



HEALTH HOLDING

HAFER ALBATIN HEALTH  
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CHILDREN HOSPITAL

<b>Department:</b>	Neonatal Intensive Care Unit (NICU)		
<b>Document:</b>	Multidisciplinary Policy and Procedure		
<b>Title:</b>	Use of Pulse Oximetry in Neonates		
<b>Applies To:</b>	All NICU Staff and Biomedical engineers		
<b>Preparation Date:</b>	January 05, 2025	<b>Index No:</b>	NICU-MPP-006
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## 1. PURPOSE:

- 1.1 To monitor hemoglobin oxygen saturation of all neonates admitted to neonatology department units on admission and regularly all through their stay.
- 1.2 To monitor all infants receiving oxygen therapy in order to guide selection of the appropriate FiO<sub>2</sub>.
- 1.3 To monitor response to therapy e.g. during resuscitation, mechanical ventilation.
- 1.4 To monitor oxygenation during procedures.
- 1.5 During neonatal resuscitation immediately after birth when positive pressure ventilation is administered for more than few breaths, cyanosis is persistent or when oxygen is administered.

## 2. DEFINITIONS:

- 2.1 **Pulse Oximetry** is one of the vital signs that are continuously monitored for admitted neonates to the neonatology department units. It is documented routinely every 2 hours in the intensive care and every 4 hours in the intermediate care neonatology units and more frequently if needed.

## 3. POLICY:

- 3.1 The assigned nurse records SpO<sub>2</sub> every 2 hours and as needed in the patient's NICU Daily Flow Sheet.
- 3.2 Written physician order of accepted SpO<sub>2</sub> is required for all cases especially infants with congenital cyanotic heart disease.
- 3.3 Acceptable saturation for infants receiving oxygen:
  - 3.3.1 For preterm infants less than 36 weeks post-conceptional age:
    - 3.3.1.1 Keep SpO<sub>2</sub> between 91 – 95% (Upper limit of monitor; 95% and lower limit of monitor; 89%)
    - 3.3.1.2 Note that in preterm infants; at PaO<sub>2</sub> 80 mmHg (~97%) Retinopathy of Prematurity was detected.
    - 3.3.1.3 Several studies have shown that SpO<sub>2</sub> > 92% can be associated with PaO<sub>2</sub> ≥ 80 mmHg.
    - 3.3.1.4 The goal is to maintain adequate tissue O<sub>2</sub> delivery without harm to other organs. This can be accomplished by PaO<sub>2</sub> of 50-70 mmHg, results in SpO<sub>2</sub> of 89 -95%. Preferably the upper limit not to exceed 92%.
  - 3.3.2 For infants 36 or more weeks post-conceptional age:
    - 3.3.2.1 Keep SpO<sub>2</sub> between 92 -95% (Upper limit of monitor; 97% and lower limit of monitor 90%)
    - 3.3.2.2 Note that at SpO<sub>2</sub> 98% or more, in oxygen treated infants, the PaO<sub>2</sub> can be well above 100 mmHg (toxic range).
- 3.4 For infants in room air SpO<sub>2</sub> may reach 100%
  - 3.4.1 For preterm infants less than 36 weeks post-conceptional age:
    - 3.4.1.1 Acceptable SpO<sub>2</sub> 91-100% (Upper limit of monitor 100% and lower limit of monitor 91%).
  - 3.4.2 For infants 36 or more weeks post-conceptional age:

Acceptable SpO<sub>2</sub> 92 - 100% (Upper limit of monitor 100% and lower limit of monitor 92%)

3.5 Targeted pre-ductal (right hand) SpO<sub>2</sub> of infants at birth are:  
 At 1 minutes of age: 60-65%  
 At 2 minutes of age: 65-70%  
 At 3 minutes of age: 70-75%  
 At 4 minutes of age: 75-80%  
 At 5 minutes of age: 80-85%  
 At 10 minutes of age: 85-95%

3.6 Screening apparently healthy neonates for early detection of CCHD at the age of 24 hours or as late as possible if early discharge is planned to reduce the number of false positive results

- 3.6.1 SpO<sub>2</sub> in the right hand or foot should be > 95% and < 3% difference between right hand and foot
- 3.6.2 If SpO<sub>2</sub> in right hand or foot is < 90% repeat after one hour twice. If still < 90% consult cardiologist for echocardiogram
- 3.6.3 If SpO<sub>2</sub> is 90 - < 95% in the right hand and foot or SpO<sub>2</sub> > 3% difference between right hand and foot, repeat after 1 hour twice. If still the same, it is a positive test, consult cardiologist for echocardiogram

