace uterus off vena cava

Antihypertensive treatment should be initiated for acute-onset severe hypertension (systolic blood pressure of >160 mm Hg or diastolic blood pressure of <110 mm Hg or both) that is confirmed as persistent (15 min or more). See page 16-17 for antihypertensive agents for BP control in pregnant patients.

**HELLP syndrome** (hemolysis, elevated liver enzymes, and low platelet count) is one of the more severe forms of preeclampsia because it has been associated with increased rates of maternal morbidity and mortality. In HELLP syndrome, the main presenting symptoms are right upper quadrant pain and generalized malaise in up to 90% of cases and nausea and vomiting in 50% of cases.

**Management of suspected HELLP:**
- Magnesium sulfate for seizure prophylaxis (see page 17 for dosage)
- Steroids for fetal lung development (23 weeks/0 days – 36 weeks/6 days)
- Blood pressure control per the HTN algorithm (pages 16-17)
- Call MedCom to transfer patient as an obstetric emergency
<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE</th>
<th>ONSET OF ACTION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labetalol</td>
<td>10-20 mg IV, then 20-80 mg every 10-30 minutes; maximum cumulative dosage of 300 mg</td>
<td>1-2 minutes</td>
<td>Tachycardia is less common with fewer adverse effects. Avoid in women with asthma, preexisting myocardial disease, decompensated cardiac function, and heart block and bradycardia.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Higher or frequent dosages associated with maternal hypertension, headaches and abnormal fetal heart rate tracings; may be more common than other agents.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydralazine</td>
<td>5 mg IV or IM, then 5-10 mg IV every 20-40 minutes; maximum cumulative dosage of 20mg</td>
<td>10-20 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IR Nifedipine</td>
<td>10-20 mg orally, repeat in 20 minutes if needed, then 10-20 mg every 2-6 hours; maximum daily dose is 180 mg</td>
<td>5-10 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypertension in Pregnancy

BP target for antihypertension therapy: < 160/110s
Seizures in pregnant or recent postpartum patients should always be considered eclampsia until proven otherwise. This is an obstetric emergency!

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345

Eclampsia:

New-onset, generalized seizures or coma in a patient >20 weeks gestational age, without a preexisting diagnosis of epilepsy.

Most common warning signs of Eclampsia:
- High blood pressure
- Blurred vision
- Sensitivity to bright light
- Altered mental state

Seizure precautions should be taken:
- Roll patient onto their left side
- Maintain airway and prevent aspiration
- Begin treatment of severe hypertension (see algorithm on page 16-17)

Eclampsia

Seizures in pregnant or recent postpartum patients should always be considered eclampsia until proven otherwise. This is an obstetric emergency!
Magnesium Sulfate may help prevent recurrent seizures:
Intravenous 20 g in 500 ml of sterile water for infusion, followed by a maintenance dose of 2 g/hour.

Intramuscular injection, 10 g initially as a loading dose (5 g IM in each buttock), followed by 5 g every 4 hours. (Can be mixed with 1 ml of xylocaine 2% solution because the intramuscular administration is painful)

Still seizing at 20 minutes after the bolus
- OR -
more than 2 recurrences, consider:

- Seizures refractory to Magnesium: Lorazepam: 2 mg IV, repeat after 2 min if needed
- Diazepam: 5-10 mg IV, may repeat q15 min for a max of 30 mg total
- Endotracheal intubation and assisted ventilation in the intensive care unit are appropriate in these circumstances

Call MedCom to arrange critical care transport, or for emergency obstetric assistance 888-862-2345
Magnesium Sulfate should be considered the drug of choice in the prevention of eclampsia in the intrapartum and postpartum periods.

Who needs Magnesium Sulfate?
- Any patient with BPs >160/110s
- Any patient with BPs >140/90s with Severe Features (see page 19)
- Suspected HELLP syndrome (see page 20)
- Suspected Eclampsia

What dosage should be given?
Therapeutic range of 4.8 - 9.6mg/dl (4 -8 mEq/L).

DOSAGE: Intravenous administration of a 4g loading dose over 30 minutes, followed by a maintenance dose of 2g/hr

In case of difficulties with establishing venous access, Magnesium Sulfate can be administered by intramuscular (IM) injection, 10g initially as a loading dose (5g in each buttocks), followed by 5g every 4 hours

MONITOR DTRs with physical and lung examination every 2 hours and obtain Magnesium levels every 4 hours
Obstetric Hemorrhage

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
Obstetric Hemorrhage

Obstetric hemorrhage is defined as blood loss of more than 500 ml in a vaginal delivery. This should always be investigated and managed as an emergency situation.

Postpartum hemorrhage (PPH) is defined as blood loss of greater than or equal to 1000 ml during and after delivery, accompanied by signs or symptoms of hypovolemia within 2 hours.

