

 <p>NEONATAL CLINICAL PRACTICE GUIDELINE</p>	Title: Physiologic Monitoring and Assessment of Neonates in Neonatal Units	
	Approval Date: March 2016	Pages: 1 of 8
	Approved by: Neonatal Patient Care Teams, HSC & SBH Child Health Standards Committee	Supercedes: HSC: 80.275.362 SBH: none

1.0 **PURPOSE AND INTENT:**

- 1.1 To provide a process for safe and accurate monitoring and assessment of a neonates condition in neonatal units within the WRHA and during transportation within the hospital complex.

2.0 **PRACTICE OUTCOME**

- 2.1 Optimize response to changes in patient's condition and prevention of patient safety events.

Note: All recommendations are approximate guidelines only and practitioners must take in to account individual patient characteristics and situation. Concerns regarding appropriate treatment must be discussed with the attending neonatologist.

3.0 **GUIDELINES**

Cardio-Respiratory Monitoring

- 3.1 Monitor all neonates meeting any of the following criteria with a cardiorespiratory monitor unless there is a physician/NNP order to the contrary:
- Documented episodes of apnea or bradycardia (see guideline for [Management of Cardiorespiratory Events in Newborns](#))
 - ≤ 2000 gram current weight
 - Infants <35 weeks corrected gestational age
 - Potential or actual airway instability
 - Intubated and mechanically ventilated
 - Maintained on nasal continuous positive airway pressure (NCPAP)
 - Critical transfers to the Operating Room
 - A respiratory depressant administered within the previous 4 hours (excluding maintenance Phenobarbital)
 - Receiving oxygen therapy
 - A significant congenital cardiac anomaly present (see table in appendix)
 - For 24 hours following any anesthesia or procedure requiring conscious sedation
 - Growing premature infants born at less than 35 weeks or those with a history of apnea with routine Immunization administered – monitor for at least 24 hours post administration
- 3.2 Monitor neonates going for the following tests during transport and testing:
- CT scan / MRI.
 - Sleep study.
 - Cardiaccatheterization.
 - GI series
- 3.3 Monitoring during transport is **not required** when:
- There is a physician/NNP order to discontinue cardiac monitoring.
 - A neonate is being transferred to a unit where cardio-respiratory monitoring will be discontinued.
 - Neonate is full term with no cardio/respiratory problems.

- 3.4 Neonates not falling into any of the above criteria are monitored based on a collaborative decision of the bedside nurse, Clinical Resource Nurse or Charge Nurse and physician/NNP.
- 3.5 Obtain a written physician's order to discontinue any monitoring parameters.
- 3.6 Ensure that all monitor alarms are activated (not suspended) unless the patient is under constant observation.

Assessment Guidelines

- 3.7 Manually assess heart rate, respiratory rate and temperature a minimum of approximately every 6 hours. Timing is based on assessment of the infant to ensure that sleep is protected.
- 3.8 Set cardio-respiratory monitor alarm limits at the following unless there is a physician/NNP order indicating other parameters:

Population	Parameter	Limit
All infants	High heart rate	200
>28 Weeks Gestation	Low heart rate	80
≤28 Weeks Gestation	Low heart rate	100

- 3.9 Set oxygen saturation alarm limits according to the guideline [Oxygen Therapy in Newborns](#).
- 3.10 All invasive arterial catheters are monitored by a transducer. Zero when transducer initiated and at least every 12 hours and when readings are in doubt. Level and adjust position of the transducer in relation to the heart (right atrium) and each time that the neonate's position is changed.
- 3.11 For neonates with the following conditions who do not have invasive blood pressure monitoring lines, check blood pressure manually at least once a day. See Appendix B for normal values
 - Suspected or confirmed sepsis.
 - Broncho-pulmonary dysplasia (BPD).
 - Impaired renal function.
 - Impaired respiratory function requiring ventilation or NCPAP.
 - Impaired cardiac function.
 - Documented thrombus.
 - Receiving cardiac drugs or any medication that may affect blood pressure including diuretics.
 - Other clinical indications or changes in patient status as assessed by the nurse.
- 3.12 Assess pain as outlined in the Clinical Practice Guideline "[Pain and Sedation Assessment and Management in Newborns](#)".

Fluid and Hydration Status Assessment

- 3.13 Perform physical assessment of hydration and review fluid status every 4-6 hours or more frequently as clinically indicated.

- 3.14 Perform accurate daily calculation of input and output unless and document in the clinical data record for the following indications (otherwise ordered by the Physician/NNP). Calculate fluid balance more frequently as ordered.
- Renal failure acute or chronic
 - All infants less than 32 weeks gestation – continue for 24-72 hours and then reassess
 - Sepsis suspected or confirmed
 - Infants requiring nephrotoxic antibiotics such as vancomycin and gentamicin
 - Respiratory distress
 - Congenital heart disease suspected or confirmed
 - Clinically significant Patent ductus arteriosus Suspected or confirmed
 - Treatment with indomethacin or ibuprofen
 - Congestive heart failure
 - Hyperglycemia
 - Dehydration
 - Hyperbilirubinemia during treatment with phototherapy
 - Post-operatively
 - Congenital abnormalities of the genito-urinary tract
 - Neonates not falling into any of the above criteria on a physician's order.

Assessment of Neurologic Status

- 3.15 Assess neurologic status q4-6 hours unless otherwise ordered by the Physician/NNP for the following indications. Vacuum extraction (See Guideline for [Care of Infant Following Vacuum Extraction](#))
- Hypoxic ischemic encephalopathy suspected or confirmed (with or without hypothermia therapy)
 - Altered level of consciousness not yet diagnosed
 - Seizures suspected or confirmed
 - Sepsis suspected or confirmed
 - Intra-cranial bleeds
 - Post-op neurosurgery (such as ventriculo-peritoneal shunts)
 - Ventricular taps
 - Myelomeningocele
- 3.16 Neurologic assessment includes: level of consciousness, limb movements and tone, gag, suck, response to stimuli, fontanel, head circumference and vital signs. It may include assessment of pupils as required for term infants.
- 3.17 Document on Clinical Data Record, Neurological record or NICU Special monitoring sheet.

Chronic / Long Term Infants and Infants Who Do Not Require Continuous Cardio-Respiratory Monitoring

- 3.18 Assess and record heart rate and respiratory rate manually a minimum of every 6 hours.
- 3.19 Measure and record temperature a minimum of once a shift. If elevated, notify Physician/NNP and monitor every 4-6 hours until resolved.
- 3.20 Obtain a non-invasive blood pressure only when there are clinical indications or changes in the infant's condition.

- 3.21 Observe the infant's condition and general status at least once every hour. This is documented on the clinical data record.
- 3.22 Assess neonates rooming in with their mother in preparation for discharge, at least every 4 hours. Document on the clinical data record.

Monitoring Neonates Post Procedure or Surgery

- 3.23 Immediately upon admission from the operating room or after any invasive procedure including biopsies, heart catheterization, exchange transfusion or ventricular taps, assess and document heart rate, respiratory rate and blood pressure; SpO₂
- q15 minutes x 4
 - q 30 minutes x 2
 - q 60 minutes ongoing

Monitoring During Transportation Within the Hospital

- 3.24 Neonates meeting the following criteria are accompanied by a physician when leaving the clinical unit:
- Intubated and mechanically ventilated.
 - Potential or actual airway and/or cardiovascular instability.
 - Respiratory depressant administered within the previous 4 hours (excluding maintenance Phenobarbital)
- 3.25 Monitor cardio-respiratory status unless the infant is determined stable enough by the bedside nurse and charge nurse to monitor only oxygen saturation.
- 3.26 For critically ill or unstable patients monitor both cardio-respiratory parameters and oxygen saturation.
- 3.27 Ensure the following equipment accompanies the nurse and patient:
- Portable suction if required ,
 - Stethoscope,
 - Self-inflating bag and appropriate sized mask.
- 3.28 When transporting a neonatal patient who has potential for cardiorespiratory events carry an oxygen tank and anesthesia / flow inflating or self-inflating bag even if the patient is not on oxygen therapy.
- 3.29 Consider taking "Emergency Equipment Bag / Backpack" for all unstable infants. This bag contains airway and IV supplies.
- 3.30 The type of transport bed will depend on the clinical situation and the appropriateness of the bed for the patient's needs.
- 3.31 When transporting a neonatal patient who is intubated a CO₂ detector accompanies the patient.

