Purpose: To provide guidance to practitioners caring for pediatric patients during a disaster.

Disclaimer: This guideline is not meant to be all inclusive, replace an existing policy and procedure at a hospital or substitute for clinical judgment. These guidelines may be modified at the discretion of the healthcare provider.

---

**Initial Management of a Premature Neonate**

Initial management immediately following delivery should adhere to Neonatal Resuscitation Program (NRP) guidelines. This care guideline reviews the additional special care considerations for premature newborns.

Please see the [Newborn Care Guideline](#) for standard care of all newborns.

Contact the Pediatric Care Medical Specialist for guidelines on withholding and discontinuing resuscitation of a premature newborn.

---

**General Concepts for Caring for a Premature Neonate**

Premature neonates are at a much higher risk of developing complications than the term infant. The anatomy/physiology of a premature neonate increases their vulnerability to morbidity/mortality factors. Constant monitoring is necessary to determine when increased management and support are needed. Therefore, it is recommended that premature neonates be stabilized and then transferred to a center that is capable of providing neonatal intensive care as soon as safely possible given the circumstances of the disaster incident.
# Management of a Premature Neonate

## AIRWAY

### Preterm Neonates that require oxygen:
- Neonates with spontaneous respirations may be given supplemental oxygen per:
  - Neonatal nasal cannula at 1-2 LPM flow
  - Oxygen mask
  - Flow-inflating bag and mask
  - Oxygen hood or blow-by $O_2$ with $O_2$ tubing held close to neonate’s face
  - CPAP (if available) with a PEEP of 4 or 5

Consult Pediatric Care Medical Specialist for assistance with care if respiratory support needs go beyond the above methods.

### Preterm neonates that require assisted ventilation:
- Follow Neonatal Resuscitation Program (NRP) guidelines for initiating positive pressure ventilation (PPV):
  - Heart rate < 100 bpm
  - Gasping respirations
  - Apnea
- Use the appropriate sized bag for PPV—maximum volume of 750 mL, and appropriate sized neonatal mask
- Monitor inflation pressures carefully.
  - Initial inspiratory pressure of 15-20 cm H$_2$O
  - Deliver subsequent breaths with approximately 15 cm H$_2$O of pressure, or just enough pressure to see the chest rise
- Best indication that PPV is effective is:
  - Increasing heart rate
  - Auscultation of equal breath sounds bilaterally
  - Color improvement
  - Increased oxygen saturation per pulse oximetry

### Avoid hypoxia/hyperoxia
- All neonates receiving $O_2$ should have oxygen saturations closely monitored with pulse oximetry.
- Neonates ≤ 1250 grams at birth maintain SpO$_2$ between 85-92% with supplemental oxygen.
- Use an oxygen blender in the delivery of supplemental $O_2$ so that the FiO$_2$ may be titrated according to pulse oximetry.

### Preterm neonates that require prolonged assisted ventilation:
- Consider intubation. See endotracheal intubation below for more information.
- The potential risk for serious complications with intubation and ventilator management is high. It is recommended to consult the Pediatric Care Medical Specialist for assistance.

### Consider surfactant therapy for preterm neonates who have clinical signs of respiratory distress syndrome:
- Signs of impairment in oxygenation:
  - PaO$_2$ <50 mmHg in room air, central cyanosis in room air
  - $O_2$ required to maintain PaO$_2$ > 50mmHg, or required supplemental oxygen to maintain pulse oximeter saturation over 85% in the first 24 hours of life
  - Newborn is often tachypneic with grunting, nasal flaring and chest retractions. Lung sounds may be decreased with rales present.
- **AND** chest radiograph is consistent with Respiratory Distress Syndrome (reticulogranular appearance of lung fields with or without low lung volumes and air bronchograms within the first 24 hours of life)
- Should only be considered and administered by care providers with expertise in surfactant administration. The potential for complications with surfactant administration is high. Consult Pediatric Care Medical Specialist for assistance.
Endotracheal Intubation

Endotracheal tube size is determined based on the neonate’s weight or gestation.

<table>
<thead>
<tr>
<th>Weight (in grams)</th>
<th>Gestational Age (in weeks)</th>
<th>Endotracheal Tube Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1000 grams</td>
<td>&lt;28 weeks gestation</td>
<td>2.5 uncuffed*</td>
</tr>
<tr>
<td>1000-2000 grams</td>
<td>28-34 weeks gestation</td>
<td>3.0 uncuffed*</td>
</tr>
<tr>
<td>2000-3000 grams</td>
<td>34-38 weeks gestations</td>
<td>3.5 uncuffed*</td>
</tr>
</tbody>
</table>

*Cuffed endotracheal tubes are not recommended for the neonatal population.

Determine the initial depth of endotracheal tube insertion using the ‘Tip-to-lip’ rule:
Add 6 to the neonate’s weight in kg to determine the centimeter marking on the Endotracheal tube at the lip.
For example a neonate that weighs 2,030 grams: 6 + 2 (kg)= 8cm marking at the lip.
Correct Endotracheal tube placement is confirmed with chest x-ray, and should be at the level of T1- T3 (Below the clavicles and above the carina).

THERMOREGULATION

Premature neonates are at an increased risk of developing hypothermia and are more vulnerable to cold stress than the term neonate. The axillary temperature should be monitored within the first 30 minutes of life, and then every 1 hour, and should be maintained between 97.7° F and 99.5° F (36.5° C and 37.5° C). Continue to monitor temperature every 1-3 hours once stabilized.

Measures that may prevent hypothermia include:
1. Increase the room/delivery room temperature >25° C (77° F)
2. Use of radiant warmer for resuscitation if available
3. Use of chemical warming mattress
   a. Caution: Place receiving blanket on chemical warming mattress to avoid direct skin contact with warming device
4. Use of occlusive/polyethylene wrap or large plastic bag (i.e. gallon size food grade storage bag) for neonates <28-30 weeks gestation.
   a. Wrap neonate in occlusive wrap up to the neck, or insert entire body of neonate up to the neck in plastic bag
   b. Caution: Do not allow plastic to cover any part of the face
5. Use of knit hat
6. Neonates > 32 weeks gestation may be placed skin-to-skin with mother if stable. Place unwrapped, undressed neonate directly onto mother’s chest/abdomen and cover both with warm blankets.
7. To avoid burns, Never use hot water bottles or gloves filled with hot water to warm the neonate.
**HYPOGLYCEMIA**

There is no consensus as to what specific plasma glucose concentration defines a normal glucose value. Because premature neonates are at an increased risk of hypoglycemia, it is recommended that the blood glucose levels be maintained between >50 and <200mg/dL. Monitor blood glucose within the first hour of birth, and then every 1-3 hours if stable.

**IV FLUIDS**

- Establish IV access
- Preferred IV fluids for infusion during first 24 hours of life is D$_{10}$W
  - After 24 hours, consider need to add electrolytes
- Initial maintenance rate: 80 mL/kg/day
  - Calculation example: 1.8kg X 80mL divided by 24 = rate of 6 mL per hour
- Always administer IV fluids via infusion pump

**GLUCOSE BOLUS**

- For blood glucose < 50 mg/dL, administer a glucose bolus:
  - D$_{10}$W, 2 mL/kg at a rate of 1mL/min
  - Calculation example: 1.8kg X 2 = 3.6mL to be administered over 4 minutes
- Recheck blood glucose (use heel for site) within 15 min. post bolus infusion
- Repeat glucose bolus if blood glucose remains < 50 mg/dL
- Premature neonates with persistent low blood glucose may need to consider increasing IV glucose maintenance fluid rate or IV fluid glucose concentration. Consult Pediatric Care Medical Specialist for assistance with care

**ADDITIONAL SPECIAL CONSIDERATIONS FOR PREMATURE NEONATES**

**METHODS TO DECREASE RISK OF INTRAVENTRICULAR HEMORRHAGE**

- Handle the neonate gently
- Closely monitor pressures delivered if positive-pressure ventilation is needed
  - Avoid big changes in pulmonary pressures
  - Avoid delivering high pressures if possible
- Avoid rapid infusion of IV boluses and fluids
- Avoid hypertonic solutions
- Make any changes in care/management, (i.e. ventilation or O2 requirements), gradually and according to assessment of response