**Identify Risk on Arrival**

<table>
<thead>
<tr>
<th>Low Risk:</th>
<th>Type and Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No previous uterine incision</td>
<td></td>
</tr>
<tr>
<td>• Pregnant with one fetus</td>
<td></td>
</tr>
<tr>
<td>• (&lt; 4) previous vaginal births</td>
<td></td>
</tr>
<tr>
<td>• No known bleeding disorder</td>
<td></td>
</tr>
<tr>
<td>• No history of PPH</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medium Risk:</th>
<th>Type and Screen and consider Cross</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prior c/s or uterine surgery</td>
<td></td>
</tr>
<tr>
<td>• Multiple gestation</td>
<td></td>
</tr>
<tr>
<td>• (&gt; 4) previous vaginal births</td>
<td></td>
</tr>
<tr>
<td>• Chorioamnionitis</td>
<td></td>
</tr>
<tr>
<td>• History of previous PPH</td>
<td></td>
</tr>
<tr>
<td>• Large uterine fibroids</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High Risk:</th>
<th>Type and Cross</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Placenta Previa, or low lying</td>
<td></td>
</tr>
<tr>
<td>• Suspected accreta or percreta</td>
<td></td>
</tr>
<tr>
<td>• HCT &lt; 30 AND other risk factors</td>
<td></td>
</tr>
<tr>
<td>• Platelets &lt; 100,000</td>
<td></td>
</tr>
<tr>
<td>• Active bleeding on arrival</td>
<td></td>
</tr>
<tr>
<td>• Known coagulopathy</td>
<td></td>
</tr>
</tbody>
</table>
Antepartum Vaginal Bleeding in the 2nd and 3rd Trimester

Evaluation:
1) What is the extent of bleeding and is it accompanied by PAIN?
   - *Placenta previa* is associated with *painless vaginal bleeding*
   - *Placental abruption* is associated with *vaginal bleeding accompanied by pain and contractions*

2) Digital exam should be avoided until a placenta previa has been excluded by ultrasound examination.
   - Sterile speculum exam (SSE) can be safely performed to estimate bleeding and cervical dilation
   - CBC, coagulation studies (PT/PTT/fibrinogen), T&S and cross-match
   - Sonogram for placental location
   - Fetal assessment

3) DO NOT treat antepartum patient with postpartum medications.

Management
- ABC’s
- Estimate blood loss
- Place 2 large bore IV access
- Start fluid resuscitation with Ringer’s Lactate (SBP>90) 2:1 ratio (give 2x crystalloids of the estimated blood loss)
- Blood products transfusion if hemodynamics do not improve with 2-3L isotonic crystalloid
- Left lateral position for uterine displacement
- Consideration for fetal lung maturation steroids (23w0d—36w6d):
  - *Bethamethasone*: 12mg IM q24 hours x 2 doses
  - OR-
  - Dexamethasone 6mg IV q 12 hours x 4 doses
Antepartum Vaginal Bleeding in the 2nd and 3rd Trimester

**Placenta Previa:**
- Painless bright red bleeding
- Replace blood loss
- Evident in lower segment
- Vitals indicate shock
- Inspect fetal heart rate
- Avoid digital exams

If placenta previa is suspected, check cervix with speculum. Digital exam should be avoided until a placenta previa has been excluded by ultrasound examination.

*Example of placenta previa presenting in open cervix*

---

**All antepartum bleeding is an obstetric emergency.**

**Call MedCom to arrange critical care transport, or for emergency obstetric assistance**

888-862-2345
Normal blood loss for a vaginal delivery, once the placenta is expelled, is approximately 300 ml. Bleeding should significantly slow with fundal massage and active management with oxytocin infusion of 10-40 units/500-1000 ml titrated; or 10 units IM

**Blood loss of MORE THAN 500ml in a vaginal delivery should be investigated and managed as postpartum obstetric hemorrhage.**

**Common causes** of postpartum hemorrhage are:
- Uterine atony
- Retained placenta (see page 32)
- Trauma during or before delivery (see page 32)
- Coagulopathy

**Tests to order include:**
- CBC
- Coagulation studies (PT/PTT/Fibrinogen)
- Type and screen with cross-match if necessary
- Ultrasound if available (looking for retained placenta tissue)
- CT (to help locate retained placenta tissue)

**Management:**
- Volume of blood loss (continuously monitor volume)
- ABCs
- Vigorous uterine/fundal massage - uterus should feel hard like a rock
- Place 2 large bore IVs
- Place Foley catheter to empty bladder and monitor UOP
- Start fluid resuscitation with Ringer's Lactate (SBP>90) 2:1 crystalloid ratio (give 2x of the estimated blood loss)
- Blood products transfusion if hemodynamics do not improve with 2-3 L crystalloids
Post-delivery blood loss of more than 500 ml in a vaginal delivery and should be investigated and managed as a postpartum obstetric hemorrhage.

Below are examples to help estimate blood loss volume.

- **Peri pad—300 ml**: 300 ml blood loss on peri pad (Normal blood loss in vaginal delivery)
- **Full kidney basin—500 ml**: 500 ml blood loss shown in kidney basin (Suspect obstetric hemorrhage and begin treatment)
- **Chux pad—200 ml**: 200ml blood loss shown on Chux pad.