3.7 Episodes of hypoxia-hyperoxia should be avoided:

- 3.7.1 High alarm limit:  
 -If the baby's SpO<sub>2</sub> exceeds the target saturation for  $\geq 3$  minutes, FiO<sub>2</sub> may be decreased in increments of 2-3% every 5 minutes. Continue reducing inspired oxygen by 2-3% every 3-5 minutes until saturation is stable in targeted range.
- 3.7.2 Low alarm limit:
  - 3.7.2.1 If the baby's SpO<sub>2</sub> drops below 89% for preterm or 90% for term infants, or if associated with bradycardia, check if the baby has apnea. Babies having apneas need to breath to oxygenate: it may be more appropriate to stimulate, ambu bag or change ventilation settings rather than increase FiO<sub>2</sub>. Many preterm neonates respond to stimulation.
  - 3.7.2.2 If not responding, FiO<sub>2</sub> may be increased in increments of 5% every 1-2 minute, not to exceed the acceptable range of SpO<sub>2</sub>. Sick babies must be immediately assessed by the assigned physician.
  - 3.7.2.3 Check the following:
    - 3.7.2.3.1 Ventilator function and settings: to determine if it is the infant or a mechanical problem, manually ventilate the baby
    - 3.7.2.3.2 Position and patency of endotracheal tube or other oxygen delivery device e.g. nasal prongs or mask, and consider suctioning or repositioning.
    - 3.7.2.3.3 Lung problem; pneumonia, collapse, pneumothorax, hyperinflation
    - 3.7.2.3.4 Apnea; obstructive or central
    - 3.7.2.3.5 Seizures,
    - 3.7.2.3.6 Assess for sepsis.
    - 3.7.2.3.7 Metabolic or electrolyte abnormalities e.g. hypoglycemia, hypokalemia, hyponatremia, hypo- or hypercalcemia, hypo- or hypermagnesemia and acid-base disturbances.
    - 3.7.2.3.8 Infant's temperature; hypothermia or hyperthermia.

3.8 The assigned nurse should inform physician if it is necessary to increase and maintain the FiO<sub>2</sub> > 10% above the previous stable FiO<sub>2</sub> to maintain the saturation target.

#### 4. PROCEDURE:

4.1 Select the appropriate sensor and apply it to:

- 4.1.1 The palm or anterior part of a foot for infants weighing 500gm to 3kg.
- 4.1.2 Palm, thumb, great toe or index finger for infants weighing >3kg.

- 4.1.3 Whenever possible the sensor should not be on the same extremity as the blood pressure cuff.
- 4.2 Align the light emitting source and the photo detector so they are directly opposite each other.
- 4.3 Tighten sensor snugly to the skin but not so as to impede circulation.
- 4.4 Attach the sensor to the pulse oximeter's interconnecting cable and turn the monitor ON. If the pulse level is adequate, the monitor will display SpO<sub>2</sub> and pulse rate.
- 4.5 Set the high and low alarm limits as indicated above.
- 4.6 Assess the sensor site every 1 hour to be certain that the adherent bandage is not constricting the site and that the skin is intact and shows no signs of burn. Change the sensor site every 8 hours.
- 4.7 Note that tense peripheral edema, hypothermia, low tissue perfusion secondary to shock or hypovolemia and peripheral vasoconstriction may interfere with obtaining accurate readings.

## 5. MATERIAL AND EQUIPMENT:

- 5.1 Pulse oximeter
- 5.2 Connecting probes

## 6. RESPONSIBILITIES:

- 6.1 Physician
- 6.2 Nurse
- 6.3 Biomedical engineers to ensure monitors maintenance

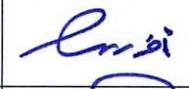
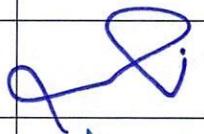
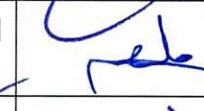
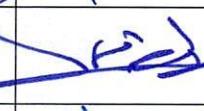
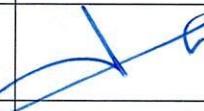
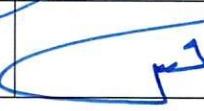
## 7. APPENDICES:

N/A

## 8. REFERENCES:

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9. APPROVALS:

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