# Blood Pressure Monitoring: Arterial Line

## Policy Group
- Cardiovascular

## Date Effective
- May, 2015

## Next Review
- May, 2018

## Approved by:
- **Gail Cameron**
  - Senior Director, Operations, Maternal, Neonatal & Child Health Programs
- **Dr. Ensenat**
  - Medical Director, Neonatology
- **Dr. Sharif Shaik**
  - Medical Director, Neonatology

## Purpose
To ensure safe management of arterial lines and allow frequent arterial blood sampling. To ensure safe management of arterial lines, continuous blood pressure monitoring and allow for frequent arterial blood sampling.

## Policy Statement
Accurate blood pressure monitoring is essential for the optimal management of the neonatal patient. Blood pressure is a physiologic parameter that aids in evaluation of clinical stability. Recognition and prompt treatment of blood pressure instability is vital in the Neonatal Nursery. Blood pressure may be measured using noninvasive or invasive methods. Noninvasive measurements are obtained using oscillatory arterial blood pressure measurement, whereas invasive blood pressure monitoring may be obtained via peripheral or central line arterial access. A monitoring device also provides a closed blood sampling system, allowing continuous blood pressure monitoring, minimizing blood loss with blood sampling and decreasing the risk for nosocomial infections. Arterial lines may present a risk for acute blood loss, therefore a monitoring device will be utilized to detect and prevent potential concerns relating to damaged lines, misconnections, accidental dislodgement and occlusions.

## Equipment
- Heparinized intravenous solution as ordered
- Anti-reflux tubing
- 10 cc syringe
- Line clamp
- Disposable Vamp Jr. transducer set
- Edwards blood pressure cable

## Procedure

<table>
<thead>
<tr>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perform hand hygiene, gather equipment, and don gloves. Maintain no touch technique for equipment in contact with IV solution.</td>
</tr>
<tr>
<td>2. Prepare anti-reflux tubing. Attach prepared IV bag to anti-reflux tubing. Fill set with solution removing all visible air.</td>
</tr>
<tr>
<td>3. Attach anti-reflux set to IV line port of Vamp Jr. set. Keep anti-reflux set open to allow for fluid movement during transducer set up.</td>
</tr>
</tbody>
</table>

## Rationale
- Standard precautions. Systemic infection may occur as a result of poor aseptic technique.
- IV solution is ordered. Refer to Heparin Use Policy for recommended guidelines for arterial line infusions.
4. Open reservoir plunger to approximately ½ mL. Facilitates the flow of priming solution.

5. Open shut-off valves (parallel to tubing), and hold sampling site above the reservoir at 45° angle. Allows air to rise and to be removed during the priming procedure.

6. Prime transducer set. Depress syringe plunger and provide flow by pulling Snap-Tab of the pressure transducer. Slowly deliver priming solution to remove air. Once the transducer head is primed, change the initial white open cap to the alternate white closed cap provided in the package. The initial white cap has an open end to help with priming. Replacing it with the alternate closed white cap provides a closed system and decreases the risk for introduction of infection.
7. Close plunger and remove all air from the system. Ensure that Vamp Jr. and IV line is filled with fluid. Air emboli may occur as a result of air in the tube. Symptoms include a decrease in BP; weak, rapid pulse; cyanosis; and loss of consciousness. Turn patient on left side with head of bed down if air emboli are suspected.

Air in the pressure system compromises the dynamic response of the system and interferes with accurate blood pressure measurement.

8. Load the IV administration set into the IV pump and start the pump. IV pump rate should not exceed 2 mL/hr to minimize fluid intake and should not be less than 0.5 mL/hr to ensure line patency.

9. Clamp the extension set on a peripheral arterial line or the UAC itself. Attach the Vamp Jr. set up to the end of the extension set or the UAC. No connector is used on luer lock UAC’s to reduce the amount of blood withdrawal and flush requirements.

10. Connect blood pressure cable to monitor and to disposable transducer.

11. Calibrate the monitoring system now and every shift using the procedure outlined below. Calibration helps to ensure accurate blood pressure values.

12. Restrain the limb when a peripheral artery catheter is in the arterial access. Hemorrhage may occur if the arterial line is accidently dislodged due to limb
site.