Begin AGGRESSIVE TREATMENT if:
- Cumulative blood loss > 500 ml for vaginal or > 1000 ml for C/S
- OR- VS > 15% change (HR > 110, BP < 85/45, O₂Sat < 95%)
- OR- increased bleeding during recovery or postpartum

https://www.researchgate.net/figure/a-visual-aid-depicting-known-volumes-of-blood-on-obstetric-materials-used-during-the_fig2_316321152
Obstetric Hemorrhage

If Postpartum bleeding exceeds 500ml, BEGIN AGGRESSIVE TREATMENT

Begin with **Oxytocin**
10-40 units/500-1000 ml titrated
- OR -
IM 10 units

**Bleeding DOES NOT SLOW**

**Tranexamic Acid**
Slow IV push, 1000 mg over 10 mins within 3 hours of delivery
If bleeding continues after 30 mins, or stops and restarts, a second dose may be given

**Bleeding DOES NOT SLOW**

Quickly implement treatment cycle until bleeding slows or stops.

**Cytotec**
100-200 mcg tablets
1000 mcg, rectally

If bleeding starts again, restart treatment cycle!

Continue Fundal Massage & Check Vitals every 10 minutes

**Bleeding DOES NOT SLOW**

**Hemabate**
IM 250 mcg every 15 min, (max 8 doses)

**Bleeding DOES NOT SLOW**

**Methergine**
IM 0.2 mg every 15 mins (max 5 doses)
PO 0.2 mg (max dose 1 mg)
Uterine Inversion

Uterine inversion can occur during a vaginal delivery and be classified in stages (see illustration below). If uterine inversion occurs, follow these steps:
1) Remove any attached placenta tissue.
2) Repair any vaginal or cervical lacerations
3) Restore uterine inversion

Restore uterine inversion:

NOTE: If severe bleeding continues it may be necessary to pack uterus with kerlex (see page 32).
Retained Placenta & Lacerations

- Consider intrauterine sweep with hand to feel for retained placental fragments. It should be smooth on surface (see illustration)
- Examine vagina for presence of lacerations or trauma
- If lacerations are hemostatic, no intervention is needed

- If lacerations are actively bleeding, insert saline moistened vaginal packing for compression (see illustration)
- Insert Foley after packing
- The Delivery Packet in your STORK Bag includes kerlex packing

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
## Obstetric Hemorrhage

### Uterotonic Agents

<table>
<thead>
<tr>
<th>Drug / Dose</th>
<th>Route / Frequency</th>
<th>Side Effects</th>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxytocin 10-40 units in a L of LR</td>
<td>Continuous IV infusion</td>
<td>Usually none; nausea/vomiting, hyponatremia (&quot;water intoxication&quot;) with prolonged IV; increased BP and HR with high doses,</td>
<td></td>
</tr>
<tr>
<td>Cytotec 1000 mcg</td>
<td>Rectal, one time</td>
<td>Nausea/vomiting, diarrhea; shivering; fever (transient); headache</td>
<td>Rare; known allergy to prostaglandin; hypersensitivity to drug</td>
</tr>
<tr>
<td>Methergine 0.2 mg/ml</td>
<td>IV or IM every 15 min for max of 5 doses</td>
<td>Nausea/vomiting, severe hypertension, especially with rapid administration, or inpatients with HTN or preeclampsia</td>
<td>HTN, preeclampsia, heart disease; hypersensitivity Caution: if multiple doses of ephedrine have been used, may exaggerate hypertensive response w/possible cerebral hemorrhage</td>
</tr>
<tr>
<td>Hemabate 250 mcg/ml</td>
<td>IM only every 15 min, max 8 doses in 24 hours</td>
<td>Nausea/vomiting, diarrhea, fever (transient), headache, chills, shivering, HTN, bronchospasm</td>
<td>Caution in women with hepatic disease, asthma, HTN, active cardiac or pulmonary disease; hypersensitivity to drug <strong>Do not give to asthmatics</strong></td>
</tr>
</tbody>
</table>
Tranexamic Acid (TXA) is an anti-fibrinolytic drug used for prevention and treatment of postpartum bleeding. Studies show that it reduces death due to bleeding in women with postpartum hemorrhage by 20-30% without an increase in adverse effects.

NOTE: Do not administer Tranexamic acid before delivery since it freely crosses the placenta.