**ADDRESSING THE INCREASED RISK OF INFECTION**

- Obtain blood lab work to include blood cultures and CBC
  - IF UNABLE TO OBTAIN BLOOD WORK OR LUMBAR PUNCTURE, AND NEONATE AT RISK FOR INFECTION, ADMINISTER ANTIBIOTICS AS SOON AS POSSIBLE
- Initiate antibiotic therapy promptly:
  - Ampicillin: 100mg/kg IV every 12 hours. Infuse over 30 min.
  - Gentamycin: Consult Pediatric Care Medical Specialist for assistance with dosing.
### RISK FACTORS

<table>
<thead>
<tr>
<th>MATERNAL RISK FACTORS</th>
<th>NEONATAL RISK FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Hypertension</td>
<td>Prematurity (&lt;37 weeks)</td>
</tr>
<tr>
<td>Pregnancy-induced hypertension</td>
<td>Small for gestational age (&lt;10&lt;sup&gt;th&lt;/sup&gt; percentile for gestational age)</td>
</tr>
<tr>
<td>Illicit and certain prescription drugs use</td>
<td>Large for gestational age (&gt;90&lt;sup&gt;th&lt;/sup&gt; percentile for gestational age)</td>
</tr>
<tr>
<td>Tobacco, alcohol use</td>
<td>Intrauterine growth retardation (IUGR)</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>Infection</td>
</tr>
<tr>
<td>Premature or prolonged rupture of membranes</td>
<td>Birth trauma</td>
</tr>
<tr>
<td>Maternal infection</td>
<td>Meconium stained amniotic fluid</td>
</tr>
<tr>
<td>Oligohydramnios/Polyhydramnios</td>
<td></td>
</tr>
</tbody>
</table>

### UNIQUE ANATOMY/PHYSIOLOGY CONSIDERATIONS RELATED TO MEDICAL MANAGEMENT OF THE PREMATURE NEONATE

<table>
<thead>
<tr>
<th>MANAGEMENT</th>
<th>ANATOMICAL/PHYSIOLOGICAL CONSIDERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airway</td>
<td>• Weak chest muscle anatomy → may cause ineffective breathing</td>
</tr>
<tr>
<td></td>
<td>• Immature nervous system → decreased or absent respiratory drive</td>
</tr>
<tr>
<td></td>
<td>• Deficient surfactant production</td>
</tr>
<tr>
<td></td>
<td>• Vulnerable to hyperoxia</td>
</tr>
<tr>
<td></td>
<td>• Lung anatomy more fragile and less compliant than term neonates</td>
</tr>
<tr>
<td>Thermoregulation</td>
<td>• High risk of rapid heat loss → hypothermia</td>
</tr>
<tr>
<td></td>
<td>• Thin skin</td>
</tr>
<tr>
<td></td>
<td>• Large surface area to body mass ratio</td>
</tr>
<tr>
<td></td>
<td>• Decreased or no fat stores</td>
</tr>
<tr>
<td></td>
<td>• Risk of ↑ evaporative water loss → promoting heat loss</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>• Diminished glycogen stores: most hepatic glycogen stores are gained in the third trimester of pregnancy</td>
</tr>
<tr>
<td></td>
<td>• Decreased fat stores</td>
</tr>
<tr>
<td></td>
<td>• Potential increased glucose utilization due to respiratory distress, hypoxia, hypothermia</td>
</tr>
<tr>
<td>Intraventricular hemorrhage</td>
<td>• Fragile germinal matrix → increased risk in preemies &lt;32 weeks gestation</td>
</tr>
<tr>
<td>Increased risk of infection</td>
<td>• Immature immune system</td>
</tr>
<tr>
<td></td>
<td>• Association of preterm labor with maternal infection (i.e. chorioamnionitis)</td>
</tr>
<tr>
<td></td>
<td>• Preterm premature rupture of membranes, and/or rupture of membranes &gt; 18 hours</td>
</tr>
</tbody>
</table>