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5.1 **PRIMARY AUTHORS**

- 5.1 Karen Bodnaryk & Tanya Tichon: Neonatal Nurse Educators, HSC
- 5.2 Doris Sawatzky-Dickson, Neonatal Clinical Nurse Specialist, HSC
- 5.3 Barbara Wheeler, Neonatal Clinical Nurse Specialist, SBH
- 5.4 Ceceile Porter, Neonatal Nurse Educator, SBH

APPENDIX A

Congenital Cardiac Lesions Requiring Continuous Physiologic Monitoring

Most consistently cyanotic:

- Hypoplastic left heart syndrome (HLHS)
- Pulmonary atresia with intact septum (PA IVS)
- Total anomalous pulmonary venous return (TAPVR)
- Tetralogy of Fallot (TOF)
- Transposition of the great arteries (TGA)
- Tricuspid atresia
- Truncus arteriosus

Maybe cyanotic:

- Coarctation of the aorta (COA)
- Double outlet right ventricle (DORV)
- Ebstein anomaly
- Interrupted aortic arch (IAA)
- Single ventricles

Adjusted on July 4th 2018 by Yasser Elsayed and Karen Belen
 Blood pressure ranges for the first day of life:

Gest age weeks	Systolic			Diastolic			Mean(derived)			Pulse Pressure
	Highest (95%)	Mean (50%)	Lowest (5%)	Highest (95%)	Mean (50%)	Lowest (5%)	Highest (95%)	Mean (50%)	Lowest (5%)	Mean (50%)
22	55	39	22	31	23	14	39	28	17	16
23	56	40	23	32	24	15	40	29	18	16
24	57	42	25	33	25	16	41	31	19	17
25	58	43	26	34	26	17	42	32	20	17
26	60	44	27	35	27	18	43	33	21	17
27	61	45	29	36	28	19	44	34	22	17
28	63	47	31	37	29	20	46	35	24	18
29	64	48	33	38	30	21	47	36	25	18
30	66	50	35	39	31	22	48	37	26	19
31	68	51	36	40	32	23	49	38	27	19
32	69	52	37	41	33	24	50	39	28	19
33	70	53	38	42	34	25	51	40	29	19
34	71	55	40	43	35	26	52	42	31	20
35	73	57	41	44	36	27	54	43	32	21
36	75	59	42	45	37	28	55	44	33	22
37	76	60	44	46	38	29	56	45	34	22
38	77	61	46	47	39	30	57	46	35	22
39	79	62	47	48	40	31	58	47	36	22
40	81	64	48	49	41	32	60	49	37	23
41	82	65	50	50	42	33	61	50	39	23
42	84	67	51	51	43	34	62	51	40	24

Blood pressure ranges for Post – menstrual age (in weeks)

age	systolic			Diastolic			Mean(derived)			Pulse Pressure
weeks	Highest (95%)	Mean (50%)	Lowest (5%)	Highest (95%)	Mean (50%)	Lowest (5%)	Highest (95%)	Mean (50%)	Lowest (5%)	Mean (50%)
24	68	49	33	46	29	14	53	36	20	20
25	69	51	36	47	30	15	54	37	22	21
26	70	52	38	48	31	17	55	38	24	21
27	71	54	40	49	32	18	56	39	25	21
28	72	55	41	50	33	19	57	40	26	21
29	73	56	42	51	34	20	58	41	27	21
30	75	59	43	52	35	21	60	43	28	23
31	78	61	46	53	36	22	61	44	30	24
32	80	62	48	54	37	23	63	45	31	25
33	81	63	50	55	38	24	64	46	33	25
34	83	66	51	56	39	25	65	48	34	26
35	84	69	52	57	40	26	66	50	35	27
36	87	71	55	58	41	27	68	51	36	29
37	89	72	57	59	42	28	69	52	38	30
38	90	75	59	60	43	29	70	54	39	30
39	91	78	60	60	44	30	70	55	40	30
40	92	80	61	61	45	30	71	56	40	31
41	93	81	62	62	46	31	72	58	41	31
42	95	82	63	63	47	32	74	59	42	32
43	97	83	65	64	48	33	75	60	44	33
44	98	86	67	65	49	34	76	61	45	33
45	100	88	69	66	50	35	77	63	46	34
46	102	89	71	66	51	36	78	64	48	36

The tables designed and adjusted from the article by:
 Dr. Karen Belen, MD
 Dr. Yasser Elsayed, MD
 Health sciences Centre, Winnipeg, Canada

Derived from Zubrow, A.B., Hulman, S., Kushner, H. & Falkner, B. (1995). Determinants of blood pressure in infants admitted to neonatal intensive care units: A prospective multicenter study. *Journal of Perinatology*, 15(6), 470-479