Dosage:
Slow IV push at the rate of 1000 mg over 10 minutes given within 3 hours of vaginal birth or cesarean. Do not inject faster than 1mg/min to avoid hypotension. If bleeding continues after 30 minutes or stops and restarts within 24 hours after the first dose, a second dose of 1000 mg may be given. About 90% of the drug is eliminated within 24 hours after IV administration. Tranexamic acid can be given along with other drugs and procedures for control of bleeding (see page 30).
ADDITIONAL PEARLS AND PITFALLS

- Bleeding may not be visible. Boggy and dilated uterus may contain significant amount of blood.
- Young patients may not show altered hemodynamics at the outset.
- HCT/HGB drop may be delayed and not be representative of blood loss.
- Failure to realize the extent of blood loss. Younger women can compensate for acute blood loss, therefore, they may not develop signs of hypovolemia until later.
- Failure to give oxytocin for uterine atony because manual uterine massage is working. However, once massage has ceased, bleeding can resume again and can be brisk.
- Failure to detect vaginal lacerations. After uterine atony, lacerations are the second most common cause of PPH.
- Pallor, delayed capillary refill and decreased UOP may indicate compromise without a change in BP or HR.
- Decreased UOP, low blood pressure and tachycardia can be late signs of compromise.
- Be AGGRESSIVE and act fast in a hemorrhage!
- Notify team members.
- Call for help.
- Bring supplies to the room.

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
Blood Products

Packed Red Blood Cells (PRBCs)
- Best first line product
- 1 unit = 200 ml volume
- If antibody positive, may take 1-24 hrs for cross match

Fresh Frozen Plasma (FFP)
- Approximately 35-45 min to thaw
- Highly desired if > 2 units PRBCs given, or for prolonged PT, PTT
- 1 unit = 18 ml volume

Platelets (PLTs)
- Priority for women with platelets < 50,000
- Single - donor apheresis unit (= 6 units of platelet concentrates) provides 40-50 K transient increase in platelets

Cryoprecipitate (CRYO)
- Approximately 35-45 min to thaw
- Priority for women with Fibrinogen levels < 80
- 10 unit pack raises Fibrinogen 80-100 mg/dl
- Best for DIC with low Fibrinogen and don't need volume replacement
- Caution: 10 units come from 10 different donors, so infection risk is proportionate
- Warm upper body with blankets or warming device
- Sequential compression stockings

Obstetric Hemorrhage
Emergency Delivery

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
Emergency Delivery

When delivery is imminent due to maternal or fetal indications, prepare an area for resuscitation of the infant with access to:

- Warmth
- Oxygen
- Suction
- Basic airway supplies
- Blankets
- Epinephrine
- O2/HR monitor

The STORK Bag has the following items to assist with delivery:

**Delivery Packet:**
- Sterile scissors
- Towels
- Receiving blanket
- 4 umbilical clamps or ties
- Bag for placenta
- Nasal/mouth suction bulb
- Kerlex packing

**Neonatal Resuscitation Packet:**
- Preemie and newborn oxygen mask, size 00, 0 & 1
- Laryngoscope ETTs 2.5, 3.0 & 3.5
- Newborn hat
- Warming mat
Emergency Delivery

Ask these questions:
Is this your first delivery?
   If not:  Were there any problems with other delivery?
      How long did labor/delivery last?
Have you been told you have any problems with this pregnancy?

Do not instruct mother to begin pushing until dilation
and effacement are complete.

Access the Delivery Packet in the STORK Bag and follow
these delivery guidelines:

- Allow the mother to push with her contractions
- No fundal pressure on the uterus
- As the head is being pushed out, use one hand to gently control
  expulsion (don’t let head just fly out).
- Feel around the neck for a nuchal umbilical cord (NOTE: the cord may
  be wrapped around the neck more than once).
  - If the cord is around the neck, gently lift it over the baby’s head —
    do not pull or force hard.
  - If it won’t reduce easily, clamp the cord in two places and cut the
    cord IN BETWEEN clamps.
- After the head is out and the face turns left or rightward, put one hand
  on both sides of the baby’s face. Using gentle downward traction on
  the head to allow the anterior shoulder to deliver under the pubic
  symphysis.
- Grab behind the baby’s neck to control delivery.
- Lift the baby gently towards the ceiling to delivery the posterior shoulder
  and rest of the baby.
- Clamp cord in two places ~3-4 inches from the baby. Cut in between the
  clamps.
Emergency Delivery

Vaginal Delivery Illustration

1. Presentation of head
2. Rotation and delivery of anterior shoulder
3. Delivery of posterior shoulder
4. Delivery of lower body and umbilical cord

Vaginal delivery—Wikipedia image
Delivery of the Placenta (30 minutes or less)

- Place a ring or Kelly forceps on cord to assist with traction
- Gentle downward traction on cord with circular fundal massage on mother’s abdomen
- Small maternal pushes can assist with delivery of placenta
- After placenta has been delivered, begin internal/external bimanual uterine massage to remove clots and slow bleeding.
- Administer Oxytocin: 10mg IM or 10-40 units in 1 L of LR
- Monitor bleeding

Maternal Assessment After Delivery

**MONITOR VITAL SIGNS:**
Check vitals every 15 minutes for first hour, then every 30 minutes for the second hour, then hourly. **EMERGENCY:** If blood pressure elevates to >160 systolic, or >110 diastolic AND/OR if mother begins seizing. Refer to Hypertension/Preeclampsia/Eclampsia section (pages 22 - 24)

**MONITOR BLOOD LOSS:**
Perform fundal massage and assess bleeding every 15 minutes. Normal blood loss during vaginal delivery should be 500ml or less. **EMERGENCY:** If blood loss is over 500ml it is considered a postpartum hemorrhage. Refer to Obstetric Hemorrhage section (pages 28-36)
Verbalize to all in the room that this is a BREECH DELIVERY. You will need extra assistance.