13. For peripheral arterial line use, secure the Vamp Jr. syringe reservoir with tape to prevent use. Blood sampling for PAL’s will not use the syringe reservoir.

14. Change the IV administration system and the transducer every 96 hours or if blood backs up into the pressure dome. This does not include the extension set immediately connected to the intracath on a PAL. Discard the transducer when it is changed or discontinued into Biohazard waste bins. Clean the monitoring cable and return it to its proper storage space.

15. Observe the system hourly for blood clots, a dampened or flat waveform, the limb’s color and perfusion, and perfusion to the legs with an UAC. Thrombosis may occur as a result of arterial damage or inadequate heparin infusion. If occlusion is suspected or waveform dampens or flattens, notify the physician/designate immediately.

Calibration Procedure

- Once an infant is connected to arterial pressure monitoring, the monitor is calibrated immediately, at the beginning of each nurse’s shift, and whenever the line has been disconnected.

**ACTION**

1. Position the transducer head horizontally so that the stopcock port is at heart level.

**RATIONALE**
2. Clamp the arterial line closest to the patient by either clamping the extension set or by turning the valves on the Vamp Jr. off (turning the valve perpendicular to the line). Ensure the line is off to the patient to prevent accidental hemorrhage.

3. Turn the stopcock off to the patient side. Open the transducer head. Alternate white closed cap does not need to be completely removed, just loosened.

4. Check to ensure that there is no backflow of blood. In the event a line is not clamped off to the patient, blood will back up quickly.

5. Depress the soft key labeled zero on the blood pressure module until a tone is emitted. Alternately, touch the blood pressure reading on the screen to bring up a list of options, scroll down to and press “Zero ABP”.

6. The zero and calibration process is complete when the monitor states that the line has been calibrated.

7. Close the transducer head.

8. Open the stopcock.

9. Unclamp the arterial line to the patient by either unclamping the extension set or by
turning the valves on the Vamp Jr. open  
(turning the valve parallel to the line).

10. Document in the nursing flowsheet that calibration has been done.

Possible causes of a dampened waveform:
- Catheter too small
- Clot forming on catheter
- Loose connections
- Catheter or blood pressure tubing kinked
- Air between transducer diaphragm and head
- Occlusion forming

Related Documents
Adapted with permission from Stollery Children’s Policy and Procedure Manual:  
http://www.intranet2.capitalhealth.ca/nicu/pages/policiesprocedures/policiesprocedures_new.htm
Blood Pressure – Arterial Lines, December 2009

RELATED POLICIES AND PROCEDURES
Assessment of the Newborn
Blood Sampling, Arterial Lines
Heparin Use

References
Inservice Bulletin  

Revisions
July 2005
December 2009
May 2015
## Signing

<table>
<thead>
<tr>
<th>Original Signed</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAIL CAMERON</td>
<td>7 May 2015</td>
</tr>
<tr>
<td>SENIOR DIRECTOR OPERATIONS</td>
<td>DATE</td>
</tr>
<tr>
<td>MATERNAL, NEONATAL &amp; CHILD HEALTH PROGRAMS</td>
<td></td>
</tr>
<tr>
<td>COVENANT HEALTH</td>
<td></td>
</tr>
<tr>
<td>GREY NUNS &amp; MISERCORDIA HOSPITALS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DR. SANTIAGO ENSENAT</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDICAL DIRECTOR</td>
<td></td>
</tr>
<tr>
<td>NEONATAL PROGRAM</td>
<td></td>
</tr>
<tr>
<td>COVENANT HEALTH</td>
<td></td>
</tr>
<tr>
<td>GREY NUNS HOSPITAL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Original Signed</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR. SHARIF SHAIK</td>
<td>14 May 2015</td>
</tr>
<tr>
<td>MEDICAL DIRECTOR</td>
<td>DATE</td>
</tr>
<tr>
<td>NEONATAL PROGRAM</td>
<td></td>
</tr>
<tr>
<td>COVENANT HEALTH</td>
<td></td>
</tr>
<tr>
<td>MISERCORDIA HOSPITAL</td>
<td></td>
</tr>
</tbody>
</table>