BLOOD PRESSURE MONITORING IN NEWBORN CARE CENTRE

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INTRODUCTION
Blood pressure (BP) measurement is an important vital sign to monitor in infants admitted to a neonatal intensive care unit (NICU).

1. AIM
   - To provide guidance on timing and frequency of blood pressure monitoring for infants admitted to the NCC

2. PATIENT
   - Newborns

3. STAFF
   - Medical and nursing staff

4. EQUIPMENT
   - Drager Monitor in Level 3 for continuous intra-arterial measurement in infants with indwelling arterial catheters via transducer
   - SpaceLab Monitor in other clinical areas
   - Non-invasive blood pressure devices

CLINICAL PRACTICE
Blood pressure measurement and monitoring should be performed in the following circumstances:

- All neonates on admission to NCC
- Infants with an intra-arterial line in situ need BP monitored by continuous intra-arterial blood pressure monitoring and hourly documentation of BP in the Neonatal Observation Chart
- Infants admitted to Level 3 should initially have 1-4 hourly non-invasive BP measurements according to their clinical needs, with less frequent monitoring 4-12 hourly when their condition is stable
- Infants who are unwell or unstable for any reason (signs of clinical changes eg. lethargy, poor perfusion, unstable respiratory status) need regular BP monitoring at least every 4 hours until their condition stabilises
- Infants on inotropic or vasoactive medications with no indwelling intra-arterial catheters need non-invasive BP monitoring at least every hour
- Post-operative or post-anaesthetic babies
  - Initial post-operative infants returning to NCC from theatres every 30 minutes for 2 hours
  - Increase the frequency or duration of observations if clinically stable after first 2 hours
  - For stable infants, monitor BP every 4 hours for the first 24 hours as a minimum
- Infants with renal conditions: initially monitor BP 4-6 hourly or as prescribed by the medical team
- Infants with cardiac conditions: initially monitor BP 4-6 hourly or as prescribed by the medical team
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Measuring blood pressure invasively:
- See the following NCC LOPs:
  - Arterial Line - Blood Sampling
  - SAFESET Intra-Arterial Line Set – Set up and priming

Measuring blood pressure non-invasively (Oscillometric method):
- Choose appropriate size blood pressure cuff that covers at least 2/3 of length of upper arm or lower leg/calf.
- Apply inflatable cuff to infant’s limb
- Connect inflatable cuff hose to the BP monitor hose
- Press “start” button

NB. Limitation with this method is that values tend to be too high for smaller infants and may be too low for larger infants

5. DOCUMENTATION
- eMR nursing notes
- Daily Care Plan
- Neonatal Observation Chart

6. EDUCATIONAL NOTES
- There are only a few small studies on the practical and predictive applicability of BP measurements in preterm infants.1,9
- BP monitoring is only part of the assessment of adequate circulation and tissue perfusion in the newborn. There is often a poor relationship between BP and either cardiac output or blood volume in preterm infants.10
- BP increases steadily in the first week of life in very premature neonates. Preterm infants generally stabilize their BP after 14 days of life and at this time they have a BP similar to that of term infants.1,9

Normal BP range
- The normal physiologic BP range ensuring appropriate organ perfusion in the neonate is unknown.11
- Hegyi et al9 reported that the maximum and minimum systolic and diastolic BP during the first 7 days of life in premature infants with birthweight less than 2000 grams increased daily for the first 7 days of life. They derived the following formula for normal BP range during the first week of life:
  - Minimum Systolic (mmHg) = 1.8(DAY)+43
  - Maximum Systolic (mmHg) = 2.6(DAY)+57
  - Minimum Diastolic (mmHg) = 1.3(DAY)+24
  - Maximum Diastolic (mmHg) = 2.0(DAY)+36

Hypotension
- Agreement on the definition of hypotension in preterm infants is still lacking.
- For very low birth weight (VLBW) infants, a good rule of thumb is to aim for the baby’s gestational age in weeks as the desired minimum mean BP.12,13 For example, for a 24 weeks gestation infant, aim for a mean arterial pressure of 24 in the first few days of life.
- A postal questionnaire sent to all 120 NICUs in Canada, which had a 79% return rate (95 replies), found that 25.8% relied on BP values as the sole criteria for intervention. A BP less than gestational age in weeks was the most common trigger for treatment.14
- There is controversy over how active to be in treating a low BP in an otherwise stable premature infant. Decision to treat hypotension should be based on the general condition of the infant, not on the mean arterial BP alone.
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**Hypertension**
- Hypertension in the term infant has been defined as a systolic BP > 90mmHg or a diastolic > 60mmHg. In preterm infants a systolic pressure > 80mmHg or a diastolic BP > 50mmHg has been used.\textsuperscript{15,16}

7. RELATED POLICIES/PROCEDURES/CLINICAL PRACTICE LOP
- Arterial Line - Blood Sampling
- SAFESET Intra-Arterial Line Set – Set up and priming

8. RISK RATING
- Medium

9. NATIONAL STANDARD
- Standard 1 Governance for Safety and quality in Health Service Organisation
- Standard 11 Service Delivery
- Standard 12 Provision of Care

10. ABBREVIATIONS AND DEFINITIONS OF TERMS

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11. REFERENCES

12. \url{http://www.newbornnetworks.org.uk/staffs/documents/Hypotension-evidence.pdf}
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12. AUTHOR:

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FOR REVIEW: