Munson Medical Center's Neonatal Intensive Care Unit's

Nursing Standards of Care

2023

The NICU Nursing Standards of Care (SOC) are intended to inform bedside nursing practice by using and maintaining current evidence based practices, recommendations, and guidelines.

Nursing interventions provided should keep the patient at the center while aiming to achieve optimal outcomes.

These SOC were created using the highest level of evidence, current best practices, guidelines, and recommendations available at the time.

These Nursing SOC will be maintained and updated by the NICU Unit Action Council on an on-going basis as new evidence, best practices, guidelines, and recommendations emerge.

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All equipment will be weight, size, and age appropriate. Safety checks will be done and documented within the first two hours of care.

1. **Patient Identification** – All infants will wear a Munson identification (ID) band at all times
    a. ID band will be applied before transfer to NICU
        i. Infants from another facility will be identified upon arrival to NICU by 2 staff and have a Munson ID applied
    b. Infants are identified by two patient identifiers: **name and medical record number**
        i. The oncoming nurse will verify bedside barcode card to the **patient ID band on the patient** at the hand-off report
            1. One (1) bar-coded ID label containing the patient name, DOB, and MRN will be affixed to the infant's bed
        ii. The two-patient identifiers of name and medical record number will be used in accordance with National Patient Safety Goals prior to administering
            1. Medications
            2. Blood or blood components
            3. Collecting blood samples or other specimens for clinical testing
            4. Providing treatments of procedures
    c. The on-coming nurse will verify and document the identification of the patient in Power Chart iView on *Safety ADLs* or *Ad Hoc* at the time of 1st assessment
    d. In case an ID band needs to be replaced, 2 staff will ID from the old band and apply a new band
    e. **Privacy Code** will be given ONLY to the patient's parents/legal guardian for purposes of HIPPA information sharing over the phone
        i. The RN being asked to provide patient information over the phone will request the Privacy Code at the start of each phone conversation prior to providing any patient information
        ii. Privacy Code consists of the **LAST five (5) digits of the patient's MRN**
        iii. If the caller cannot provide the privacy code, then patient information will not be shared with the caller.
2. **Patient Security** –

   a. HUGS tags will be placed on all infants when developmentally appropriate
      i. Refer to the MMC Hugs Infant/Child Security System Policy for more detailed information

3. **Bag and Mask** –
   a. Every patient will have a self-inflating bag with appropriate-sized mask at the bedside
   b. Intubated patients will have a self-inflating bag and a Neopuff with appropriate sized mask at the bedside
      i. Neopuff settings will be set to match the vent and FiO2 settings, or according to NRP recommendations (25/5 (PIP/PEEP))

4. **Suction** –
   a. Suction regulator ON at all times to be set between 80 – 100 mm Hg. Continuous and intermittent suction pressures should be maintained between 80 - 100 mm Hg.
      i. Suction will be silenced when using the Neosuckers with the covers, or by clamping the suction tubing with a blue Kelly clamp
   b. Suction equipment (tubing and canister) to be changed Q 24 hrs when is use, and PRN when visibly soiled
      i. Label with date and time changed
   c. Sterile water for cleaning tubing, NeoSucker, to be changed Q 24 hrs
      i. Label with date and time changed
   d. In-line suction catheter should be connected to suction tubing at all times and locked when not in use
      i. See Ventilator-Associated Pneumonia (VAP) Prevention Bundle Guidelines for further details related to care of intubated patients
   e. Oral and endotracheal suction canisters should be separate
      i. Do not 'Y' suction tubing to a single canister
   f. For gastric decompression, a Replogle should be used
      i. Intermittent suction should be utilized to prevent gastric irritation

5. **Bedside Emergency Basket** –
   Emergency equipment will include
   a. CO2 detector
   b. NeoSucker

i. 1 Purple
ii. 1 Yellow

c. Mask
i. ELBW
ii. Preemie
iii. Term

d. Self-inflating Bag with accessible O2

6. **Emergency Drug Calculator** –
Each patient will have a NICU Emergency Drug Calculator at their bedside in their grey chart
a. Drug Calculators will be generated:
i. Upon admission
ii. Once patient surpasses birthweight
iii. Q Saturday night
b. Drug Calculators require review and verification by 2 RNs
7. **Cardio-Respiratory Monitor** –
a. All patients must be on EKG and PulseOx monitoring and follow the MMC Cardiac & Hemodynamic Monitoring policy
i. NAS patients may be removed from PulseOx monitoring with a Provider order.
b. Alarm Limits
i. All parameters monitored continuously must have alarm limits on and set at:
1. Heart Rate – 100 - 200
2. Respiratory Rate – 20 - 100
3. SpO2 saturation –
a. **Non**-PPHN patient parameters:
i. Monitor limits = 88 – 97 (100 if on room air)
1. **Goal saturations** = 90-95%
b. PPHN patient parameters:
i. Monitor limits = 93 – 99 (100 if on room air)
1. **Goal saturations** = 95-98%
4. Apnea alarm 20 seconds
c. Oxygen With Love (OWL) cards will be posted on all monitors of patients receiving oxygen
d. Documentation
i. Alarm limits will be documented in PowerChart at the start of the shift and with alarm limit changes
8. **Patient Bed/Environment** –

a. Bed wheels will be locked at all times except during transfer
b. Side rails on radiant warmers and open cribs should be up at all times unless a caregiver is next to the bedside
c. Locks on incubator doors, portholes, and warmer walls will be used at all times
d. Safety belts should be used when infants are placed in swings, car seats, vibrating chairs, or strollers per manufacturers recommendations
e. No co-bedding infants
f. Infants are placed "back to sleep" one stable in crib
    i. See Safe Sleep guidelines for more information
g. All "high-touch" hard surfaces will be wiped down with a hospital approved disinfecting product at least once a shift
h. Per manufacturer's instructions the Giraffe isolette, water reservoir, and air filter will be changed according to the table below:

Device or Component	Use Condition	Minimum Frequency	Notes
Giraffe OmniBed Carestation	0-75% noncondensing humidity	Every 2 weeks	Cleaning and disinfecting the device is required between each patient use. Clean and disinfect the device and check the air filter. Clean and disinfect the incubator if required or after use with infectious patients.
	> 75% humidity, or visible condensation	Every 1 week	In the presence of high humidity (> 75% RH), it is possible for condensation to develop on the inside panels of the system microenvironment. The condensate is likely to accumulate in the pan under the mattress deck.
Water Reservoir	In use	Every 1 week	The humidity water reservoir should be cleaned and disinfected weekly, and when humidity use is discontinued.
Air Filter	In use	Quarterly	Changing the air filter quarterly is a minimum requirement. The air filter should also be changed when visibly dirty or following bed use with infectious patient. When you replace the filter, mark the date on the label supplied with the filter and affix it above the air filter cover panel.

9. **Neonatal Crash Cart & Defibrillator** –
    a. The NICU crash cart will be checked daily

i. If the crash cart is used, or expires before use, follow the instructions on the back of the Neonatal Crash Cart Checklist (form # 10749) to obtain a replacement cart from Central Transport.

b. The defibrillator will be checked daily and documented on the Neonatal Crash Cart Checklist
c. Every Monday the defibrillator needs to be checked by the Charge Nurse, before noon.

10. **Medication Administration** –
    a. All staff working in the NICU will adhere to the Medication Administration policy
    b. Controlled Substance Handling in the NICU:
        i. When controlled substances are used in the NICU, all staff will adhere to the Pharmaceutical Waste Management policy
            1. Specifically the section on *Wasting Pharmaceuticals in the Patient Care Areas (non-Hazardous Waste)* section
                a. Staff will utilize the *Cactus Sink* on the unit
            2. Staff will resolve and report discrepancies as soon as they are identified according to the Controlled Substances policy
    c. Utilizing a Nasal Atomizer to administer intra-nasal Versed:
        i. If ordered to administer intra-nasal Versed refer to the Intranasal Administration of Medications Using Nasal Atomizer policy
    d. Inotropic medications (Dopamine, Dobutamine, Epinephrine) cannot be titrated by the bedside RN; each dose change requires an order modification
        i. The Provider should place a nurse communication order for what the acceptable mean arterial pressure (MAP) range is.
        ii. If this order is not entered by the initiation of medication administration the RN will request a range order be entered by the Provider ASAP

11. **Breast Milk Administration** –
    a. Before breast milk feeding, the infant and milk match should be verified, using two patient identifiers.
        i. This may be accomplished by a double-check with another healthcare provider or the patient's parents
            1. Meticulous attention is necessary to ensure that the correct milk is given to the infant
    b. Documentation:

i. Document the two patient identifier double-check in PowerChart

12. **Infection Prevention** –

To decrease healthcare-associated infections (HAIs) and promote compliance with guidelines recommended by regulatory bodies and experts in the field of infection prevention

a. **Considerations**:

i. All employees in the neonatal intensive care unit (NICU) must be familiar with and comply with all hospital-wide infection prevention policies and procedures, including standard precautions, hand hygiene, and medical waste handling and disposal

ii. The most important infection prevention practices are:

1. Proper hand hygiene
2. Aseptic technique and standard precautions
3. Early recognition of potential problems and use of appropriate barrier techniques (e.g., isolation)

iii. The attending physician or allied health professional (AHP) should

1. Determine criteria for admission and readmission of infants in the NICU
2. Review status of infants to detect occurrence of transmissible infections

iv. Eating or drinking in the NICU should be limited according to local and state health laws. Water may be available for breastfeeding mothers in a covered container

b. **Nursing Knowledge**:

i. General infection prevention practices include:

1. Hand hygiene should be performed
   a. Before and after infant contact
   b. Before handling an invasive device for infant care
   c. After contact with body fluids or excretions, mucous membranes, non-intact skin, or wound dressings
   d. When moving from a contaminated body site to another body site during care of the same infant
   e. After contact with inanimate surfaces and objects in the immediate vicinity of the infant
   f. After removing sterile or nonsterile gloves

2. Parents are to use germicidal wipes to regularly wipe cell phones before and after use and then perform hand hygiene before touching their infant
3. Parents are encouraged to wear gloves when changing diapers
4. "Wash in and out": Follow hand hygiene procedures before entering and after leaving infant bed spaces, whether clean areas or isolation rooms.
    a. Frequent use of waterless hand sanitizer is encouraged.
    b. Containers of waterless hand sanitizer should be available at each infant bedside
5. Wipe down all surfaces before care, including ventilator, incubator, or warmer and monitor buttons
    a. It is important to note that no disinfectant should be used inside the incubator, where the infant may inhale the fumes

c. **Process**:
    i. Infant management
        1. Upon admission and throughout stay, all infants are checked for signs of infection and placed on isolation care as indicated
    ii. Equipment and supplies
        1. Each infant has his or her own supply of daily articles for care
        2. Do not stock more than 24 hrs worth of supplies at any infant's bedside
        3. Shared equipment is minimized
            a. Any shared equipment (e.g., scales) is cleaned with hospital-grade cleaner before use by another infant
        4. All disposable equipment is discarded or recycled appropriately after use. Guidance for length of use of each type of disposable equipment is developed according to manufacturer guidelines, infection prevention principles, and applicable literature
        5. Suction tubing and canisters are changed on a regular basis as defined by the hospital
            a. Q24 hrs from initial use

d. **Environmental Practices**:

i. All surfaces in the infant care environment (e.g., monitors, tables, cables, and the outsides of incubators) are wiped with hospital-approved disinfectant wipes during every shift
ii. Soiled linens are handled as little as possible to avoid dispersing organisms into the air, and gloves are worn by personnel when handling linens contaminated with body fluids

e. **Family and Visitor Education**:
   i. Caretakers are instructed on hand hygiene techniques and isolation protocols
   ii. Caretakers are instructed not to visit when they are ill or not feeling well
   iii. A caretaker with oral herpes may be allowed to visit **after** the lesion is crusted over and the person has received instruction on proper use of a mask and the importance of hand hygiene to prevent spread of the virus

Shift Responsibilities –

1. **Shift Huddle** –
   a. Shift huddle will take place starting at 0705 & 1905 each day
   b. All RNs working that shift are expected to be dressed and in attendance for shift huddle at this time
2. **Hand-off Report** –
   a. Report will be given using the standardized report sheets available on the unit
   b. Hand-off report will occur at the patient's bedside
   c. Hand-off report to include:
      i. Verification that all infusion weights, rates, and concentrations coincide with the current order
      ii. Verification that IV tubing/bags are
         1. Labeled with **date to be changed** and traced to insertion site
         2. All clamps are unclamped and fluids are infusing appropriately
      iii. Review and verification that all invasive medical device sites are intact, secured, and unremarkable
         1. IV sites
         2. Endotracheal tubes
         3. Umbilical lines

4. Chest tubes
5. NG/OG tubes
6. Urinary catheters

iv. Review that Respiratory support is being provided as ordered
v. Review MAR Summary and check for overdue meds
vi. Review and sign Individualized Plan of Care (I-POC)
vii. Review discharge plan and learning needs

3. **Documentation** – See the MMC Electronic Nursing Documentation policy for additional details and to see MMC documentation expectations
   a. Initial assessment by system completed within 30 minutes of admission and documented in EMR within first 2 hours of shift
   b. Completion of Patient Education form in AdHoc
   c. Completion of Shift Summary regardless of shift length
4. **Other Shift Responsibilities** –
   a. Update patient's white board by 0800 and 2000
   b. Review chart for orders at the start of shift and regularly throughout shift
   c. Participation in interdisciplinary daily rounds
   d. Update the I-POC each shift
   e. Review and Update the NICU Charge Ticket at least once per shift
   f. Patient's bedside will be wiped down at least once a shift with a hospital approved disinfecting solution
   g. Additional responsibilities as identified in the Safety Guidelines section of the NICU Nursing SOC

Physical Care Guidelines –

1. **Delivery** -

To provide for efficient and effective management of neonate in the delivery room, by clearly defining the roles of each discipline at delivery attendance, and identifying the process for assessing and managing high risk neonate that may need resuscitation.

a. Infants born > 32 6/7 weeks gestation or weighing > 1,500 grams:

i. Considerations:

1. Everyone with hands-on involvement in a resuscitation must have completed the neonatal resuscitation program (NRP)

2. Steps for resuscitation should follow the most current recommendations of the NRP

ii. Equipment:
1. Intubation box
2. Neopuff with appropriate mask sizes
3. Bag/mask
4. Suction equipment
5. Prewarmed radiant warmer
6. Warmed blankets
7. Hat
8. Stethoscope
9. Bulb syringe
10. Pulse oximetry
11. Crash cart available
12. ECG Monitor available
13. Documentation form

iii. Nursing Knowledge:
1. Successful completion of basic life support training and NRP and maintenance of current updates
2. Successful completion of delivery attendance orientation

iv. Process:
1. Verify that all necessary personnel and equipment are present and functioning
2. Review maternal history to identify potential risk factors or complications
3. Follow the steps outlined in NRP for neonatal resuscitation as indicated by infant condition
4. If time allows MD/NNP to assign roles of staff in the delivery room
5. Participants assuming a role during a delivery/resuscitation should remain in that role until the end of the stabilization/resuscitation unless they are relieved by another competent healthcare provider
6. Clear communication among team members is crucial for successful stabilization and resuscitation
7. Call for extra help if needed
8. Final documentation of event completed on delivery room resuscitation record
9. Refer to VLBW delivery room SOC if appropriate
10. Transport infant to the NICU via transport isolette if admission indicated

a. Infants will be monitored with pulse oximeter during transfer to NICU

11. Perform post resuscitation debrief when warranted

b. VLBW/ELBW Delivery: infants < 32 6/7 weeks gestation or weighing < 1,500 grams

i. Purpose: To deliver care during the first hour of life, including the delivery period, to minimize complications in very-low-birth-weight (VLBW) infants. These complications are hypothermia, intraventricular hemorrhage, chronic lung disease, and retinopathy of prematurity

ii. Considerations:
1. A skilled resuscitation team should be available at every delivery of an infant younger than 32 weeks' gestation or weighing less than 1,500 grams
2. Members of the team should be aware of their role in resuscitation and practice good communication skills regarding care and response of these infants and next steps in treatment

iii. Equipment:
1. Intubation box
2. Neopuff with appropriate mask sizes
3. Bag/mask
4. Suction equipment
5. Prewarmed radiant warmer
6. Warmed blankets
7. Stethoscope
8. Bulb syringe
9. Pulse oximetry
10. Crash cart available
11. ECG Monitor available
12. Documentation form
13. Curosurf
14. Small baby pack
15. Tortle midline positioning device
16. Warmed transport isolette

iv. Nursing Knowledge:
1. RNs attending deliveries of VLBW infants should be competent in the care of these infants and principles of neonatal resuscitation specific to this population
2. RNs also should be knowledgeable regarding limits of viability concepts for VLBW infants and competent in pa-rental support in situations in which treatment/resuscitation may not be provided

v. Process:
    1. Refer to the process for *infants born > 32 6/7 weeks gestation or weighing > 1,500 grams* section above, in addition to the following process considerations for this population
        a. For all patients born less than 30 weeks gestation, labs will be hand delivered to the Lab for the first 2-weeks of the patient's life
    2. Hypothermia Prevention:
        a. After preterm delivery is recognized, heat in the delivery room should be increased to 77-82.4°F per the WHO recommendations
        b. Pre-warm a radiant warmer
        c. Activate the warming mattress just before delivery
        d. Prepare the radiant warmer surface with warmed blankets, bowel bag/neo-wrap, and an infant hat. Two infant hats may be required for infants weighing less than 1,000 grams
        e. After the infant is delivered, maintaining midline positioning place him or her (in bowel bag) on a pre-warmed radiant warmer or on a chemical mattress with a single warm blanket over the mattress and blanket rolls.
            i. The nurse also may place warmed developmental supports around the infant
        f. The infant should NOT be dried, should simply be placed in bowel bag
        g. Transport to the NICU in a pre-warmed isolette with a warming mattress in place, a warmed nest of developmental support, a double hat, and a bowel bag if appropriate in place
        h. Once placed on a giraffe in the NICU, continue with the chemical mattress, bowel bag /neo wrap, and double hat. Implement additional humidification after the admission process has been completed according to physician/allied health professional orders
    3. Chronic lung disease prevention:
        a. Ensure the transport unit is warmed and the ventilator or t-piece resuscitator tank is full and ready to transport the infant to the NICU

b. Set the t-piece resuscitator to blender and adjust oxygen delivery appropriately. Ensure the pulse oximeter is available and the probe is ready to be placed on the infant.
    i. Rule of thumb is "30 under 30" – start with 30% FiO2 for neonates under 30 weeks' gestation.
    ii. For all other infants start with 21% FiO2
c. Prepare all intubation equipment
d. After delivery occurs, apply the pulse oximeter probe, intubate as indicated, and ventilate with a t-piece resuscitator. Adjust oxygen to maintain pulse oximetry according to the latest recommendations of the American Academy of Pediatrics Neonatal Resuscitation Program
e. Prepare for and assist with Curosurf administration as ordered
    i. Refer to Respiratory section for more details on Curosurf administration

4. Retinopathy of prematurity prevention:
    a. Ensure availability of blended oxygen and pulse oximetry
    b. Adjust oxygen levels during resuscitation to maintain pulse oximetry as appropriate
5. Intraventricular hemorrhage prevention:
    a. Maintain thermoregulation as above
    b. Provide developmental support to decrease pain and agitation
    c. Monitor pain scores as per unit standard of care. Administer sedation/analgesia as ordered
        i. Refer to Pain and Sedation section
    d. Apply tortle as soon as possible.
        i. Maintain head to midline for the first 72 hours (3 days) of life to prevent venous obstruction and stasis
    e. Monitor perfusion and assess for changes in blood pressure
        i. Provide developmental support, pain management, volume support, or inotropic management to stabilize blood pressure as indicated

vi. Documentation:

1. Initiate a *Neonatal Emergent Event Flowsheet* (Form # 1677) when the following NRP interventions are initiated
    a. Intubation

c. **HIV Exposed Infant** –
    i. Necessary Equipment:
        1. Two radiant warmers
        2. Large metal bath basin from OB
        3. Soap, warm water, and washcloths
        4. Clean towels
        5. Gloves
    ii. Initial Infant Care Steps:
        1. Follow the delivery process for newborns **< 32 6/7 weeks gestation or weighing < 1,500 grams** OR **> 32 6/7 weeks gestation or weighing > 1,500 grams** depending on which category they fall into
        2. Immediately after delivery take the infant to the first warmer and wash the baby well with warm soapy water, rinse well, towel dry, then transfer infant to second 'clean' warmer
        3. **DO NOT perform any invasive procedure such as administering Vitamin K or drawing labs** until **AFTER** the infant has been thoroughly washed and the provider orders have been verified. A CBC with diff should be collected on HIV-exposed newborns **prior** to initiation of antiretroviral (ARV) drug prophylaxis.
        4. Begin AZT prophylaxis treatment within 6-12 hrs of life (as close to the time of birth as possible)
            a. AZT prophylaxis can either be administered orally or by IV infusion
        5. HIV-infected mothers should be counseled **NOT** to breastfeed their infants
    iii. **Note**: According to the U.S. Department of Health and Human Services Recommendations, virologic tests should be performed at 14 to 21 days of life. Maternal HIV antibody crosses the placenta and will be detectable in all HIV-exposed newborns; therefore, standard antibody tests should not be used in newborns.

d. **Delivery Attendance in the Main Operating Room** –
    i. Considerations:
        1. Refer to VLBW/ELBW Delivery if needed
    ii. Equipment: Supply Checklist for Delivery in Main OR
        1. Panda warmer from OB (includes:

a. T-piece tubing
b. appropriate size masks
c. ambu bag
d. stethoscope

2. Infant crash cart from OB
3. Intubation box
4. Transport isolette
5. SpaceLabs portable monitor and ECG leads from OB
6. Suction supplies
   a. canister
   b. appropriate size suction catheters
   c. 2 packages of suction tubing
7. Diapers
8. Warm blankets and hat
9. Small baby kit (if less than 32 weeks gestation)
10. Bulb syringe
11. Pulse oximeter and posey

iii. Process:

1. The Main O.R. is located on the 2nd floor, to the right of the B elevators
2. Follow guidance of O.R. staff, as they may have department specific requirements
3. Verify that all necessary personnel and equipment are present and functioning appropriately prior to delivery
4. If time allows, provider to designate roles of staff in delivery room.
   a. Participants with a role in resuscitation/stabilization should remain in that role unless relieved by another competent staff member
5. Provide routine stabilization and resuscitation if needed, following NRP guidelines
6. Clear communication is essential amongst team members during resuscitation
7. Call for additional help if needed
8. Complete documentation on delivery room resuscitation record
9. Transport infant to NICU via transport isolette if admission is deemed necessary. If NICU admission is not indicated, care of infant is then assumed by Maternity staff

2. **Admission** –

Refer to the Admission to NICU Policy

a. **Tasks:**
   i. Notify admitting of patient name, birth time or admit time if transport, diagnosis, and NICU bed
   ii. Admit infant on cardio-respiratory monitor with pulse oximeter
   iii. Associate in PowerChart
   iv. Secure skin temperature probe and set to an ISC of 36.5 C initially
   v. Verify and apply proper identification
   vi. Footprints on Munson Infant ID, complimentary birth certificate, and bedside name card
   vii. Initiate bedside weight card, Interdisciplinary outcomes record (IOR), and patient education record
   viii. Administer Vitamin K, Erythromycin, and Hepatitis B vaccine as ordered with parental consent
      1. Hepatitis B Vaccine is administered within 24 hours of birth to patients weighing **≥ 2,000 grams at birth**
      2. Hepatitis B Vaccine is administered at 30 days of life OR at hospital discharge (whichever is first) to patients weighing **< 2,000 grams at birth**
      3. If parents refuse they need to sign a declination form
   ix. Apply HUGS tag as applicable
      1. See Safety Guidelines for further detail

b. **Initial Assessment**:
   i. An initial head-to-toe assessment should be completed within 30 minutes and documented within 2 hours of admission
   ii. Initial pain assessment should occur on admission
      1. NPASS
   iii. Neonatal Skin Risk Assessment should be completed on admission
      1. NSRAS

c. **Documentation**:
   i. Admission note and admission assessment form should be completed
   ii. Plan of care for the infant should be initiated upon admission and completed within 24 hr. of admission
   iii. Complete an emergency medication reference based on current weight. The emergency medication reference is updated weekly or at other defined intervals with the current weight

iv. Apply identification bands, upon admission, the admitting nurse should check the infant's ID bands to ensure that they are properly applied
v. Document gestational age
vi. Document IV starts, OG/NG placement and any additional procedures performed on admission
vii. Document on the NICU Charge Ticket (Form #11829) any charges that occurred that shift

d. **Vitals**:
   i. Admission vital signs every hour x4
   ii. Vital signs should be documented at least every 2 hours until they are stable
   iii. Frequency of vital signs should occur more often with any change in condition or as deemed appropriate according to the infant's status
   iv. Reassessment is an ongoing function of the nurse caring for the infant
e. **Measurements**:
   i. Upon admission measure and document:
      1. Length
      2. Weight
      3. Head circumference
      4. Abdominal circumference
      5. Gestational age
   ii. Weigh infants daily unless an order indicates otherwise. Document information in infant's record, including change in weight. Report excessive weight loss or gain to the provider
   iii. Measure head circumference and length weekly and document
f. **Blood glucose (Admission)**:
   i. All infants admitted to the NICU should have an initial blood glucose screening completed within 30 minutes to 1 hour of birth or upon admission if already at or past this age.
   ii. Range: A bedside blood glucose level lower than 45 mg/dl or higher than 150 mg/dl should be reported to the provider unless ordered otherwise
      1. **Screening should be repeated every 15-30 minutes until the level is higher than 45 mg/dl on at least <u>two consecutive tests</u>**.

a. Screening should reflect treatment of IV therapy within 15 minutes. If oral therapy is given, the effect should be seen within 30 minutes.

iii. Treatment:
1. Treatment is considered on an individual basis and is ordered by the attending provider. Treatment may include oral feedings, IV glucose infusion, or a combination of these methods

iv. Documentation:
1. Blood glucose value, communication with the provider, actions taken, and orders received
2. The infant's symptoms, if any
3. Response to treatment, as appropriate
4. Complete critical value task if indicated

v. Equipment:
1. Bedside blood glucose monitor
2. Lancet-appropriate size
3. Alcohol swab
4. 2x2 gauze
5. Sharps container

3. **Blood Glucose Monitoring (Routine)** –

a. Screening should also occur in the following situations
i. 30 - 45 minutes after a changing an IV bag
ii. Based on acuity:
1. High acuity: 30 – 45 minutes after IV fluids are initiated or discontinued
2. Low acuity: prior to the next feeding (AC) per written order
iii. In infants who have been receiving nothing by mouth for more than 6 hours without IV fluids
iv. PRN if there are changes in the infant's clinical condition
v. Pre-operatively and post-operatively
vi. In infants who are maintained on IV fluids, but access has been lost for a period exceeding 30 minutes
vii. In infants who show signs of low blood glucose at any time
1. Signs may include jitteriness, irritability, seizures, temperature instability, lethargy, poor feeding, emesis, apnea, pallor, cyanosis, and weak or high-pitched cry

b. Range: A bedside blood glucose level lower than 45 mg/dl or higher than 150 mg/dl should be reported to the provider unless ordered otherwise
    i. **Screening should be repeated every 15-30 minutes until the level is higher than 45 mg/dl on at least two consecutive tests**.
        1. Screening should reflect treatment of IV therapy within 15 minutes. If oral therapy is given, the effect should be seen within 30 minutes.
c. Treatment:
    i. Treatment is considered on an individual basis and is ordered by the attending provider. Treatment may include oral feedings, IV glucose infusion, or a combination of these methods
d. Documentation:
    i. Blood glucose value, communication with the provider, actions taken, and orders received
    ii. The infant's symptoms, if any
    iii. Response to treatment, as appropriate
    iv. Complete critical value task if indicated
e. Equipment:
    i. Bedside blood glucose monitor
    ii. Lancet-appropriate size
    iii. Alcohol swab
    iv. 2x2 gauze
    v. Sharps container

4. **<u>Physical Assessment</u>** –
To provide guidelines for physical assessment of infant and appropriate documentation
    a. **Considerations:** Documentation should follow with hospital policies. The RN should cluster the infant's care as much as possible, maximizing periods of undisturbed rest.
    b. **Process:**
        i. The RN should perform a physical assessment within 2 hr of assuming care and document appropriately
        ii. Document a complete physical assessment at least once per shift. Neonatal nurses assess:
            1. <u>General</u>
                a. Daily weight unless ordered otherwise. Document in clinical record; include change in weight.

Report excessive weight loss or gain (≥10%) to the provider.

b. Weekly head circumference and length measurements, unless ordered otherwise. Document in clinical record.

2. Integumentary
    a. General color, temperature and dryness of infant's skin. Document q shift and PRN.
    b. Assess skin integrity with each hands-on interaction. Reposition infant with hands-on care to avoid pressure injuries. Document in clinical record.
    c. Monitor line, tube and drain sites at least hourly and document.
3. Neurological
    a. Assess infant's anterior fontanel q shift and PRN
    b. Level of consciousness and behavior with vital signs and PRN unless ordered otherwise
    c. Muscle tone, cry, and symmetrical movement q shift and PRN
    d. Suck reflex upon admission and suck-swallow coordination with feedings
4. Cardiovascular
    a. Monitor, assess and document heart rate, respiratory rate, color, capillary refill time, perfusion, oxygen saturation and heart sounds with vital signs.
    b. Assess blood pressure at least q 12 hr
        i. Infants with arterial lines in place will have a transducer in-line. Blood pressure should be documented hourly for these infants.
            1. See NICU Central Line Policy for more detail
        ii. Document blood pressure q 4 hr or per order for infants on steroids or oral anti-hypertensive medication
        iii. Document blood pressure hourly if the infant is on continuous infusion of vasopressors or antihypertensive medications

c. Perform accurate I&O monitoring on all infants who are receiving IV fluids or diuretics or on other infants according to nurses' judgment or provider order.
    i. Notify provider if urine output is ≤ 1ml/kg/hr.
    ii. It is not abnormal for premature/sick infants to have < 1ml/kg/hr of urine output in the first 24 hours of life

5. Respiratory
    a. Assess breath sounds with each hands-on assessment and PRN
    b. Assess respiratory effort at least q 3 hr
    c. Monitor pulse oximeter values and document q 2 hr for infants on respiratory support and q 4 hr for infants on room air
    d. Assess episodes of apnea, bradycardia, and/or desaturation, intervene as needed, and document episodes and actions taken for recovery
6. Gastrointestinal
    a. Measure abdominal girth in the same location at least q 8 hr for infants receiving noninvasive ventilation who have an OG in place. Otherwise, measure girth q shift and PRN.
    b. Inspect abdomen for discoloration and abnormalities q shift and PRN
    c. Auscultate bowel sounds q shift and PRN. Assess stool frequency and characteristics and document
    d. Notify provider of changes in abdominal assessment, feeding intolerance, or altered stooling pattern
7. Genitourinary
    a. Assess appearance of male and female anatomy, discharge, passage of urine, and physical abnormalities
        i. Document assessment
    b. Check diapers as needed and weigh if keeping accurate I&O

i. All patients on continuous IV fluids or receiving diuretics
    1. Until 24 hrs after therapy is discontinued
ii. Urine output range of 1-4 ml/kg/hr is acceptable after 24 hrs of age
    1. Notify the Provider of urine output outside this range
iii. Diaper counts should be recorded otherwise

c. Assess for diaper rash or fungal-like infection
    i. If diaper rash occurs, refer to the Skin Care Standard of Care

8. Musculoskeletal
    a. Assess infant's tone, range of motion, strength, and symmetry. Document at least q shift
    b. Assess and document any musculoskeletal abnormalities

5. **Thermoregulation** –
To maintain a thermoneutral environment in which an infant's metabolic rate is minimal and core temperature is within normal range

a. **Considerations**:
    i. Temperatures in neonates should be measured via the axillary route.
        1. Rectal temperature measurement carries risks
        2. If taken correctly, the axillary route is just as accurate as the rectal route
    ii. Axillary temperature should be maintained at:
        1. 36.5 °C–37.4 °C (97.7 °F – 99.3 °F) unless a candidate for therapeutic hypothermia
    iii. Infants on radiant warmers must be maintained on patient control mechanism with a temperature probe in place
        1. A reflective patch must cover the temperature probe under a radiant warmer to prevent the heater from heating the probe versus the probe measuring the patient's temperature
    iv. Infants in an isolette may be cared for in either patient-controlled mechanism or air-controlled mode

b. **Equipment**:

i. Equipment will vary depending on infant needs
    1. Bed for infant
        a. Open crib
        b. Radiant warmer with attached temperature probe
        c. Isolette with temperature probe and humidification capabilities
    2. Infant thermometer
    3. Hydrogel temperature probe cover

c. **Nursing Knowledge**:
    i. Mechanisms of heat loss include conductive, convective, evaporative, and radiant
    ii. Temperature probe placement, infant position, and environment should be considered when thermoregulation is being monitored
        1. There is little evidence to guide optimal site selection for skin temperature probe placement
        2. Position, particularly prone may change the difference in abdominal and back temperatures, with the abdomen temperature being warmer
        3. Light emitting diode fiber optic phototherapy pads with high irradiance may be a hidden source of heat, raising axillary temperature

d. **Process**:
    i. Upon admission, identify the appropriate thermal support for the infant based on weight and physiologic needs
        1. If able pre-warm the bed based on gestational age:

≤ 29 weeks	36.2 – 37.2
30 weeks	35.8 – 36.8
31 weeks	35.5 – 36.5
32 weeks	35.1 – 36.1
33 weeks	34.8 – 35.8
34 weeks	34.5 – 35.5
35 weeks	34.1 – 35.1
≥ 36 weeks	29.5 – 33.8

    ii. Monitor temperature frequently during stabilization
    iii. If temperature probe is needed to maintain axillary temperature of 36.5-37.4 °C
        1. Secure temp probe to the infant with an insulated temperature probe cover, avoiding air pockets

2. Lay probe flat on skin
3. Do not place temp probe directly over bone

iv. To maintain and conserve environmental heat (and, when applicable humidity), keep incubator portholes closed except during direct patient care
    1. Work through portholes whenever possible without opening the isolette wall or canopy

e. **Use of Humidification**:
    i. Mature skin barrier function may not be present until 30-32 weeks postconceptional age. Humidification is one strategy to reduce trans epidermal water loss (TEWL) and improve temperature stability in neonates less than 30 weeks gestation. Evidence-based strategies include the following:
        1. **85%** relative humidity for the **first week of life** in neonates born **23-27 6/7 weeks gestation**
            a. then a step-wise reduction to **50%** humidity for 21 additional days, OR until 30 -32 weeks CGA depending on patient's temperature stability
                i. Decrease humidity by 10% (5% at the first or last wean) Q3 hours until it reaches 50%
                    1. Leave portholes closed as much as possible so that the bed can wean the humidity naturally
        2. **80%** relative humidity for the **first week of life** in neonates **born 28 0/7 - ≤ 29 6/7 weeks**
            a. Then a step-wise reduction to **50%** humidity until 30-32 weeks corrected gestational age, OR 28 days of life depending on patient's temperature stability
                i. Decrease humidity by 10% Q3 hours until it reaches 50%
                    1. Leave portholes closed as much as possible so that the bed can wean the humidity naturally
    ii. Follow protocol below unless ordered differently by Provider
        1. Patients born between 30 - 32 weeks gestation may need humidity depending on their temperature stability and labs
    iii. Access printable humidity signs for the patient's bedside here:
        1. ≤ 26 6/7 weeks gestation

2. 27 weeks gestation
3. 28 weeks gestation
4. 29 weeks gestation

MMC – NICU Humidity Protocol

Gestational Age at birth	Starting Humidity **DOL 0-7**	**DOL 8** *gradually* decrease humidity to…	DOL 8-14	DOL 15-21	DOL 22-28	D/C Humidity on DOL # OR at 30 - 32 weeks CGA depending on temp stability
23	85 %	50 %	50 %	50 %	Off on DOL 28 or at 30 - 32 weeks CGA	DOL 28 or 30 -32 weeks CGA
24	85 %	50 %	50 %	50 %	Off on DOL 28 or at 30 - 32 weeks CGA	DOL 28 or 30 -32 weeks CGA
25	85 %	50 %	50 %	50 %	Off on DOL 28 or at 30 - 32 weeks CGA	DOL 28 or 30 -32 weeks CGA
26	85 %	50 %	50 %	50 %	Off on DOL 28 or at 30 - 32 weeks CGA	DOL 28 or 30 -32 weeks CGA
27*	85 %	50 %	50 %	50 %	50 % or off this week depending on patient's temperature	DOL 22 – 28 depending on pt. temp.
28*	80 %	50 %	50 %	50 % or off these weeks depending on patient's temperature		DOL 15 – 28 depending on pt. temp
≤ 29 6/7*	80 %	50 % or off	50 % or off these weeks depending on patient's temperature			DOL 8 – 21 depending on pt. temp

*After DOL 7 infant should remain in 50% humidity until they are 28 days old **OR** 30-32 weeks CGA depending on temp stability

iv. Clothing should NOT be used in the presence of humidity
v. Check bed linen to ensure it is not damp.
vi. High humidity of 80% - 90% or more with water condensation may reduce irradiance levels with halogen and light-emitting diode phototherapy devices
vii. Per GE Ohmeda Giraffe OmniBed Incubator User manual, when used, the humidity chamber should be cleaned using a mild detergent-disinfectant solution and dried prior to reassembly/use to reduce the risk of infection. *NOTE do **NOT** use Peroxide solutions on the humidifier reservoir.
    1. **Weekly**
    2. After each patient
    3. As needed

f. **Weaning from an Isolette**:
    i. When the infant is medically stable, dress with a cap, shirt, and diaper days to weeks before weaning to provide insulation
    ii. When a premature infant has maintained a stable axillary temperature, weighs ≥ 1,600 grams, and has a stable incubator temperature, the infant may be weaned from the isolette

1. This also may be done upon an order from a NICU Provider

iii. Weaning from the isolette may be done when these conditions exist
   1. Weight of 1,600 grams
   2. Five days of consistent weight gain
   3. Medically stable

iv. Weaning may occur over several days
   1. Dress the infant in a diaper, shirt, and hat and swaddle in a blanket, if not already done
   2. If the incubator is not on air control, switch to air control
      a. Infant should be on infant skin probe (ISC) initially until temperature is stable
      b. Axillary Temperature must be compared to skin probe temp initially and re-checked within 3 hours of transitioning to air temp
   3. Manually decrease the isolette temperature while monitoring the infant's temperature
      a. Isolette May be weaned by 0.5 °C Q 3-4 hours if infant is able to maintain temperature in the target range
   4. If infant's temp drops to <36.5 °C while weaning, increase temp by 0.5 °C Q15 min until infant's temp is >36.5 °C
      a. Wean failed at this time and can be reattempted after 24 -72 hrs of stable temperatures
   5. When the isolette temperature is 28 - 29 °C and the infant's temperature is stable for at least 2 consecutive readings, place the infant in an open crib
      a. The open crib ideally is placed in a draft-free area
      b. Maintain environmental temperature in the room at 22-26 °C
   6. **Check infant's temperature 1 hour after placed in open crib and hourly until 2 consecutive axillary readings of 36.5 °C or higher are obtained**
      a. Signs of thermal stress include:
         i. Poor feeding / feeding intolerance
            1. Abdominal distension

2. Emesis
3. Weak suck

ii. Weak cry
iii. Weight loss
iv. Increased cardio respiratory alarms
1. Apnea
2. bradycardia
v. Central cyanosis
vi. Hypotonia
vii. Irritability
viii. Lethargy
ix. Peripheral vasoconstriction
1. Pallor
2. Increased capillary refill time
x. Respiratory distress
xi. Shivering

b. If the temperature is unstable, check hourly and add an additional blanket if necessary
c. If infant temperature is lower than 36 °C more than 1 hour after adding the second blanket, or shows signs of thermal stress, return infant to the incubator
i. Set isolette temperature 0.5 °C higher than infant's temperature and adjust Q30 min until infant's axillary tem is >36.5 °C
ii. If patient returns to isolette reconsider weaning to an open crib after 24–72 hours of stable temperatures

7. Do not bathe the infant on the first day he or she is placed in an open crib
8. After temperature is stable, continue to monitor temperature every 3-4 hours

g. **Documentation:**
i. Document skin, control, and environmental temperatures as applicable, infant's temperature, daily weights, and interventions to maintain thermoneutral environment

6. **Skin** –
To optimize neonatal skin integrity, reduce exposure to potential toxins, and promote healthy barrier function by providing skin care based on

scientific principles and empiric evidence. Poor skin integrity is believed to be a major predisposing factor for neonatal sepsis. Therefore, prevention and mitigation of skin compromise are essential areas of focus in clinical care.

a. **Considerations**:
   - **i. Developmental variations in newborn skin:**
     1. Underdevelopment of the stratum corneum in premature neonates younger than 34–35 weeks' gestation leads to higher risk for evaporative heat loss, trans epidermal water loss (TEWL), and microbial invasion.
     2. Cohesion between the epidermis and dermis in premature neonates is diminished. Removing medical adhesives that attach firmly to the epidermis can result in skin disruption.
     3. Dermis, which is less developed in both full-term and premature neonates, may be more likely to become edematous.
     4. Skin surface pH forms an acid mantle within days of birth.
        a. Acid mantle protects against pathogenic microorganisms.
        b. Acid mantle is temporarily altered by bathing and topical treatments.
        c. Diapered skin is more alkaline.
     5. Neonates are more susceptible to toxicity from topically applied substances.
        a. Larger surface area compared to body weight
        b. Reduced skin barrier function in premature infants, injured skin
        c. Alkaline skin surface is more permeable
   - **ii. Skin Assessment:**
     1. Assess skin condition, head to toe, upon admission, and daily or more frequently as needed.
     2. Identify risk factors for skin injury. Risk factors for skin injury include the following
        a. Physiological (e.g., prematurity, dehydration, vascular injury)
        b. Mechanical (e.g., medical devices, friction, pressure, thermal devices)

c. Postural (e.g., immobility)
d. Pharmacologic (e.g., vasopressors)
e. Chemical (e.g., disinfectants, intravenous fluid injury)
f. Congenital (e.g., epidermolysis bullosa)

3. Use the Neonatal Skin Risk Assessment Scale (NSRAS) to objectively evaluate overall skin condition.
    a. It evaluates six objective categories to determine the neonate's risk of skin break down.
        i. Gestational Age
        ii. Mental Status
        iii. Nutritional Status
        iv. Mobility
        v. Activity
        vi. Moisture
    b. Population the NSRAS is used on
        i. developed for use on neonates between 26 - 40 weeks gestation
        ii. We will be using this tool on patients between **26 – 42, 6/7 weeks corrected gestational age**, in order to cover the age gap between the NSRAS and the Braden Q
    c. NSRAS should be documented in the patient's EMR *at least* once every 24 hours
        i. Usually completed on first assessment on day shift
        ii. If NOT completed on day shift then it is the night shift nurse's responsibility to complete it
    d. Scoring: Neonate's risk of skin breakdown
        i. Low Risk Score = 12 or less
        ii. High Risk Score = 13 or more
            1. If the patient receives a high risk score implement the Pressure Injury Prevention Bundle (outlined below)
        iii. See Reference text in PowerChart for scoring criteria

4. Use the BradenQ to objectively evaluate overall skin condition of patients **≥ 43 weeks corrected gestational age**.
    a. The Braden Q is also a skin risk assessment scale, which was modified from the Braden Scale.
    b. It evaluates seven objective categories to determine the patient's risk for skin breakdown.
        i. Mobility
        ii. Activity
        iii. Sensory Perception
        iv. Moisture
        v. Friction/Shear
        vi. Nutrition
        vii. Tissue Perfusion/Oxygenation
    c. It should be documented in the patient's EMR *at least* once every 24 hours
        i. Usually completed on first assessment on day shift
        ii. If NOT completed on day shift then it is the night shift nurse's responsibility to complete it
    d. Scoring: Neonate's risk of skin breakdown
        i. Low Risk Score = 17 or more
        ii. High Risk Score = 16 or less
            1. If the patient receives a high score implement the Pressure Injury Prevention Bundle (outlined below)
        iii. See Reference text in PowerChart for scoring criteria
5. With this information we will be able to better monitor patients' risk for skin breakdown and intervene prior to the development of a pressure injury for patients with a HIGH RISK score by using a pressure injury prevention bundle.
6. **Pressure Injury Prevention Bundle** - Each bundle will need to be tailored to that patient's specific risk factors, but interventions may include:
    a. Provider notification of a score requiring initiation of the pressure injury prevention bundle

b. Routinely documented skin assessment with particular attention paid to the skin over bony prominences and under medical devices
c. Routine repositioning (Q2 - 4 hrs) with documentation
d. Moisture management by changing linens Q12 hrs or PRN
e. Nutritional support (discuss with Provider)
f. Use of pressure redistribution surfaces
g. WOCN consult if the patient has skin breakdown

iii. Transepidermal water loss (TEWL) control:

1. Recognize that preterm infants less than 30 weeks' gestation or weighing less than 1,200 g are at risk for insensible water loss (IWL)
    a. TEWL increases with decreasing gestational age
    b. TEWL is the major source of IWL in very premature infants
    c. TEWL is highest on the first day after birth, decreasing on subsequent days as the barrier function of the skin improves.
        i. This improvement slows with decreasing gestational age, taking several weeks for the development of a fully functional stratum corneum in the extremely premature infant.
    d. TWEL is closely related to ambient relative humidity
        i. It increases with decreasing ambient humidity
2. See Humidity guidelines
3. Factors that may increase IWL:
    a. Extreme prematurity
    b. Postnatal age less than 1 week
    c. Low relative ambient humidity
    d. Radiant warmer use
    e. High ambient temperature
    f. **Hyperthermia**
    g. Convection, drafts
    h. Ventilation with dry gases

i. **Tachypnea**
j. High minute ventilation
k. **Phototherapy**
l. **Activity**

4. Factors that may decrease IWL:
    a. Increasing gestation
    b. Increasing postnatal age
    c. **High relative ambient humidity**
    d. Double-walled incubator use
    e. **Neutral thermal environment**
    f. Heat shields/plastic wrap
    g. Humidification of inspired gases
    h. Ointment or transparent dressings on skin
    i. Clothing

iv. Vernix caseosa:

1. Be aware of the function and protective benefits of vernix, which include facilitation of adaptation of neonatal skin, protection from infection, decreased skin permeability and TEWL, moisturization of the skin, pH development, wound healing, and temperature regulation.
2. Allow to naturally wear off; leave vernix on the skin. If contaminated with blood, meconium, or other intrauterine debris, gently remove the contaminant, but scrubbing to remove all the vernix is not necessary or recommended.

v. Umbilical cord care:

1. Cleanse the cord during normal bathing with water; dry thoroughly
2. Keep umbilical cord area clean and dry, without applying topical agents
3. Keep umbilical stump exposed to air or loosely covered with clean clothes.
    a. Keep the diaper folded under the cord
4. Differentiate normal umbilical cord healing from potential problems (infectious or noninfectious); notify primary care provide if signs of a potential problem are present
    a. The newborn umbilical cord first appears moist and gelatinous

b. After subsequent days it becomes dry and blackened and eventually separates
c. Small amounts of cloudy mucoid material normally collect at the junction of the necrotic ford stump and abdominal skin, and should not be misinterpreted as pus

5. Educate parents about normal cord appearance and healing

vi. Diaper dermatitis:

1. Check for wet or soiled diapers frequently, with clustered caregiving, and change as needed considering the infant's gestational age and severity of illness
2. Use appropriate methods to gently cleanse the diaper area based on the gestational age of the neonate, such as soft cloths and water, a gentle cleanser, or disposable diaper wipes
3. Determine whether the cause is contact with fecal enzymes or *Candida albicans* (yeast)
4. Use antifungal ointment or cream to treat *Candida* dermatitis as prescribed
5. Avoid use of the following products in the diaper area whenever possible:
    a. topical corticosteroids
    b. antibiotic ointments
    c. talcum baby powders
    d. cornstarch
6. **Medline SurePrep No-Sting Skin Protectant Barrier Wand**:
    a. Description:
        i. Alcohol-free, water-based, non-flammable polymer which dries quickly to form a durable protective membrane over the skin
        ii. Helps to protect intact or damaged skin from irritation caused by body fluids such as
            1. urine or feces
            2. digestive fluids
            3. wound drainage

4. Friction or adhesives

b. Considerations:
   i. Use of other protective products, ointment, creams, or lotions may significantly reduce its effectiveness
   ii. Avoid contact with clothing or other textiles while the liquid dries.

c. Application:
   i. Cleanse and dry skin as much as possible prior to application
   ii. Evenly and uniformly apply a layer of barrier solution over the entire area of concern
   iii. Reapply the solution to any area that has not been covered after the earlier application has dried (approx. 1 minute)
   iv. If applying between skin folds, separate the skin during application and ensure that the product is thoroughly dry before allowing skin to resume its normal position to avoid adhering skin surfaces together.
   v. During use as a protective barrier against bodily fluids, reapply as needed, or every 2-3 days depending on frequency of cleansing
      1. For heavy fluid exposure, such as diarrhea, more frequent application may be necessary, such as every 12-24 hours.

d. Removal:
   i. The film barrier can be removed by using most medical grade adhesive remover or by washing with soap and water.

7. **Ilex Instructions for Use to treat skin breakdown**:
   a. Description:
      b. Ilex is a topical skin barrier for use on intact or broken skin
      c. Ilex adheres to moist weeping wounds to form an occlusive barrier against urinary and fecal

material, digestive enzymes and wound exudates
    a. Ilex is alcohol free so it is safe to use on all skin types
b. Considerations:
    a. Ilex by its nature adheres well to moist tissue and forms an effective barrier. To protect delicate skin we recommend a layer of petroleum jelly (such as Vaseline) over the top of the ilex to prevent the outer surface sticking to clothing or other material.
    b. To avoid skin damage when removing ilex, Mineral or baby oil can be used
c. Application:
    a. Gently clean the wound as normal. Water and cotton wool balls or soft cloth can be used.
        i. Do not use baby wipes.
    b. A mild soap or cleansing foam can be used
    c. Apply any other treatment if required (such as antifungal or antibacterial powder/cream)
    d. Apply a thin coating of ilex over the entire wound needing protection.
        i. You should still be able to see through the layer of ilex to the skin below.
    e. Allow to dry for 30 seconds
    f. In areas where the ilex may stick to clothing or other material apply a good coating of petroleum jelly over the ilex and surrounding skin
    g. **IMPORTANT** - A coating of petroleum jelly (such as Vaseline) should be applied over ilex when used in the perianal area to prevent the bottom and/or nappy from sticking. Do not forcibly try to remove ilex that has adhered to the skin.

d. Maintenance:
    a. When cleansing, only the stool should be wiped off using cotton wool or soft cloth and water leaving the ilex intact.
        i. You may reapply additional ilex if required, then reapply petroleum jelly. This procedure will minimize any trauma to the already broken skin
    b. The ilex should only be removed once a day *if necessary* –
        i. to remove use a soft cloth with a good amount of mineral oil/ baby oil
        ii. Removing ilex more often or without the use of mineral oil/baby oil may inhibit the healing process and lead to further skin breakdown.

vii. Medical adhesives:

1. Be aware that neonates are at high risk for medical adhesive–related skin injuries; use adhesives sparingly
2. Avoid solvents (alcohol- or organic-based products, oil-based solvents) and bonding agents that increase adhesive adherence.
    a. Avoid the use of adhesive bandages after drawing laboratory samples.
3. Alcohol-free skin protectants can prevent adhesive damage
    a. SurePrep Skin Protectant Wand
4. Hydrocolloids can cause skin trauma equal to acrylic tape when removed within 24 hr, but they also absorb moisture, mold well to skin surfaces, and serve as a platform for the transparent dressing.
5. Remove adhesives slowly and carefully, using moistened gauze, saline pledgets, or silicone-based adhesive removers when appropriate. Apply mineral oil or petrolatum to loosen tape unless re-taping is necessary at the site. Slowly pulling adhesives at a very low angle, parallel to the skin surface, while holding the surrounding skin in place may reduce epidermal stripping.

6. Provide pain control measures during adhesive removal, including skin-to-skin care, sucrose, or expressed human milk.

viii. Skin Injury:

1. Medical device use is the major risk factor for neonatal skin injury, with infants born before 27 weeks at greatest risk. Risk factors include the following
    a. Infant characteristics (e.g., gestational age less than 32 weeks, low birth weight, immobility)
    b. Physiological aberrations (e.g., edema, dehydration, hypotension)
    c. Pharmacologic (e.g., vasopressors, sedatives)
    d. Monitoring equipment involving use of probes and/or electrodes (e.g., cardiorespiratory, blood pressure, oxygen saturation, electroencephalography monitors)
    e. Cardiorespiratory support (e.g., nasal continuous positive airway pressure, high-frequency ventilation, extracorporeal membrane oxygenation
    f. Medical devices (e.g., endotracheal, nasogastric, or orogastric tubes; vascular access devices; cooling devices)
    g. Therapeutic hypothermia
    h. Surgical wounds and devices (e.g., tracheostomy, gastrostomy)
2. Assess skin under medical devices regularly, at least every 12 hr, as status changes based on skin assessment, to identify pressure points secondary to medical device use; implement measures to pre-vent skin injury.
3. In the presences of skin injury, assess the stage of injury or status of wound healing, consider possible causes, and treat as ordered.
4. Several single- and multiple-case studies have demonstrated safe treatment of skin injuries with silver-impregnated dressings
    a. A variety of skin injuries (e.g., chemical burns, thermal burns, pressure injuries) and wounds can

be successfully treated with silver dressings in term and preterm neonates.

i. See the Vascular Access section for more information.

ix. Documentation:

1. The infant's skin condition should be documented on a regular basis
2. The NSRAS or BradenQ should be documented:
   a. Upon admission
   b. Q24 hrs on dayshift
      i. Night shift is responsible to document if it was not documented during dayshift.
3. Document the presence of skin irritation or break-down and actions taken.

7. Feeding Protocol –

Munson Medical Center Feeding Protocol-Simplified

Last revision: 7/10/2020

Day/Step	1	2	3	4	5	6	7	8	9	10	11	12
Start Date												
Birth wt (g)												
<700	1q12	1q6	1q6	1q3	20	40	60	80	100	120	140	160
701-800	1q6	1q6	1q3	20	40	60	80	100	120	140	160	
801-1000	1q3	2q3	20	40	60	80	100	120	140	160		
1001-1250	20	40	60	80	100	120	150	160				
1251-1500	20	40	60	80	110	140	160					
1501-1750	20	50	70	100	130	150	160					
1751-2250	30	60	90	120	150	160						

Reminders:

- Use human milk (maternal or donor) until 34 weeks' corrected age
- Fortify with Prolacta +6 (begin transition to HMF at ~ 33 0/7 weeks')
- Fortify with LHMF to 24 kcal/oz
- Remove central access once at ≥120
- Add vitamins once at full feeds (≥140)

8. Total Fluid Goal (TFG) –

An essential part of the successful transition to extra uterine life is the achievement of fluid, electrolyte, and acid base homeostasis and control. Because mature control of these processes may not occur for days to weeks after birth premature and stressed neonates can have transient disturbances of fluid, electrolyte, and acid-base balance.

a. **Considerations**:
   i. A physiologic contraction of extra-cellular fluid (ECF) volume occurs with diuresis in the first week of life, resulting in postnatal weight loss:
      1. 5 -10% for term infants
      2. Up to 20% in preterm infants
   ii. Our standard practice is to start fluid therapy at 80 ml/kg/day
      1. Always verify the IV rate compared to the order
      2. Confirm verbally with the Provider if unable to review order at initiation of fluid therapy
   iii. Use birth weight rather than current body weight to calculate TFG per kilo until birth weight is regained
   iv. If patient has a decrease in fluid volume (ex. Made NPO) you CANNOT increase the TPN rate
      1. an additional IV fluid will need to be ordered and piggy-backed in to the TPN to make up the difference

b. **Process**:
   i. Review the Provider's order or daily progress note specifying the TFG for the day
   ii. Utilize the patient's birth weight to calculate TFG until birth weight is regained/surpassed
      1. Then use daily weight to calculate TFG
   iii. Include all continuous IV fluids
      1. Do not include intermittent IV or PO medications
         a. Unless they substantially increase the patient's fluid intake, this warrants further discussion with the provider
   iv. Include all non-trophic feedings (≥ 20 ml/kg/day) in the TFG
      1. Do not include trophic feedings (< 20 ml/kg/day) in the TFG

c. **TFG calculation example**:
   i. TFG order = 80 ml/kg/day
   ii. Patient's weight = 1 kg
   iii. **TFG for the day: 80 ml x 1 kg = 80 ml/day**
   iv. Feedings: 3 ml MBM Q3 hrs (non-trophic) = 24 ml/day
   v. IL: 0.25 ml/hr = 6 ml/day
   vi. **80 (TFG) – 24 (feeds) – 6 (IL) = 50 ml/day of TPN**
   vii. **50 ÷ 24 hrs = 2.1 ml/hr (TPN)**

9. **Bathing** –

a. **Considerations:**
    i. The first bath should occur once the neonate has achieved thermal and cardiorespiratory stability.
        1. Ideally, the first bath should occur between 6 and 24 hours of age
        2. If mother is HIV +, bathe infant immediately after birth
            a. See section on delivery of baby to HIV+ mother
    ii. Routine bathing every few days with mild cleanser and shampooing once or twice a week is usually adequate
    iii. Infants should be bathed with immersion tub bathing or swaddled immersion bathing
    iv. Preterm infants less than 32 weeks' gestation:
        1. Gently clean skin surfaces using **warm water only** during the **first 2 weeks of life**
            a. Provide sponge baths using soft materials such as cotton cloth or cotton balls
    v. Late preterm infants (34 0/7 – 36 6/7 weeks' gestation):
        1. Postpone bath until thermal and cardiorespiratory stability AND at least 6 hours, ideally 12-24 hours after birth
    vi. Full-term infants who are not compromised:
        1. Infant is at least 6 hours of age
        2. Axillary temperature is ≥ 36.8 ◦C on two consecutive measurements
    vii. Consider weight, gestational age, and severity of illness prior to bathing
        1. Due to morbidity risks associated with hypothermia, carefully consider the need for bathing infants less than 1500g

b. Contraindications:
    i. No tub baths or swaddled immersion bathing until:
        1. Stable respiratory status
        2. Central lines are discontinued
        3. Respiratory support **(exceeding nasal cannula)** is discontinued
        4. 24 hours post-circumcision

c. Umbilical Cord Care:
    i. Use a clean technique when managing the umbilical cord, in all settings
    ii. Clean the umbilical cord and surrounding skin surface as part of the initial bath
    iii. Use dry cord care when caring for the newborn umbilical area

iv. Use of antimicrobial-antibacterial-antiseptic agents should not be routinely used on the umbilical cord, including:
    1. Poviodone-iodine
    2. Chlorhexidine
    3. Triple antibiotic ointment
    4. Alcohol
    5. Triple dye
v. Differentiate normal umbilical cord healing from potential problems, including infections
    1. The newborn umbilical cord first appears moist and gelatinous
        a. After subsequent days it becomes dry and blackened and eventually separates
    2. Small amounts of cloudy mucoid material normally collect at the junction of the necrotic ford stump and abdominal skin, and should not be misinterpreted as pus

d. Turtle Tub Instructions:

i. Inspect the tub prior to use and discontinue the use of the product if it becomes damaged, broken, or disassembled
ii. Clean TurtleTub prior to use (refer to step xxv)
iii. Modify environment as needed to decrease draft and sensory stimuli
iv. Arrange TurtleTub contents for use
v. For Multiple patient use: place TurtleTub bath liner in the tub
vi. Undress infant
vii. If infant has leads, unplug them. The sticky gel portion of the lead can remain on infant. They are easier to remove when wet
viii. Position infant with hands near face and swaddle in blanket
ix. Fill TurtleTub with water until temperature is **101F - 103F**. Test the water with your hand in addition to using the temperature strip. Water height should be to infant's chest. If using a liner, ensure the liner is smooth (no wrinkles) on the temperature strip.
x. Fill rinse cup with water and place in tub
xi. Encourage parents to bathe infant
xii. Place swaddle infant in tub. Keep bath time as short as possible.
xiii. Use clean 4x4 washcloths without cleanser to wash baby's face. Wash one eye at a time moving from the inside corner of eye outward. Use clean section of cloth on each eye. Clean outer ear only. Wash face, neck and behind ears.

xiv. Gently unswaddle one arm and use cleanser on your gloved hands to wash infant. Parents can use ungloved hands for bathing. Use a firm, but gentle touch. Rinse and re-swaddle. Repeat with all extremities and chest. If infant has chest leads, remove them. Remember to keep infant swaddled throughout the bath
xv. Gently roll infant to side-lying and clean the infant's back. Reposition infant to supine
xvi. Wash genital area with a 4x4 washcloth and cleanser
xvii. Check temperature and add warm water as needed
xviii. Wash infants head last to conserve heat. Use scalp brush. Use water from clean rinse cup to rinse the baby's head
xix. Stand close to the tub with a warm drying blanket secured under your arms
xx. Unswaddle infant and lift infant out of tub and into warm blanket. Pat dry making sure infant's head is dry
xxi. Place infant in the bed on another warm blanket and wrap infant
xxii. Take axillary temperature
xxiii. Place new leads on infant
xxiv. Prepare infant for skin-to-skin holding or feeding. Or dress and position infant for sleep.
xxv. Clean for multiple patient use:
    1. Use the pour spout to empty the water from the tub
    2. Discard the TurtleTub liner
    3. Wipe the TurtleTub with a hospital approved alcohol-based wipe such as PDI Sani-Cloth Super wipes
xxvi. Cover the tub with an infant blanket to keep clean between uses
xxvii. Umbilical cord care
    1. Cleanse the cord during normal bathing with water; dry thoroughly
    2. Keep umbilical cord area clean and dry, without applying topical agents
    3. Keep umbilical stump exposed to air or loosely covered with clean clothes. Keep the diaper folded under the cord.
    4. Differentiate normal umbilical cord healing from potential problems (infectious or noninfectious); notify provider if signs of potential problem are present
xxviii. Educate parents about normal cord appearance and healing, document education

e. **Documentation:**

i. Document baths in PowerChart and track on bedside weight card using asterisk next to date
ii. Document parent education as applicable

10. **Oral Care** –

Decreases the risk of ventilator associated pneumonia (VAP), decreases the length of stay (LOS), and the risk of developing necrotizing enterocolitis (NEC) by maintaining a patent airway through removal of secretions and exposing the oropharynx to maternal colostrum/mother's expressed breast milk in a developmentally appropriate manner.

a. **Considerations:**
   i. Oral care should be provided at least every 6 hours
   ii. Suctioning is based on assessment and infant cues
b. **Equipment:**
   i. Sterile 1ml syringes
   ii. Maternal colostrum/expressed breast milk
      1. fresh is preferred
   iii. Sterile water if no colostrum/expressed breast milk available
   iv. Foam tipped swab
   v. 2x2 gauze
   vi. In-line suction equipment if on ventilator
   vii. Clean gloves
c. **Nursing Knowledge:**
   i. Nurses providing oral care must be knowledgeable in respiratory care and support of neonates
   ii. Must be aware of infant cues paying attention to developmentally appropriateness of process in extremely preterm infants
   iii. Nurses must be aware of the adverse effects of suctioning and response to those effects
   iv. During oral and nasal suctioning, the mouth is always suctioned first
   v. Do not double dip syringes or swabs into breastmilk bottles or sterile water bottles
   vi. Use of colostrum/expressed breast milk is highly preferred over sterile water due to the high levels of lactoferrin that provides protection against late onset sepsis and NEC, as well providing maturational effects on the intestines
   vii. Colostrum/breast milk should be drawn up in 2 sterile 1ml syringes (0.1ml per syringe) and warmed to room temperature
d. **Process:**

i. Gather/prepare all necessary equipment
ii. Utilize 2-person care if indicated based on infant gestation or condition
iii. Perform hand hygiene
iv. Follow universal precautions while performing all steps of the procedure unless directed to use sterile precautions
v. Moisten 2x2 gauze with sterile water and gently wipe any secretions from lips
vi. Assess infant for the need to perform oral and/or in-line suctioning
vii. Follow procedures in Respiratory section below for suctioning oral, nasal or pharyngeal and Procedure for inline suctioning
viii. Slowly administer 0.1ml of colostrum/breast milk into each cheek monitoring for any intolerance (vital sign changes, increased oxygen needs >10%)
    1. **Notify Provider of any significant intolerance
ix. Gently swab each side of cheek with foam tipped swab for <5 seconds each side
x. Follow NICU VAP prevention bundle for ventilated patients

e. **Documentation:**
    i. Document infant response to therapy
    ii. Complications or additional actions taken
    iii. Respiratory assessment before and after
    iv. Color, quantity, consistency of secretions if suctioned

11. NG/OG Placement & Management –

a. **Manufacturer recommendation for use**:
    i. PVC feeding tube (**Argyle**) needs to be changed Q 3-5 days
    ii. Polyurethane feeding tube (**Kangaroo**) needs to be changed Q 30 days
b. **Nasogastric (NG) vs. Orogastric (OG) placement**:
    i. NG placement may impair lung function because of obstruction of the airway in infants weighing less than 2,000 g. Consequently, this danger should be considered when determining placement and size of the gastric tube
    ii. Each NG or OG tube should be labeled with the date and time it was last changed
        1. Create a new "Dynamic Group" with each change and inactivate the previous group

iii. When a gastric tube is placed nasally, it should be moved from one nare to the other when changed
iv. Gastric tube placement should be checked once placed, before feedings or medication administration, and as indicated. Consider the following when verifying placement:
    1. Air insufflation while listening over the stomach is least reliable to verify placement
    2. Check aspiration of stomach contents and evaluate the color of aspirate, although color is unreliable when determining placement
    3. Evaluate placement whenever an X ray is taken to confirm proper location of the tip of the tube
    4. For indwelling gastric tubes, in addition to at least one of the above methods, verify placement by checking the mark at the lip line and confirm this with the initial placement

c. Determining correct placement depth:

i. **Nasal-Tragus-Xiphoid (NTX)**
    1. Use the catheter itself, or a tape measure
        a. Place the end of the catheter of tip of the nose or middle of the mouth
        b. Extend the catheter/tape measure to the tragus of either ear
        c. Extend the catheter/tape measure to the xiphoid process and add 1 cm
        d. Read the measurement in centimeters, this is the depth the catheter should be placed

ii. **Weight Based Formula**
    1. Double check measured depth using the appropriate formula
        a. Orogastric length (cm) = 3 x weight (kg) x 12
        b. Nasogastric length (cm) = 3 x weight (kg) x 13

d. **Feeding solution and tubing change**:

i. **Formula or breast milk**: Change every 4 hr for continuous feedings and at every feeding for intermittent feedings.
ii. **Syringe**: Change every 4 hr for continuous feedings and at every feeding for intermittent feedings
iii. **Extension tubing**: Change every 4 hr for intermittent feedings and every 24 hours for continuous feedings

iv. **Kangaroo pump bag**: Change every 4 hr for intermittent feedings and every 24 hours for continuous feedings

e. **Gastric decompression**: Gastric decompression may be accomplished by use of an 8-Fr or larger single-lumen gastric tube or a double-lumen (Replogle/Salem Sump) tube available in a 6-, 8- or 10-Fr size. Advantages of a double-lumen tube include the capacity for greater drainage and less risk of obstruction by the stomach wall.
   i. Sizing:
      1. The largest drainage tube that can comfortably be inserted should be used. This provides for proper drainage and decompression of the stomach and decreases restriction of the diaphragm.
         a. 6-Fr tube for infants weighing less than 800 g
         b. 8-Fr tube for infants weighing less than 1,500 g
         c. 10-Fr tube for infants weighing 1,500 g or more
   ii. Maintenance:
      1. Flushing the tube with air, saline, or water after checking its position ensures patency. The second lumen of a dual-lumen tube is not to be flushed with anything but air because water or saline will prevent adequate intake of air to relieve pressure.
         a. If you notice fluid in the blue air lumen, reestablish an air buffer by injecting air with a syringe to clear the lumen of the residual fluid.
      2. Attach NG/OG tube to specimen trap
         a. Measure and record drainage collected in the specimen trap every shift or as ordered.
            i. Measuring the drainage accurately is necessary to maintain fluid balance
            ii. Notify the physician or AHP of any change in drainage color or quantity
         b. Record the color and character of the aspirate
      3. Recommended suction settings
         a. Always use the lowest suction setting that effectively decompresses the stomach
         b. Intermittent suction should be set at a low level (30-40mm Hg)
            i. If necessary, slightly increase suction until flow is observed.

4. Tubes should be changed every 72 hr
5. After proper positioning is confirmed note tubing changes on a sticker on the tube and in the medical record; note the centimeter mark at the nare or mouth and record it in the medical record
    a. This mark should be checked every shift to assess for tube migration
6. If secretions are very thick or drainage has stopped, the tube may be irrigated to prevent or correct plugging.
    a. It may be irrigated with 1 ml/kg (no less than 1 ml with a 5-ml maximum) of normal saline periodically, followed by a 1-ml/kg air bolus.
    b. If the tube cannot be irrigated, discontinue using it and insert a new gastric tube. If the tube is placed to gravity drainage, irrigate with air only.
    c. When calculating intake and output, subtract the amount of normal saline used as irrigant from the total output
7. Notify a provider if the output is > 10ml/kg/day

f. **Documentation**:
    i. Initial documentation should include
        1. The size of the gastric tube and the date and time inserted
        2. Infant's tolerance of insertion
    ii. Ongoing documentation
        1. Amount of drainage
        2. Any replacement given and the specific interval

12. **Cue Based Feeding** –

To initiate a developmentally supportive, individualized infant-driven feeding based on feeding readiness cues exhibited by infants and to promote a positive experience during which infants are active participants in the feeding process.

a. Considerations:
    i. Implementation of nipple oral feedings begins in healthy infants at a post conceptual age as early as 30 weeks
        1. After discussing with the Provider
        2. Infants are able to successfully breastfeed at an earlier gestational age than bottle feeding

ii. Infants demonstrate a range of behavioral states as gestational age increases
    1. Awake states and quiet alert states increase in duration as gestational age increases
    2. Awake states and quiet alert states support behavioral and physiological ability to nipple feed
iii. Feedings need to be a safe, positive experience for infants. They need to be developmentally appropriate for the gestational age and ability of each infant
iv. Parent involvement and education are needed during the feeding process so parents can gain competence in feeding their infant
v. Infant will remain on cue-based feedings if the following guidelines are met and sustained:
    1. Clinical condition remains stable
    2. Infant continues to show a trend in weight gain that is consistent with previous pattern of weight gain and is deemed appropriate for gestational age
    3. Infant maintains an appropriate urine output

b. **Definitions:**
    i. Interval feedings: based on time sequence and volume delivered
    ii. Cue-based feedings: used during the transition to on-demand feeding
        1. Feedings may still be time cycled (e.g., every 3 hr)
        2. Nonnutritive sucking should be provided during all gavage feedings, even when exclusive breastfeeding is planned
        3. Nonnutritive sucking may also be beneficial before bottle feeding or breastfeeding
        4. Feeding readiness cues are used to initiate, continue, or stop an oral feeding at breast or bottle.
    iii. On-demand feedings (AdLib): are infant driven and are controlled according to the volume of intake and timing of the feeding
        1. There should not routinely be more than 4 hours between AdLib feedings

c. Nursing Knowledge:
    i. Nurses should be competent in identifying infant feeding readiness cues and distress signals

1. Behavioral cues:
    a. crying
    b. rustling
    c. sucking interest
    d. rooting
    e. ability to maintain alert or quiet state
    f. restlessness
    g. flexed state
    h. body oriented toward nipple
2. Physiological cues:
    a. ability to maintain oxygen saturation
    b. respiratory rate
    c. heart rate
    d. color
    e. ability to coordinate sucking, swallowing, and breathing
3. Distress signals related to motor system, state, or autonomic system:
    a. bradycardia
    b. apnea
    c. poor tone
    d. finger splaying
    e. irritability
    f. gagging
    g. staring
    h. yawning
    i. loss of fluid from mouth
    j. disorganization
    k. poor latching

ii. Criteria for beginning cue-based feeding:
1. A gestational age of 34 weeks or greater
2. Infant should demonstrate the ability to nipple 120ml/kg/day and/or the ability to nipple a full oral 75% of feeds in the last 24 hours (6 out of 8 feeds)

iii. Criteria for nipple feeding:
1. Feed when exhibiting at least 2 hunger cues
2. Feed whenever the infant is hungry
3. Refer to cue-based feeding minimum requirement chart and attempt to nipple amount of the prescribed EBM or formula

4. Do not gavage the rest of feeding if infant does not take full prescribed amount at that feeding
5. Record what was taken and wait for infant cues to feed again
6. Maximum time to be allowed between feedings is four hours

iv. Criteria for breastfeeding:

1. Breastfeed when infant exhibits at least two hunger cues
2. Breastfeed whenever the infant is hungry and for as long as the infant desires
3. If infant latches on, sucks and swallows effectively, this will be considered a successful feeding.
4. Mother may put infant to breast for as many feedings as she desires, unless otherwise indicated per Provider's discretion.
5. If infant latches on but then falls asleep, allow infant to continue sleeping.
    a. When infant awakens and exhibits at least 2 hunger cues, attempt breastfeeding again.
    b. Infant may continue to do this until a maximum of four hours from the last successful feeding has been reached.
    c. After four hours, gavage feed the four-hour amount.
6. If infant is unable to latch on within 10 minutes but continues to exhibit at least 2 hunger cues, then attempt to bottle feed
    a. Consult Lactation if infant continues to have difficulty latching on

v. Criteria for gavage feeding:

1. If it takes longer than 30 minutes to nipple the minimum required amount, gavage the next feeding.
2. If infant has not nippled the minimum amount due to stress signs for **2 feedings**, gavage the next feeding.
    a. Do not gavage the remainder of the feedings- record what was taken and wait for infant cues again
3. If infant is still sleeping at the four-hour interval, wake infant up and assess for feeding readiness.
    a. If the infant does not display feeding cues, gavage the four hour required minimum amount

d. **Process:**

i. Identify infants of appropriate gestational age and abilities
ii. Assess infants before each feeding using the *Feeding Readiness Scale* Reference text in PowerChart and behavioral and physiological cues
iii. Facilitate a breast or nipple feeding based on observation or scoring tool assessment
iv. Allow infants to breast or nipple feed for an amount of time according to the infant's choice
    1. Cue Based Feeding Volume Chart
v. Utilizes the NICU Cue-based Feeding Volume Chart for volume requirements based on patient weight and time between feedings
vi. Complete feeding via gavage as needed with expressed breast milk or formula according to above mentioned criteria for gavage feeding

e. **Documentation:**
    i. Document the following in PowerChart after each assessment/feeding:
        1. Feeding Readiness Scale score
        2. Quality of Nippling Scale score
        3. Breast feeding assessment and assistance if applicable
        4. Bottle feeding assessment and assistance if applicable
        5. Feeding type
        6. Feeding tolerance
        7. Feeding duration
    ii. Feeding volume (if known for breast feeding)

13. **Pain & Sedation** –

Our pain management standards of care align with MMC Pain Management Policy

a. **Considerations**:
    i. Assess pain using the Neonatal Pain, Agitation, and Sedation Scale (N-PASS)
        1. Detailed information about the N-PASS can be found in the reference text of iView for each portion of the tool
    ii. Infants are unable to self-report pain; therefore, other indicators such as physiological, behavioral, or biochemical measures are required
        1. Physiologic measures reflect the body's nonspecific response to stress and may not be specific to pain when pain is prolonged

2. The presence of a cry can provide valuable information about pain; however, its absence should not be equated with absence of pain
3. Facial activity (i.e., brow bulge, eye squeeze, nasolabial furrow) seems to offer the most specificity as an indicator of acute procedural pain, but it is affected by contextual factors such as gestational age, severity of illness, and previous painful procedures
    a. the significance of facial activity in chronic pain is unclear

iii. Extremely-low-birth-weight (ELBW) infants have limited capacity to respond to pain
    1. ELBW infants have less muscle power, posture, tone, and movement compared with full-term infants, and interpretation of their pain responses is difficult

iv. Evidence suggests that earlier pain experiences may affect pain responses by contributing to less mature behavioral responses to noxious stimuli

v. Cognitively impaired preterm and full-term newborns show similar physiological and behavioral responses to pain compared with healthy full-term newborns, but the magnitude is decreased

vi. Provide pain management during the end-of-life (EOL) stage

vii. Do not use sedatives to manage pain

b. **Pain/Sedation Assessment:**
    i. Will be completed:
        1. With each assessment
        2. Change in condition
        3. After (or during continuous) administration of a pain or sedation medication
            a. 45 - 60 minutes after administration of an oral, IM, rectal medication
            b. 15 - 30 minutes after administration (the start) of an IV medication
        4. 30 - 45 minutes after non-pharmacologic interventions
        5. During and after procedures
        6. PRN

c. **Nursing Knowledge:**

i. The most common pharmaceuticals used for pain control include:
    1. Morphine
    2. Fentanyl
    3. Infant Tylenol

d. **Pain management:**
    i. Use both non-pharmacologic and pharmacologic therapies to control or prevent pain. A combination of strategies provides additive or synergistic benefits.
        1. Non-pharmacologic approaches to pain management:
            a. Non-pharmacological interventions help minimize an infant's pain and stress while maximizing his or her regulatory and coping abilities
            b. Reduce the number of painful procedures performed and allow the infant time to fully recover from a painful stimulus before resuming caregiving activities
                i. Evidence suggests that after exposure to a painful stimulus, a preterm infant's pain sensitivity is accentuated by an increased excitability of nociceptive neurons in the dorsal horn of the spinal cord. This sensory hypersensitivity may exist for prolonged periods after a painful stimulus is sustained. It can cause other non-noxious stimuli (e.g., handling, physical examination, nursing procedures) to be perceived as painful because of heightened activity in nociceptive pathways
            c. Use containment and positioning strategies to maintain midline flexion and facilitate hand-to-mouth opportunities
                i. Hand or blanket swaddling during a heel stick procedure reduces physiological and behavioral pain responses in preterm infants
            d. Promote breastfeeding or breast milk for procedural pain management

e. Provide nonnutritive sucking (NNS) for painful procedures
    i. Pain-relieving effects of NNS cease once the pacifier is removed from the mouth
f. Promote skin-to-skin care during painful procedures
    i. Skin-to-skin contact, or kangaroo mother care, diminishes pain responses in full-term and moderately preterm infants
g. Use sucrose for procedural pain associated with heel sticks and venipunctures
    i. Sucrose reduces physiological and behavioral responses to pain associated with minor (tape removal, nasogastric tube insertion) and moderate (eye exams) procedures and serves as adjunct therapy for moderate to severe procedural pain. Sucrose is optimally administered 2 minutes before a painful procedure to the tip of the tongue where sweet receptors lie. This 2-minute time interval is thought to coincide with the endogenous opioid release triggered by the sweet taste of sucrose.

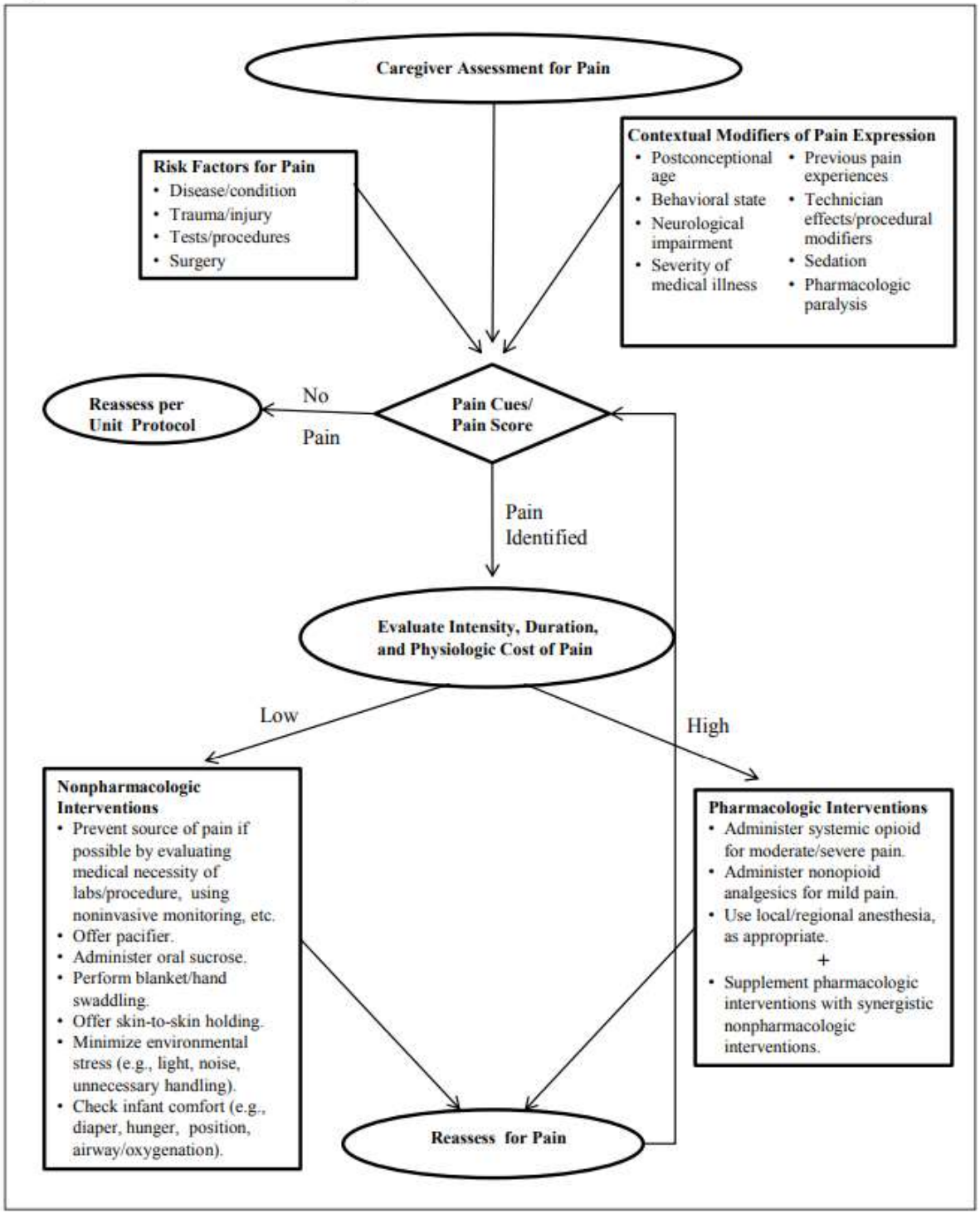
2. Pharmacologic approaches to pain management:
    a. Pharmacologic strategies are generally used in clinical situations during which moderate to severe pain is assessed or anticipated.
    b. Use non-opioid analgesics for short-term management of mild to moderate pain
        i. Unlike opioids that bind to opioid receptors, non-opioid analgesics such as acetaminophen provide mild analgesia as well as antipyretic and anti-inflammatory actions. These are the primary differences between opioids and non-opioids:
            1. Non-opioids have a ceiling effect in analgesia (a maximum dose beyond which analgesic effect does not increase).

2. Non-opioids do not produce tolerance or physical dependence.
3. The non-opioid mechanism of action is inhibition of prostaglandin formation

c. Use opioids in clinical situations during which moderate to severe pain is assessed or anticipated
    i. There is an ethical obligation to optimally manage pain in infants. Opioids are systemic analgesics used to treat moderate to severe procedural, postoperative, and disease-related pain in infants. The routine use of continuous opioids for long-term ventilation and sedation is not recommended because of concern about short-term side effects and lack of long-term outcome data

ii. Algorithm for Assessment and Management of Pain in Neonates from NANN Newborn Pain Assessment and Management Guideline for Practice 3rd edition (2012):

Algorithm for Assessment and Management of Pain in Neonates



iii. Guidelines for preventing and treating pain from NANN Newborn Pain Assessment and Management Guideline for Practice 3rd edition (2012):

Pain Intensity	Procedure	Management Strategy
Mildly Painful		
	Tape removal Suctioning Diaper change Nasogastric/orogastric tube insertion	• Nonnutritive sucking • (NNS) +/- sucrose • Containment and positioning • Skin-to-skin contact • Breast milk use • Gentle technique
	Umbilical catheterization	• NNS +/- sucrose • Containment and positioning • Breast milk use • Gentle technique
Moderately Painful		
	Intramuscular injection	• NNS +/- sucrose • Containment and positioning • Skin-to-skin contact • Breast milk use • Gentle technique • Topical anesthetic • Consider acetaminophen prophylactically for immunizations
	Venipuncture Arterial puncture	• NNS +/- sucrose • Containment and positioning • Breast milk use • Gentle technique • Topical anesthetic
	Heel stick	• NNS +/- sucrose • Containment and positioning • Skin-to-skin contact • Breast milk use • Gentle technique • Mechanical spring-loaded lance • Consider venipuncture for full-term and older preterm infants
	Eye exam	• NNS +/- sucrose • Containment and positioning • Breast milk use • Gentle technique • Consider local anesthetic eye drops *Note: Retinal surgery should be considered major surgery, and opiates should be provided.*
Moderate to Severely Painful		
	Percutaneous venous/arterial catheterization	• NNS +/- sucrose • Containment and positioning • Breast milk use • Gentle technique • Topical anesthetic • Consider opioids
	Central venous line placement	• NNS with sucrose • Containment and positioning • Breast milk use • Gentle technique • Topical anesthetic • Consider opioids

continued

Pain Intensity	Procedure	Management Strategy
	Lumbar puncture	• NNS with sucrose • Containment and positioning • Breast milk use • Gentle technique • Consider subcutaneous lidocaine or topical anesthetic
Severely Painful		
	Endotracheal intubation	• Use combination of atropine, morphine/fentanyl, and nondepolarizing muscle relaxant[67,68]
	Chest tube insertion	• Use opioids • Consider subcutaneous infiltration of lidocaine • NNS +/- sucrose • Containment and positioning
	Circumcision	• Dorsal penile nerve block or other regional block • Topical anesthetic • NNS +/- sucrose • Containment and positioning

iv. Documentation:
1. The patient's N-PASS score will be documented in PowerChart
a. With each assessment
b. Change in condition
c. After (or during continuous) administration of a pain or sedation medication
i. 45 - 60 minutes after administration of an oral, IM, rectal medication
ii. 15 - 30 minutes after administration (the start) of an IV medication
iii. During and after procedures
iv. 30 - 45 minutes after non-pharmacologic interventions
v. PRN

e. **Sedation Management:**
i. Refer to the MMC Neonatal Sedation Policy

14. **Phototherapy** –

Jaundice occurs in most newborns. Most jaundice is benign, but because of the potential toxicity of bilirubin, newborns must be monitored to identify those who might develop severe hyperbilirubinemia and, in rare cases, acute bilirubin encephalopathy or kernicterus.

a. **Considerations**:
i. Every infant discharged from the hospital should be assessed for jaundice before discharge. Further actions, as outlined in

the process, should be performed depending on the range of bilirubin.

ii. Phototherapy should be delivered at a minimum of 30 mcW/cm2 per nanometer

b. **Supplies**:
   i. Bilimeter
   ii. Ordered number of phototherapy lights
   iii. Eye patches

c. **Process**:
   i. Initiation:
      1. Patients should be wearing only a diaper for maximum skin to light exposure
         a. The patient can be on the biliblanket with a blanket swaddled around them and the biliblanket for comfort and containment
         b. The patient can be placed in a "Dandle-light" positioner that allows the light therapy to reach the patient
      2. Place a temp probe on the patient if receiving phototherapy in a warmer or incubator
         a. The patient's temperature should always be monitored when using phototherapy equipment
         b. When using phototherapy with radiant warmers or incubators use the baby skin temperature mode (servo) unless manual mode is specifically prescribed
         c. When using phototherapy in an open bassinet or crib the patient's temperature should be monitored:
            i. 30 minutes after initiation of therapy
            ii. 1 hour after initiation of therapy until you get two consecutive axillary temperatures ≥ 36.8 C
            iii. Per protocol once stable
      3. Place the eye patches on the patient
      4. Turn on the phototherapy device
         a. Do not operate the Giraffe Phototherapy Light at a distance of less than 38 cm from the patient
      5. Measure the irradiance reading at initiation of therapy
         a. Hold meter at the surface level of the patient
         b. Reading should be:

i. > 6 for bank or freestanding spotlights
ii. >30 for Giraffe spotlight
iii. >35 for Biliblanket

ii. Maintenance:
1. Phototherapy irradiance level should be checked each shift
2. The patient should be given a phototherapy 'break' of no more than 30 minutes Q 3-6 hours depending on their clinical status and development
a. Light needs to be turned off prior to:
i. Eye patches being removed
ii. Lab draws to check the serum bilirubin level
iii. Checking a transcutaneous bilirubin level
b. Eyes should be cleansed with warmed sterile water and gauze at least once a shift

d. **Documentation**:
i. Initiation and discontinuation of phototherapy
ii. Eye covering and eye care
iii. Irradiance reading every shift
iv. Parent education
1. Purpose of treatment and importance of maximizing treatment time
2. Importance of eye protection
3. Expected change in stools

15. **Respiratory** –

See Physical Assessment section for specifics on respiratory assessment standards

a. **Oxygen Administration**: To provide guidelines for delivery of supplemental oxygen to neonates
i. Supplemental oxygen is a drug with life-sustaining potential and potential toxicities. Many newborn diseases create situations where supplemental oxygen is necessary; however, newborns have reduced antioxidant defenses and underdeveloped central nervous, respiratory, and hematologic systems that are prone to oxidative stress. Prolonged low oxygen saturations are associated with poorer survival, more complicated clinical courses, and poorer neurodevelopmental outcomes. Side effects of oxygen

administration seem to be related to high oxygen levels, rapid and wide changes in oxygenation, sustained hypoxemia, and episodes of hypoxemia. This situation requires careful attention to oxygen administration to maintain a balance between sufficient oxygen levels and risk of deleterious side effects.

ii. Oxygen is a drug and requires an order for use
    1. Oxygen may be administered to an infant in distress while contacting the Provider
    2. Pulse oximeter alarms should be set at prescribed levels. In an emergency before a written order, pulse oximetry limit settings should be 90%–95%
iii. RN or respiratory therapist (RT) may adjust the FiO2 as needed to maintain blood oxygen saturations within ordered range
iv. When oxygen increases are determined to be necessary, these should be done in increments of 3%–5% at a time, and the infant should be observed for a length of time to ensure appropriate response. If recovery occurs, attempts should be made to wean the oxygen back to maintenance levels
v. In-line oxygen analyzers and an on-site blood gas laboratory should be available when oxygen is being delivered
vi. Repeated increases and decreases in oxygen delivery particularly are damaging to VLBW infants
vii. Increasing oxygen delivery in response to clinical deterioration may not be the best response. The infant must be assessed before an action can be determined
viii. **Low oxygen saturation alarms**: Both the infant and the monitor should be evaluated when a low saturation alarm occurs. Before the FiO2 is increased, the level of saturation and length of desaturation time should be reviewed. Allow the infant to recover spontaneously rather than increasing oxygen delivery
ix. **High oxygen saturation alarms**: When weaning oxygen, decrease oxygen for high saturation alarms quickly but cautiously to avoid a rebound increase in oxygen requirement
x. A registered nurse or a respiratory therapist must remain at the bedside when an increase in oxygen is required, until the oxygen has been weaned back to baseline or a new level

has been established as necessary to maintain saturation within the prescribed range

1. A Provider should be notified when an increase in FiO2 of 10% or more is required and the registered nurse or respiratory therapist is unable to wean the infant back to baseline

xi. The initial response to apnea should be tactile stimulation, followed by continuous positive airway pressure and progressing to artificial ventilation. Increases in oxygen without active respiratory effort or assisted ventilation are not indicated

b. **Nasal Cannula (NC)**: Refer to MMC Procedure – Oxygen Therapy in the NICU for more detail
   i. Equipment
      1. Blender (if blended oxygen is prescribed)
      2. Flowmeter
         a. We provide 2 volumes of flowmeters; verify that the appropriate flowmeter is at your bedside
            i. 1 Liter Per Minute (LPM)
            ii. 10 LPM
      3. Nasal cannula
      4. Securement device
         a. Duoderm & Tegaderm cut to size
         b. Sticky whiskers
      5. Pre-filled humidifier as warranted
   ii. Process:
      1. Apply NC to patient's face
      2. Secure in place using a securement device
      3. Verify that the oxygen flow being delivered matches the provider's order
      4. RN/RT may titrate the FiO2 to maintain the infant's oxygen saturation within the ordered range
   iii. Documentation:
      1. Document initiation and completion of NC in PowerChart
      2. Document LPM
      3. FiO2
      4. SpO2
c. **High Flow Nasal Cannula (HFNC)**: Refer to MMC Procedure – Oxygen Therapy in the NICU for more detail

i. Equipment:
    1. Nasal Cannula
    2. Oxygen blender
    3. Oxygen flowmeter
        a. We provide 2 volumes of flowmeters; verify that the appropriate flowmeter is at your bedside
            i. 1 Liter Per Minute (LPM)
            ii. 10 LPM
    4. Securement device
        a. Duoderm & Tegaderm cut to size
        b. Sticky whiskers
    5. Heated humidifier
    6. Single wire HFNC circuit
ii. Process:
    1. Apply NC to patient's face
    2. Secure in place using a securement device
    3. Verify that the oxygen flow being delivered matches the provider's order
    4. RN/RT may titrate the FiO2 to maintain the infant's oxygen saturation within the ordered range
iii. Documentation:
    1. Document initiation and completion of HFNC in PowerChart
    2. Document LPM
    3. FiO2
    4. SpO2
    5. Temperature of heated humidifier

d. **Continuous Positive Airway Pressure (CPAP) including bubble & Nasal Intermittent Positive Pressure Ventilation (NIPPV)**:
    i. Watch the MMC-NICU NNP C-PAP Care Bundle Video to refresh on best practices for C-PAP in the NICU
    ii. Assemble equipment that is appropriate to the size and weight of the infant
        1. In collaboration with the bedside nurse, the RT will:
            a. Obtain occipitofrontal circumference or infant weight for proper size and type of hat or headgear
            b. Will measure nares for proper prong sizing. If a mask is used, measure the mask size to ensure proper fit

c. Obtain a transcutaneous monitor if ordered and apply per manufacturer's recommendations

iii. Initial application:

1. Suction nares as needed to clear secretions. Suction the nasal pharynx as needed
2. Apply a properly sized hat or headgear, as indicated
3. Apply a skin protectant product before placing nasal interface in order to decrease risk of pressure damage
    a. Hydrocolloids or soft silicone dressing can be used and cut to size
        i. Duoderm
        ii. Mepilex
    b. Change according to the manufacturer's recommendations
4. Apply nasal interface and secure appropriately
5. Insert the OG tube to vent the stomach and for feeding
    a. Ensure proper placement at the gastroesophageal junction
        i. See NG/OG Placement and Management section for more specifics
    b. leave tube open to air for release of gastric pressure
6. Careful attention must be paid to prong fit to avoid skin irritation and breakdown.
    a. Breakdown of skin around the nares or nasal septum may be avoided with use of a skin barrier product when initiating nasal CPAP or ventilation, ensuring proper fit of nasal prongs, or changing from prongs to mask for delivery of CPAP
    b. Prong break:
        i. A prong break entails removing the prongs for 5–10 min to maintain perfusion and promote skin integrity. This facilitates inspection of nares, suctioning, and care as indicated. When nasal prongs are used, a prong break should be performed every 2–4 hr. Support the infant during this time with free flow oxygen via bag and mask or T-piece continuous positive airway pressure

(CPAP) to maintain functional residual capacity (FRC).

c. Floating prongs:
   i. NCPAP prongs should be positioned in the nares so no direct pressure is placed on nares, the nasal septum, or the upper lip
   ii. Positioning and skin protection are important during NIPPV because the prongs used may be identical. Prongs that are too tight may result in a buildup of pressure that could be dangerous to the infant

7. Stabilize the ventilator tubing at the head of the bed to avoid torqueing of prongs, which may result in skin irritation and breakdown

iv. Ongoing maintenance:

1. Inspect and evaluate the nares, septum, and surrounding skin with hands-on care and document in the medical record
2. Anticipate a prong break at least every 12 hr
   a. Gently massage and cleanse the nares during prong breaks
3. Assess setup and prongs in the floating position on an ongoing basis

4. Assess for pain per protocol (see *Pain/NPASS* section of SOC)
5. The infant may be positioned side-to-side, prone, or supine. Reposition the infant regularly, supporting tubing to avoid pressure on nares or the nasal septum.5(Level VII) Kangaroo care also may be performed during nasal CPAP or IPPV

a. Swaddling and containment help decrease the movement and pulling on the nares by the device

6. Check for proper placement of the OG tube to vent the stomach
    a. Measure girth every 8 hr at minimum with hands-on care and as needed and document in the medical record
    b. Feedings, when ordered, are given via the same 8-Fr feeding tube

v. Potential adverse effects to observe for:
    1. Pneumothorax may result from alveolar distention
    2. Gastric distension, which can be reduced by use of an orogastric (OG) tube to vent the stomach
    3. Over distension of the lungs, which results in poor oxygenation and carbon dioxide exchange and may impede venous return
    4. Nasal irritation, which may cause damage or necrosis to the nasal septum or skin
    5. Obstruction of prongs via secretions or other means will stop delivery of air; frequent inspection of setup, gas humidification, and gentle suctioning can prevent these problems

vi. Notify the Provider regarding:
    1. Presence of non-blanching erythema
    2. Any septal, nasal, or surrounding skin breakdown
    3. Frank bloody secretions
    4. Vital signs outside defined limits
    5. More than four apneas in 1 hr associated with oxygen saturation lower than 60% or bradycardia
    6. Increased work of breathing
    7. Increased abdominal girth or visible loops

vii. Documentation:
    1. Document the following in the medical record with cares
        a. The positive end-expiratory pressure, flow, and temperature of the circuit
        b. Rate, if providing NIPPV
        c. Condition of the nares, septum, and surrounding skin

d. Skin integrity

2. Complete a *C-PAP Checklist* at the start of each shift
    a. The C-PAP Checklist can be found on the unit in the document file cabinet, or on the NICU Intranet page in the Resources Forms folder

e. **Endotracheal tube (ETT) Intubation**:
The goal of mechanical ventilation is to assist in providing adequate tissue oxygenation and eliminating CO2

i. **Considerations**:
1. ET intubation is a procedure with a low frequency but high risk of complications.
2. Patient's heart rate and oxygen saturation should be monitored continuously during the procedure and stabilized with bag-and-mask ventilation before intubation and between attempts
3. Limit intubation attempts to 30 seconds
4. Have all equipment for intubation prepared and in working order before initiation procedure
5. For non-emergent intubations, infant pain management coupled with sedation or careful muscle relaxation is recommended before the procedure

ii. **Equipment**:
1. Assemble equipment that is appropriate to the size and weight of the infant per NRP Guidelines or NICU Provider
    a. ETT
    b. Stylet
    c. Laryngoscope blade
    d. CO2 detector
    e. Suction Catheter
    f. Stethoscope
    g. T-piece resuscitator, or bag-and-mask
    h. Oxygen source with blender
    i. ETT securement device (see below)
        i. NEO-fit is our standard securement device
    j. Cardio-respiratory monitor
    k. Medications for non-emergent intubations
        i. Atropine
        ii. Fentanyl or Morphine
        iii. Rocuronium

iv. Intranasal Versed (at Provider's discursion)
v. Sugamidex (reversal agent) at bedside

iii. **Procedure**:

1. Gather and prepare necessary personnel and equipment
2. Perform patient identification using two patient identifiers and perform the procedural timeout process
3. Administer medications as ordered for non-emergent intubations
4. Suction the oropharynx
5. Provider to position the patient supine on a flat surface with head midline and neck slightly extended
6. Provider to attempt intubation, with no more than 30 second for each attempt
    a. RN to relay concerning vital signs to the Provider during the procedure attempt
7. Attach the CO2 detector and resuscitation bag to assess tube placement
    a. Yellow = Yes
    b. Purple = Problem
8. Auscultate both sides of the chest for the presence and intensity of breath sounds
9. Assess chest movement with inflationary breaths
10. Auscultate over the epigastrium and visually assess for distention
11. Check for condensation in the tubing during exhalation
    a. Condensation is a sign that the patient is intubated
12. When tube is assessed to be in good position secure the ETT using a securement device
13. Provider to order x-ray to confirm placement
    a. Assist with x-ray
14. Be sure that the family is updated
15. Document the procedure in the medical record

iv. **Documentation**:

1. Date of intubation
2. Time of intubation
3. ETT size
4. ETT depth
5. Patient's tolerance of procedure

6. Medications administered
7. Pain interventions
8. FiO2
9. Timeout

f. **High Frequency Oscillating Ventilator (HFOV)**:
High frequency ventilation uses a small volume of gas (Vt) at rates of at least 150 breaths per minute to ventilate patient with severe respiratory failure. The advantage of HFOV over conventional ventilation is the ability to deliver adequate minute volumes using small Vt with lower distal airway pressure (barotrauma).

i. Indications for use:
1. Severe lung disease that is unresponsive to conventional ventilation
2. Pulmonary air leaks, pulmonary interstitial emphysema (PIE), pneumothorax, and broncho-pleural fistula
3. Pulmonary hypoplasia and diaphragmatic hernia
4. Persistent Pulmonary Hypertension (PPH) and meconium aspirator syndrome
5. Failure of conventional mechanical ventilation

ii. Parameters to be set or monitored:
1. MAP: affects oxygenation
2. Amplitude or stroke volume: size of pressure wave produced by oscillator
3. FiO2: set on the ventilator as with the conventional vent
4. Frequency (Hz): 180 to 900 breaths per minute
    a. 5 to 15 Hz; where 1 Hz = 60 breaths
    b. We do not record RR for patients on a HFOV
        i. Neither the RN nor the monitor can accurately assess the respiratory rate of patients on the Oscillator

iii. Patient care and assessment:
1. No special ETT is required
2. Suctioning procedure is performed as usual
    a. See Suctioning (ETT/HFOV)
3. Chest wall vibration "wiggle" is assessed rather than breath sounds to determine the effectiveness of vent settings and lung compliance changes.
    a. Wiggle to the belly button is considered 'adequate'
4. Breath sounds are not audible during HFOV

a. Only the NICU provider can 'pause' the Oscillator to assess for a murmur

5. Vibration may interfere with electrical monitoring of HR and RR
    a. Use pulse from arterial line or pulse-ox monitor for HR monitoring if necessary
    b. Respiratory rate cannot be monitored
    c. Sighs help reduce micro atelectasis and improve oxygenation
6. Patients need to be routinely turned while on the Oscillator

g. Ventilated Patient Transfer Techniques:
    i. Equipment
        1. Comfortable chair that can recline to 40 degrees
        2. Infant hat for infants weighing less than 1,000 grams
        3. Warm blankets
        4. Privacy screen
    ii. Procedure
        1. Have parent prepare his or her clothing for holding the infant. Open shirt in the front and remove bra or t-shirt. Parent should clean and warm hands
        2. Gather appropriate supplies: Privacy screen, chair, blankets and hat. Ask a second healthcare worker to help if needed
        3. Position infant either supine or side lying with a warm blanket folded in fourths beneath the infant. Place hat on infant if baby weighs less than 1,000 grams
        4. Assess that the infant's endotracheal tube is secured to the infant's face
        5. Auscultate breath sounds and suction as needed. Allow the infant time to recover prior to transfer
        6. Remove all water from ventilator tubing
        7. Place chair next to ventilator
        8. Assure that all IV lines, transducers and cables are untangled and are free to move with and reach the patient during and after transfer
        9. Assure that emergency equipment (ventilation device and suction) will reach the infant after transfer
        10. Temporarily disconnect continuous suction and/or feeds for transfer. Reconnect after transfer is complete

a. Do not transfer the infant immediately after a bolus feed. Try to transfer prior to feed or approximately one hour after feed. The infant may be fed during skin-to-skin care

11. If the infant is in an incubator, leave the temperature probe in place on the infant's skin. Reconnect after skin-to-skin care (this is not possible for a warmer bed or a Giraffe incubator)
    a. For transfer from a Giraffe incubator, activate fan mode prior to opening the door to minimize heat loss
    b. Place the incubator in "air mode" with the air temperature set to maintain the present air temperature while the parent is holding the infant
    c. Position ventilator tubing from end of porthole to front of incubator prior to transfer

iii. Transfer Infant:
    1. Parent-assisted transfer technique (parent able to get in and out of chair by him or herself).
        a. Have parent place his or her forearm under the blanket underneath the infant. With the other hand, have the parent cup the infant's head. Momentarily disconnect the ventilator tubing from the infant's endotracheal tube
        b. Have the parent lean forward over the bed and gently lift the infant to his or her chest. The infant's head rests on the parent's sternum and is turned to the side facing the ventilator
        c. Reconnect the ventilator tubing to the endotracheal tube while parent is holding infant and standing at the bedside
        d. Disconnect the ventilator tubing to the endotracheal tube and guide the parent into the chair. The nurse or the second healthcare provider will guide the infant's IV lines and cables to the chair with the infant
        e. Reconnect the ventilator tubing to the infant's endotracheal tube

2. Nurse-assisted transfer technique (nurse carries infant from bed and hands to parent)
    a. The nurse places forearm under the blanket and underneath the infant. With his or her other hand, the nurse cups the infant's head
    b. The second healthcare provider, will disconnect the ventilator tubing from the infant's endotracheal tube and assists the nurse by guiding IV lines and cables to the chair
    c. The nurse gently lifts the infant and places him or her on the parent's chest. The infant's head rests on the parent's sternum and turns to the side facing the ventilator
    d. Reconnect the ventilator to the endotracheal tube
3. After transfer
    a. After the infant is transferred, the parent's shirt is closed and buttoned around the infant. The outer blanket remains in place around the infant
    b. Secure the ventilator tubing
    c. RN needs to remain at or near the bedside for the duration of the session
    d. To transfer the infant back to bed, use either the parent-assisted transfer technique or the nurse-assisted transfer technique
4. Parent-assisted transfer technique
    a. Disconnect the patient from continuous feeds and continuous suction. Assure that all lines and cables are untangled and free to move with the patient
    b. Provide a warm blanket for infant containment during transfer
    c. Momentarily disconnect the infant's ventilator tubing from the endotracheal tube. Ask the parent to stand up while supporting the infant's head and back with his or her hands. The nurse can guide the IV lines and cables while the parent is moving to a standing position

   d. Momentarily reconnect the ventilator tubing to the infant's endotracheal tube while the parent is in a standing position
   e. Disconnect the ventilator tubing from the infant's endotracheal tube and have the parent lean forward placing the infant in the bed in a supine position swaddled with blanket around the infant
   f. Reconnect the infant's endotracheal tube to the ventilator tubing and position securely inside the bed
   g. Reconnect continuous feedings and continuous suction
   h. If the infant is in an incubator, return to previous set mode
5. Nurse-assisted transfer technique
   a. Disconnect patient from continuous feeds and continuous suction. Assure that all lines and cables are untangled and free to move with the patient
   b. Provide a warm blanket for infant containment during transfer
   c. Disconnect infant's endotracheal tube from ventilator tubing
   d. The nurse takes the infant from the parent, swaddles infant with a blanket, and places the infant back in the bed in a supine position. A second healthcare provider, if needed, will assist the nurse by guiding the infant's IV lines and cables to the bed
   e. Reconnect infant's endotracheal tube to the ventilator and position securely inside the bed
   f. Reconnect feeds and suction
   g. If infant is in an incubator, return to previous set mode
6. Documentation
   a. Document in the EMR skin-to-skin duration, tolerance, problems encountered and actions taken to resolve problems, and any parent education completed

h. **Securement Devices**:

Steps 1-6

Steps 9-12

Step 13

Step 14

Step 15

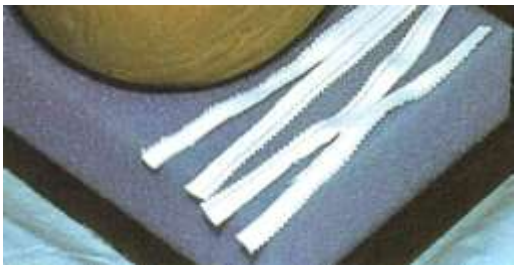
i. **NEO-fit**: (preferred method of ETT securement)

1. Trial fit the NEO-fit on the patient prior to removing the adhesive liner.
2. Make sure that the holder opening for the ETT is facing down
3. Adhesive pad should not overlap the mouth or eyes
4. The length of the pad should be ½ the distance from the corner of the mouth to the earlobe (mid cheek)
5. Holder should be offset to prevent grooving of upper gum and/or tissue necrosis of upper lip
6. Trim excess padding if necessary
    a. LBW infants may need adhesive pads proximal to upper lip to be trimmed.
    b. Opposite edge should be trimmed if they contact nostrils
7. Skin needs to be dry and clean for successful adhesive pad application
    a. Cleanse skin with Sterile Water, or Sterile Saline Wipes
    b. Apply SurePrep Skin Protectant to clean skin
        i. Allow to dry completely before applying NEO-fit
8. (**Optional**) Use a pectin-based skin preparation (Duoderm) between skin and device
9. Remove the adhesive liners from the bottom of the adhesive pads
10. Position cradle so that subsequent ETT insertion will not produce lip/gum compression
11. Affix adhesive pads to patient one side at a time
12. At this time the ETT can be placed in the cradle
13. Position the cleats to come in contact with the ETT
14. Wrap the Velcro strap around the ETT and holder
15. Check the integrity of the ETT and NEO-fit™ by holding NEO-fit™ and ***gently*** attempt to withdraw the ETT
    a. If the strap is too loose the ETT will slide thought the cleats
16. (**Optional**) If the tube is secure remove the backing from one lollipop, apply from the center of the nose toward the ear with your finger
    a. Apply the lollipops to end ½ to 1 cm beyond the adhesive pad
    b. Do no stretch the lollipops

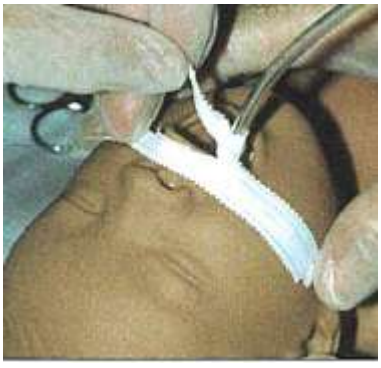

Step 16

i. Remove the backing from the second lollipop, you may overlap the lollipops but DO NOT STRETCH them

ii. **"X" / "V" Securement method**: (this method should only be used if we do not have access to the NEO-fit or is the NEO-fit is contraindicated for some reason.

1. Prepare two pieces of 1/2 inch 3M waterproof tape into an "X" & "V"
   a. 
2. Clean cheeks and upper lip with sterile water and gauze
3. Apply the SurePrep No-Sting Barrier wand
   a. Allow to dry (approx. 1 minute)
4. If possible, apply a hydrocolloid base layer
   a. Duoderm
5. An assistant should hold the tube firmly at all times
6. The upper arm of the "X" piece is applied first above the upper lip
   a. 
7. One section of the lower arm of the "X" piece is then wrapped around the tube; then the other section of the lower arm is wrapped around the tube
   a. Be sure to wrap the tape UP the tube, so that it comes in contact with the ETT and not just itself
   b. Make a tab at the end of every piece so that it is easier to unwrap if repositioning is needed.

c. Be sure to check the tube markings at the lip throughout the procedure
d. 