- Make sure the cord is NOT in front of the presenting part. If the cord IS presenting first, try to reduce it – push it back in higher in the uterus.
- During delivery DO NOT INTERFERE. Let nature take its course and allow mother to push gently as she feels contractions.
- As the baby come out, hold firmly but DO NOT PULL. The following pages will assist with delivery.

Call MedCom to arrange critical care transport, or for emergency obstetric assistance

888-862-2345
Breech Delivery

A Complete footling or Incomplete footling delivery presents with one or both feet first.

- Use gentle downward traction on feet, legs, hips - do not pull.
- Rotate baby so the back is to you (spine anterior).
- Allow the mother to push with her contractions.
- Do not put fundal pressure on the uterus.
- Continue with maternal efforts only until the infant’s leg(s), buttock and umbilical cord are out.
- Continue with delivery as outlined in following pages.

A Frank breech delivery will present buttocks first.

- Allow the mother to push with her contractions.
- Do not put fundal pressure on the uterus.
Emergency Delivery

Breech Delivery

As the infant continues to come out the leg(s) are sequentially delivered by splinting the medial aspect of each femur with the operator's fingers positioned parallel to each femur, and by exerting pressure laterally to sweep each leg away from the midline. (See illustration)

The baby’s legs, buttocks and midsection should be out and the baby’s back should face you. If it doesn’t, gently rotate the baby until the spine is up, facing you.
Place a warm moistened towel around the baby to aid with grip/traction. Rotate the body to vertical and deliver one shoulder of baby; sweep the anterior arm across the chest. Rotate in the opposite direction for the other shoulder.

Apply steady, gentle, downward traction until the lower halves of the scapula are delivered, making no attempt at delivery of the shoulders and arms until one shoulder blades becomes visible.
Breech Delivery

Rotate the body to vertical and deliver one shoulder of baby; sweep the anterior arm across the chest. Rotate in the opposite direction for the other shoulder. Keep the back facing you. When you see the hairline (back of head), have an assistant hold the baby.
Breech Delivery

DO NOT PULL. With your right hand, place two fingers behind neck. With the other hand, place your index and middle fingers over the maxilla, allowing you to flex the head.

Provide suprapubic pressure by an assistant to help extricate the head.

If head will not deliver spontaneously and entrapment is suspected, remain calm and administer either: Terbutaline 0.25 mg SQ - OR - Nitroglycerin 2-3 puffs of SL SPRAY

Refer to pages 47-50 for newborn assessment
Refer to page 40 for maternal assessment
Normal Newborn
- Dry with towels.
- Keep warm (warmed towels or place on mothers chest, stomach).
- Suction secretions from mouth then nose only if the infant has an obvious obstruction to spontaneous breathing or requires positive pressure ventilation. Automatic suction outside these conditions is not recommended.
- Assess breathing, heart rate and appearance.
- If vital signs are normal then proceed with thermoregulation and monitor.
- Determine and record APGAR score at 1 and 5 minutes (see page 48)
- Monitor and transport

Normal Neonatal Vital Signs:
Check glucose within 30 minutes of delivery

**NOTE:** If glucose is less than 45 mg/dl see page 53

Goal temperature is 98º F or 36.5º C

**NOTE:** If temperature is less than 98º F or 36.5º C see page 56

<table>
<thead>
<tr>
<th>Neonate age</th>
<th>Heart rate</th>
<th>Respirations</th>
<th>Blood Pressure</th>
<th>O₂ Sats on RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30 weeks</td>
<td>120-180 BPM</td>
<td>40-60 BPM</td>
<td>Mean BP = gestational age</td>
<td>90-100%</td>
</tr>
<tr>
<td>30-36 weeks</td>
<td>120-180 BPM</td>
<td>40-60 BPM</td>
<td>Systolic &gt; 40 and/ or mean BP = gestation age</td>
<td>90-100%</td>
</tr>
<tr>
<td>Term infant</td>
<td>100-150 BPM</td>
<td>40-60 BPM</td>
<td>Systolic &gt; 50</td>
<td>95-100%</td>
</tr>
</tbody>
</table>
Newborn Assessment

APGAR Scoring System

<table>
<thead>
<tr>
<th>Indicator</th>
<th>0 Points</th>
<th>1 Point</th>
<th>2 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ACTIVITY</td>
<td>Absent</td>
<td>Flexed arms &amp; legs</td>
</tr>
<tr>
<td>P</td>
<td>PULSE</td>
<td>Absent</td>
<td>BP below 100</td>
</tr>
<tr>
<td>G</td>
<td>GRIMACE</td>
<td>Floppy</td>
<td>Minimal response to stimulation</td>
</tr>
<tr>
<td>A</td>
<td>APPERANCE</td>
<td>Blue; pale</td>
<td>Pink body, blue extremities</td>
</tr>
<tr>
<td>R</td>
<td>RESPIRATIONS</td>
<td>Absent</td>
<td>Slow and irregular</td>
</tr>
</tbody>
</table>

Score 0-3: Critically low: Needs Intervention  
Score 3-6: Below normal: Needs stabilization  
Score 7-10: Normal: Stable Condition

Repeat APGAR scoring at 1 minute after birth and again at 5 minutes after birth, then reassess every 5 minutes.

Pre-ductal Spo₂ Target

<table>
<thead>
<tr>
<th>Time</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 min</td>
<td>60-65%</td>
</tr>
<tr>
<td>2 min</td>
<td>65-70%</td>
</tr>
<tr>
<td>3 min</td>
<td>70-75%</td>
</tr>
<tr>
<td>4 min</td>
<td>75-80%</td>
</tr>
<tr>
<td>5 min</td>
<td>80-85%</td>
</tr>
<tr>
<td>10 min</td>
<td>85-95%</td>
</tr>
</tbody>
</table>
Emergency Delivery

Meconium
Meconium is the thick greenish-black stool passed by fetus while still in the womb. The presence of meconium does not automatically mean baby will be born depressed but caregivers should be alert to the possibility.
1. Common practice has been to try to suction the mouth and nose at the perineum after the head is delivered, but this should no longer be done.
2. Perform tracheal suctioning only on non-vigorous depressed infants who have meconium stained amniotic fluid.
3. If the infant shows a strong cry and respiratory effort, routine resuscitative measures should be instituted and the infant monitored for signs of meconium aspiration.

Distressed Newborn
- Dry and keep warm with towels in a warm environment
- Position with towel roll/sniffing position
- Suction mouth, then nose
- Stimulate - flick heels and rub back
- Reassess breathing, heart rate, color/appearance
  - Most will recover with stimulation
  - If recovered, determine APGAR scores, monitor and transport
- If apneic, gasping or showing respiratory distress priority goal is establishing adequate ventilation of newborns lungs
- Heart rate increase best indicator of intervention response

If continued distress:
- BVM 30-100% O\textsuperscript{2} based on HR response, color, O\textsuperscript{2} saturations, PPV at 40-60 breaths/min
- Recheck at 30 second intervals - continue BVM until HR >100 bpm
- If HR <60 bpm, begin chest compressions at 90/min.
  Compression: breath ratio = 3:1
- Refer to pages 51-56 and call MedCom for critical care NICU transport
Neonatal Physical Assessment

**SKIN:**
Pallor; Jaundice; Cyanosis; Rashes; Birthmarks

**FACE:**
Low set or simple ears? Inner epicanthic folds. Mongolian or anti-Mongolian slant of eyes. Symmetry of face and mouth

**MOUTH:**
Cleft lip/plate, central cyanosis, Neonatal teeth

**HEAD:**
Anterior fontanelle, Skull shape & size
Scalp—swellings or birthmarks

**CHEST:**
Respiratory rate
Respiratory distress
Symmetry of chest movement

**EYES:**
Red reflex for cataracts,
Sclera for jaundice,
Coloboma (defect of the pupil)

**BACK & SPINE:**
Spina bifida or posterior encephalocele
Midline naevus lipoma
Deep sacral pit

**ABDOMEN:**
Abdominal distension or bile-stained vomiting
Palpable kidneys
Hepatosplenomegaly
Anterior abdominal wall defects
Umbilical cord vessels

**GENERAL OBSERVATIONS:**
Weight, length and head circumference
Maturity
Muscle tone
Reflexes
APGAR scores

**HIPS:**
Barlow and Ortolani tests for developmental dysplasia of the hips

**LIMBS:**
Club foot
Extra fingers or toes
Fused fingers or toes
Contractures
Neonatal Resuscitation & Stabilization

Call MedCom to arrange critical care NICU transport, or for emergency neonatal assistance

888-862-2345
# Neonatal Resuscitation & Stabilization

## NORMAL VITALS

<table>
<thead>
<tr>
<th></th>
<th>Heart rate</th>
<th>Respiration</th>
<th>O₂ Sats on RA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Less than 30 weeks</strong></td>
<td>120-180 BPM</td>
<td>40-60 BPM</td>
<td>90-100%</td>
</tr>
<tr>
<td><strong>30-36 weeks</strong></td>
<td>120-180 BPM</td>
<td>40-60 BPM</td>
<td>90-100%</td>
</tr>
<tr>
<td><strong>Term infant</strong></td>
<td>100-150 BPM</td>
<td>40-60 BPM</td>
<td>95-100%</td>
</tr>
</tbody>
</table>

## Resuscitation Guide for Newborns:

- **Quick Assessment of infant; Term? Breathing?**
  - Warm, dry, stimulate, suction airway
  - PPV via facemask
  - Alternative airway, intubation or LMA
  - Chest compressions
  - Epinephrine
  - Volume Expansion

- Heart rate <100 bpm
- PIP 20; PEEP 5
- Heart rate <60 bpm
- 0.02mg/kg IV
- 0.1mg/kg via ETT
- NaCl: 10ml/kg
## Quick Reference:

<table>
<thead>
<tr>
<th>Gestation (in weeks)</th>
<th>Estimated Weight</th>
<th>ET Size &amp; Depth</th>
<th>IV Rate (D10W)</th>
<th>D10 Bolus</th>
<th>Epinephrine 1mg/10ml IV</th>
<th>Epinephrine 1mg/10ml ETT</th>
<th>NaCl Bolus</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>500 g</td>
<td>2.5 - 5.5 cm</td>
<td>2 ml/hr</td>
<td>1 ml</td>
<td>0.1 ml</td>
<td>0.5 ml</td>
<td>5 ml</td>
</tr>
<tr>
<td>24</td>
<td>700 g</td>
<td>2.5 - 6 cm</td>
<td>3 ml/hr</td>
<td>1.5 ml</td>
<td>0.14 ml</td>
<td>0.7 ml</td>
<td>7 ml</td>
</tr>
<tr>
<td>25</td>
<td>800 g</td>
<td>2.5 - 6 cm</td>
<td>3.3 ml/hr</td>
<td>1.6 ml</td>
<td>0.16 ml</td>
<td>0.8 ml</td>
<td>8 ml</td>
</tr>
<tr>
<td>26</td>
<td>900 g</td>
<td>2.5 - 6 cm</td>
<td>3.8 ml/hr</td>
<td>1.8 ml</td>
<td>0.18 ml</td>
<td>0.9 ml</td>
<td>9 ml</td>
</tr>
<tr>
<td>27</td>
<td>1.0 kg</td>
<td>2.5 - 7 cm</td>
<td>4 ml/hr</td>
<td>2 ml</td>
<td>0.2 ml</td>
<td>1 ml</td>
<td>10 ml</td>
</tr>
<tr>
<td>28</td>
<td>1.2 kg</td>
<td>2.5 - 7 cm</td>
<td>5 ml/hr</td>
<td>2.4 ml</td>
<td>0.24 ml</td>
<td>1.2 ml</td>
<td>12 ml</td>
</tr>
<tr>
<td>29</td>
<td>1.3 kg</td>
<td>2.5 - 7 cm</td>
<td>5.5 ml/hr</td>
<td>2.6 ml</td>
<td>0.26 ml</td>
<td>1.3 ml</td>
<td>13 ml</td>
</tr>
<tr>
<td>30</td>
<td>1.5 kg</td>
<td>2.5 - 7 cm</td>
<td>6 ml/hr</td>
<td>3 ml</td>
<td>0.3 ml</td>
<td>1.5 ml</td>
<td>15 ml</td>
</tr>
<tr>
<td>31</td>
<td>1.7 kg</td>
<td>2.5/3.0 - 7.5 cm</td>
<td>7 ml/hr</td>
<td>3.4 ml</td>
<td>0.34 ml</td>
<td>1.7 ml</td>
<td>17 ml</td>
</tr>
<tr>
<td>32</td>
<td>1.9 kg</td>
<td>2.5/3.0 - 7.5 cm</td>
<td>8 ml/hr</td>
<td>3.8 ml</td>
<td>0.38 ml</td>
<td>1.9 ml</td>
<td>19 ml</td>
</tr>
<tr>
<td>33</td>
<td>2.1 kg</td>
<td>3 - 8 cm</td>
<td>8.8 ml/hr</td>
<td>4.2 ml</td>
<td>0.42 ml</td>
<td>2.1 ml</td>
<td>21 ml</td>
</tr>
<tr>
<td>34</td>
<td>2.3 kg</td>
<td>3 - 8 cm</td>
<td>9.5 ml/hr</td>
<td>4.6 ml</td>
<td>0.46 ml</td>
<td>2.3 ml</td>
<td>23 ml</td>
</tr>
<tr>
<td>35</td>
<td>2.5 kg</td>
<td>3 - 8.5 cm</td>
<td>10 ml/hr</td>
<td>5 ml</td>
<td>0.5 ml</td>
<td>2.5 ml</td>
<td>25 ml</td>
</tr>
<tr>
<td>36</td>
<td>2.7 kg</td>
<td>3 - 9 cm</td>
<td>9 ml/hr</td>
<td>5.4 ml</td>
<td>0.54 ml</td>
<td>2.7 ml</td>
<td>27 ml</td>
</tr>
<tr>
<td>37-39</td>
<td>3.0 kg</td>
<td>3.5 - 9 cm</td>
<td>10 ml/hr</td>
<td>6 ml</td>
<td>0.6 ml</td>
<td>3 ml</td>
<td>30 ml</td>
</tr>
<tr>
<td>40</td>
<td>3.5 kg</td>
<td>3.5 - 9.5 cm</td>
<td>12 ml/hr</td>
<td>7 ml</td>
<td>0.7 ml</td>
<td>3.5 ml</td>
<td>35 ml</td>
</tr>
</tbody>
</table>

Use with extreme caution!
Neonatal Hypoglycemia Treatment Protocol:

**GOAL:** Glucose greater than 45 mg/dl

- **Term infant with no respiratory distress and stable glucose**
- **All preterm infants and/or term infants with respiratory distress and hypoglycemia**

**Feed infant and recheck in 2 hours**

**Place PIV, give D10W bolus (2ml/kg), begin D10W infusion at 80 ml/kg/day, recheck glucose in 30 minutes**

**If still hypoglycemic, repeat D10W bolus (2 ml/kg) and increase infusion to 100 ml/kg/day, recheck glucose in 30 minutes**

---

**How to make D10 Infusion:**

**With D50 and Sterile Water**

To make 60 ml of D10%

- Mix 45 ml Sterile Water and 15 ml of D50%

- OR -

**With D50 and D5**

To make 60 ml of D10%

- Mix 53 ml of D5% and 7 ml of D50%

---

*With persistent hypoglycemia, call MedCom for an emergency NICU consult and further instructions: 888-862-2345*
Neonatal Resuscitation & Stabilization

Neonatal Respiratory Support

**Neonatal Resuscitation Packet:**
Preemie and newborn oxygen mask;
Laryngoscope blade size 00, 0 & 1; ETTs 2.5, 3.0 & 3.5;
LMA size 1

<table>
<thead>
<tr>
<th>Weight</th>
<th>Gestational Age</th>
<th>ETT Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 1000 grams</td>
<td>Less than 28 weeks</td>
<td>2.5 (uncuffed)</td>
</tr>
<tr>
<td>1000 to 2000 grams</td>
<td>28 to 34 weeks</td>
<td>3.0 (uncuffed)</td>
</tr>
<tr>
<td>More than 2000 grams</td>
<td>More than 34 weeks</td>
<td>3.5 (uncuffed)</td>
</tr>
</tbody>
</table>

ETT insertion depth formula in cm: kg weight + 6
*(example: 1.5 kg + 6 = 7.5 cm depth)*

Consider nasal CPAP support for neonates with respiratory support
PEEP 5 for infants with spontaneous breathing.

**Rescue airway size for near term/term infants:** LMA size #1

Initial Ventilator settings:
- **Rate:** 40-60
- **PEEP:** 5
- **PIP:** 18-20
- **iTime seconds:** 0.35 to 0.4
- **If utilizing volume ventilation:** 5 ml/kg

**NOTE:** If using blended fiO2, titrate to maintain sats at 95%

**NOTE:** If no vent available, handbag with a rate of 40 BPM; PIP 20; PEEP of 5
# Neonatal Resuscitation & Stabilization

## Emergency Neonatal Medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Route</th>
<th>Comment / Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epinephrine 1 mg / 10 ml</td>
<td>0.2 ml / kg IV 1ml / kg ETT</td>
<td>IV, IO or UVC preferred ETT route</td>
<td>Rapidly followed by 3 ml NS flush Followed by PPV for lung distribution</td>
</tr>
<tr>
<td>Normal Saline 10 ml/kg</td>
<td>Slow IV push (slower infusion rate in preterm infants)</td>
<td>For clinical evidence of poor perfusion/volume loss Use cautiously with premature infants</td>
<td></td>
</tr>
<tr>
<td>Maintenance fluids (D10) 60 to 100 ml/kg/day</td>
<td>IV</td>
<td>Higher rate (100 ml/kg/day) for preterm infants</td>
<td></td>
</tr>
<tr>
<td>PGE / prostins / alprostadil 0.05 to 0.1 mcg/kg/min</td>
<td>Continuous infusion in dedicated IV</td>
<td>Monitor for apnea and hypotension</td>
<td></td>
</tr>
<tr>
<td>Prophylaxis Medications: Erythromycin</td>
<td>Ointment</td>
<td>Ointment to both eyes</td>
<td></td>
</tr>
<tr>
<td>Vitamin K 0.5 mg to 1.0 mg</td>
<td>Injection, IM</td>
<td>Give once</td>
<td></td>
</tr>
</tbody>
</table>

Call MedCom to arrange critical care NICU transport 888-862-2345
Rewarming Hypothermic Infant:

**Goal Temperature 98° F or 36.5° C**

1. Increase room temperature
2. Dry infant, loosely wrap body in plastic wrap, cover with warm blankets
3. If available, utilize radiant warmer set at 36.5° C with skin probe. If no skin probe available switch to manual mode and set at 36.5° C and check temperature every 15 minutes until stabilized.
4. The Neonatal Resuscitation Packet in the STORK Bag has a warming mat and infant hat. Use these supplies as appropriate.
5. If infant term/stable VS and no additional heat source is available consider skin to skin on mothers chest covered with warm blanket and closely monitor the infants temp/airway/color.

NOTE: Expect bradycardia in hypothermic infant, especially in code situations

NOTE: In critical settings, circulatory collapse may occur with rewarming process, be sure to monitor heart rate and blood pressure closely

**Goal is to SLOWLY rewarm the infant.**
**Monitor temperature every 15 minutes**

Call MedCom to arrange critical care NICU transport
**888-862-2345**