8. Next, apply the "V" shaped piece to help secure the underlying tape
   a. The upper arm of the "V" is applied first to the upper lip
      i. 
   b. The lower arm of the "V" wraps around the tube again
      i. 
   c. Make a tab at the end of this piece so that it is easier to unwrap if repositioning is needed.

i. **Suctioning (Oral, Nasal, or Pharyngeal):** Maintenance of a patent airway is a care priority. This procedure addresses removing mucous

secretions and all foreign materials from the oropharynx (mouth and throat) and nasopharynx (nose).

i. **Considerations:**
   1. Suctioning should be performed based on patient assessment
      a. Assessment may include breath sounds, respiratory rate, presence of retractions, grunting, visible presence of secretions, or decrease in monitored oxygen saturation
      b. Suctioning should be avoided for 30 min to 1 hr after feeding unless it is necessary to establish a patent airway
   2. Suctioning the airway is a multidisciplinary responsibility between nursing and respiratory therapy. Communication is important to ensure suctioning is performed as needed but not excessively
   3. Suction regulators and canisters are to be assembled and at the infant's bedside at the beginning of each shift. It is the nurse's responsibility to ensure the bedside equipment is in working order
   4. All suction canisters and connecting tubing should be changed when grossly soiled or 24 hours after initial use
      a. They should be dated and timed when placed into service
   5. Change out the NeoSucker every 24 hr or as needed if unable to clear secretions from the device
   6. Monitor for and manage any adverse events as a result of suctioning; these may include
      a. hypoxemia
      b. vagal stimulation
      c. bronchospasm
      d. gagging
      e. emesis
      f. uncontrollable coughing
      g. pain
      h. cardiac dysrhythmias
      i. mucosal trauma

ii. **Nursing Knowledge:**
   1. Nurses must be knowledgeable about adverse effects of suctioning and response to those effects

2. During oral and nasal suctioning, the mouth always should be suctioned first to avoid inhalation of oropharyngeal contents when the nose is suctioned

iii. **Process:**

1. Before the procedure
    a. Set the suction regulator to 80 mm Hg negative pressure
    b. Occlude the open end of the suction tubing to verify suction reaches the desired negative pressure.
    c. Select the smallest catheter size that allows aspiration of secretions if using a suction catheter.
        i. The outer diameter of the catheter should be smaller than the inner diameter of the nare if nasal suctioning is to be performed.
        ii. Ensure appropriate-sized catheters are available at the infant's bedside
    d. If using a nasal aspirator, the smaller size, if available, should be used for infants weighing less than 1,500 g, and a larger size should be used for infants weighing more than 1,500 g or per manufacturer's recommendations
2. Patient Applications:
    a. Follow universal precautions while performing all steps of the procedure unless directed to use sterile precautions
    b. The procedure will be preceded by proper patient identification
    c. Provide pain management as indicated (refer to *Newborn Pain Assessment and Management: Guideline for Practice,* 3rd edition)
3. Nasal Pharyngeal Suction:
    a. Measure from the earlobe to the opening of the nare with measuring tape to determine the depth of catheter insertion
    b. Open the catheter package
    c. Connect the catheter to suction tubing
    d. Position the infant supine or with a slight head elevation

e. Lubricate the tip of the catheter with a water-soluble lubricant or saline
f. Gently insert the catheter upward and back into the nare
    i. Do not force the catheter
g. When the catheter reaches the predetermined insertion depth, occlude the suction port to apply negative pressure
h. Apply constant negative pressure while slowly withdrawing the catheter
    i. Do not apply negative pressure for more than 5 seconds; observe the response
i. Rinse catheter secretions with sterile saline/water
j. Allow the infant to recover and repeat the process as needed (no more than three passes at one time) to clear secretions
k. Discard the catheter and remove gloves
l. Assess the infant

4. Nasal suctioning with nasal aspirator or bulb syringe (this device remains at the opening of the patient's nose):
    a. Open the package containing the aspirator or bulb syringe
    b. Connect to suction tubing (no suction source is needed for the bulb syringe)
    c. Position the infant supine or with slight head elevation
    d. Place the tip of the aspirator into the infant's nare so it occludes the opening
    e. Occlude the aspirator port with a finger or release pressure on the bulb
    f. Allow the infant to recover and repeat the process on both nares to clear secretions. Avoid frequent nasal suctioning because it can cause trauma and edema
    g. Flush secretions from the aspirator, or if using a bulb syringe discard the syringe
    h. Place the aspirator in a protective covering, dated and timed, and discard after 24 hr
5. Oral Suctioning:

a. Prepare the suction device
    i. Catheter
    ii. Nasal aspirator
    iii. Bulb syringe
b. Connect to suction tubing as needed. A bulb syringe does not require a suction source
c. Insert the device into the side of the infant's mouth
    i. Avoid the midline of the tongue because the device may stimulate a gag reflex
d. When the catheter reaches the predetermined insertion depth, occlude the suction port to apply negative pressure or release the bulb
e. Continue applying constant negative pressure while slowly withdrawing the catheter
    i. Do not apply negative pressure for more than 15 s.
f. Allow the infant to recover and repeat the process as needed to clear secretions
g. Once suctioning is completed, discard the catheter or bulb syringe. If using an aspirator, place in a protective covering, dated and timed, and discard after 24 hr

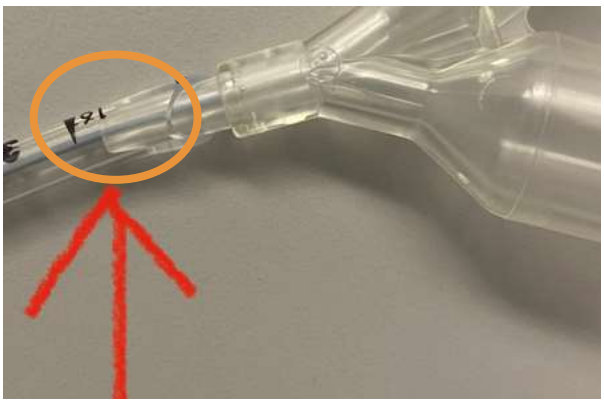
iv. Documentation:
1. Document the following:
    a. Color, quantity, and consistency of the secretions
    b. Quality of breath sounds before and after suctioning
    c. Infant response to therapy
    d. Complications or additional actions taken

j. **Suctioning (ETT/HFOV)**: Endotracheal suctioning is a necessary procedure indicated for infants with artificial airways or decreased ability to expectorate secretions. It is a mechanical means to aspirate secretions from the trachea bronchial tree
    i. **Considerations:**
    1. Suctioning of the endotracheal tube (ETT) may be performed at the discretion of the nurse or respiratory therapist
    2. Indications for ETT suctioning include any of the following:

a. Audible gurgling respirations, synchronous with air movement in and out of the ETT, often accompanied by tactile fremitus on the chest
b. Visual movement of secretions in the ETT
c. Increased coarse tubular breath sounds or coarse moist crackles on auscultation that indicate the presence of secretions in large airways accessible by suction
d. Gradual increase in peak inspiratory pressures with volume-controlled ventilation or ventilator alarms for high pressure with greater frequency
e. Decreased tidal volume during pressure-controlled ventilation
f. Changes in monitored flow and pressure graphics
g. Infant restlessness, elevated heart rate, increased respiratory rate, decreased oxygen saturation
h. Tracheal aspiration for laboratory specimen
i. Decreased chest movement with mechanical ventilation, with or without any of the above also noted
j. Increased work of breathing
k. After a respiratory treatment
l. Any clinical condition that would indicate the possibility of secretions in the airway

3. Contraindications:
    a. Contraindications are relative to the infant's risk for developing adverse reactions or worsening clinical conditions as a result of the procedure. There is no absolute contraindication for endotracheal suctioning because the decision to abstain from suctioning to avoid an adverse reaction may be lethal. Relative contraindications may include the following
        i. Unstable cardiovascular status
        ii. History of poor tolerance to suctioning
        iii. Anticoagulant therapy or pulmonary hemorrhage
4. Hazards and complications:

   a. The major hazards of suctioning often are unavoidable, even when it is performed with the best possible technique. While making every effort to avoid these effects, the caregiver should be alert for their presence. Some complications may be minimized or avoided by individualizing suctioning to each infant's needs
5. Frequency of suctioning:
   a. Suctioning should be performed only as needed, with careful assessment of the indications described above, and not on a routine schedule
6. "Safe suctioning" is the MMC NICU standard of care. Suction should be only to the tip of the ETT to prevent mucosal irritation and injury.
   a. Safe suctioning instructions are included on the VAP prevention bedside visual and each intubated patient should have a VAP Prevention Bedside Visual card hanging at the bedside at the time of intubation with the following information on it:
      i. Safe Suction information depth and color
      ii. ETT size
   b. To determine safe suctioning depth, look at the number closest to the ETT Adaptor TIP (shown by the yellow circle, and red arrow in the picture below) and add 5 to determine your safe suction depth



7. Use of saline during suctioning:
   a. The latest evidence shows that instillation of normal saline into the ETT for the purpose of

clearing secretions is unlikely to be beneficial and may be harmful. Consequently, saline should not be used routinely in endotracheal suctioning for purposes other than clearing the suction catheter

8. Selecting an appropriate-size suction catheter:
    a. Lung volume loss related to suctioning may occur and is related to suction catheter size rather than suction pressures. It is recommended that suction catheter size not exceed 70% of the ETT inner lumen. A 5- to 6-Fr suction catheter would be used with endotracheal tube size 2.5–3.5, and an 8-Fr suction catheter would be used for an ETT size 4–4.5

ii. **Process:**

1. Determine the need for suctioning
2. Follow standard precautions while performing all steps of the procedure unless directed to use sterile technique
3. The procedure will be preceded by proper patient identification
4. Provide developmental support as indicated
    a. A second person should be available for endotracheal suctioning to manage complications and provide developmental support for the infant
5. ETT suction setup should remain closed as much as possible.
    a. Closed-suction catheters should be changed out weekly according to the MMC VAP Prevention Bundle
6. The mouth should be suctioned before nasal or endo-tracheal suctioning.
    a. A separate suction device is used for oral suctioning
7. Determine the depth for insertion of the suction catheter
8. Assemble equipment
9. Gently rouse infants from sleep to avoid startling them
    a. Provide support to infants during the procedure

10. Avoid the use of saline lavage for suctioning
11. When applying suction, regulate suction to 80–100 mm Hg pressure
12. Note the infant's heart rate, respiratory rate and effort, oxygen saturation monitor values, blood pressure (if central monitoring is being used), and ventilator settings
13. Insert the suction catheter as measured into the end of the ETT.
    a. Apply suction and withdraw the suction catheter in a rotating/rolling motion.
    b. The entire motion should last no longer than 15 seconds
14. Allow the infant to recover until oxygen saturation has returned to baseline.
    a. Allow time for adequate recovery of heart rate and oxygen saturation. Vigorous suctioning may cause hypoxemia and reflex bradycardia.
    b. If the infant is not recovering and a plugged ETT is suspected, suction immediately.
    c. If no improvement results, the ETT should be removed and the infant should be ventilated with bag and mask ventilation
15. Rinse the catheter with sterile water or sterile normal saline to clear it
16. Repeat step 14 as needed, evaluating the need for continued suctioning
17. Ensure that oxygen saturation stabilizes in a patient-appropriate range before leaving the infant's bedside
18. Assess breath sounds after suctioning
19. Reposition the infant from side to side, supine to prone

iii. **Documentation:**

1. Quality of breath sounds before and after suctioning, the way in which the procedure was tolerated, and necessary actions taken to stabilize the infant
2. Color, consistency, and quantity of secretions obtained
3. Changes in ventilator settings or new maintenance oxygen level
4. Position of the infant when the procedure is completed

k. **Surfactant (Curosurf) administration**: It is preferred to give Curosruf in the delivery room – the sooner the better - amniotic fluid in the lungs enhances efficacy.
    i. Personnel required at the bedside during administration:
        1. Neonatal Provider
        2. 2 NICU Nurses
        3. Respiratory Therapist
    ii. Supplies:
        1. Curosurf vials
        2. 20-gauge or larger needle
        3. Syringe large enough to accommodate the dose
        4. 5 FR Ballard Multi-Access Catheter (MAC)
    iii. Dosing:
        1. **2.5 ml/kg birth weight** for the **first dose**
        2. 1.25 ml/kg birth weight for each **repeat dose** (up to two repeat doses)
            a. 2nd and 3rd doses have not been shown to be beneficial but there are clinical scenarios which may call for 2nd and 3rd doses at the discretion of the provider
            b. The higher initial dose should not be repeated a 2nd time
    iv. Procedure:
        1. Warm medication room temperature for 20 minutes, OR by holding in hand for 8 minutes. Do not use artificial warming methods. **Do not shake.**
            a. *To warm, roll vial in hand, or gently turn upside down, to mix medication and warm uniformly*
            b. **DO NOT** draw up medication until ready to administer it
            c. Unopened vials of CUROSURF may be warmed to room temperature for up to 24 hours prior to use
            d. CUROSURF should not be warmed to room temperature and returned to the refrigerator more than once
                i. Apply a 'use first' sticker to all vials/boxes that have been removed and returned to the refrigerator. This indicates that they can NOT be returned to the refrigerator a second time.

e. Verify endotracheal tube (ETT) position prior to dosing by positive C02 detection or auscultation of equal breath sounds bilaterally and effective air entry.
f. Remove metal ring and rubber stopper from the top of the Curosurf vial. Draw up slightly more than the ordered dose in syringe using a 20-gauge or larger needle
g. Attach the medication syringe to the MAC and discard excess drug through the catheter so that only the dose to be given remains in the syringe
h. Suction the ETT immediately prior to administration
i. Attach the primed MAC to the ETT
j. Keep the head and the body of the infant in alignment in a supine position, **without inclination**
k. The drug is administered into the trachea through a single lumen ETT using a MAC
    i. When using the MAC, ***the catheter's depth of insertion is calculated by noting the number on the ETT closest to the ETT adaptor (farthest from the tip) and adding 5 cm.*** The catheter is then inserted to a depth whereby the color corresponding to the calculated number is visualized in the adaptor window. (This places the end of the catheter at the tip of the ETT during dose administration.)
l. The dose is given as **one aliquot**, and should be administered as a bolus, ***given rapid push over 3 - 5 seconds***, or only as fast as the baby tolerates.
    i. The Provider should keep in mind compliance changes / PIP etc.
m. The aliquot is given by the NICU nurse while the infant is being either mechanically OR manually ventilated (using a self-inflating bag with a manometer or a T-piece resuscitator) by the respiratory therapist at rate of 40-60 breaths/minute. Oxygen is provided during the dosing procedure to maintain hemoglobin oximetry at approximately 90 – 95 %.

n. Dosing should be stopped if sats drop < 85% or if bradycardia occurs.
o. Monitor inspiratory pressures closely.
p. Reassess infant after dosing.
q. ETT suctioning is delayed for at least 1-2 hrs after administration to avoid removing the drug, unless signs of significant airway obstruction occur, or physician/NNP ordered.

v. Patient monitoring:
    1. Monitor continuous cardiac, respiratory, and oxygen saturation during and after administration.
    2. Frequent vital signs and blood pressure (**q15min x1 hr after administration**) and on-going assessment of air entry and chest excursion.
vi. Considerations:
    1. If given in the NICU at a later time via INtubation-SURfactant administration-Extubation (INSURE) technique, repeat the same process with provider at bedside decreasing PIP due to compliance changes.
    2. If given in the NICU at a later time and plan to keep baby on mechanical ventilation, preferred method would be to give Curosurf using volume ventilation via ventilator.
    3. Infants may become hypoxic, bradycardic, distressed, or the ETT may become blocked during surfactant administration. Rapid changes in lung compliance may occur during and immediately following dosing. Changes in lung compliance increase the risk of pulmonary hemorrhage in infants with a. **Notify a provider immediately if you notice a negative change in patient status; a negative change in lung compliance, or bloody secretions when suctioning.**

l. **Ventilator Associated Pneumonia (VAP) prevention bundle**:
    i. Utilize PolicyStat for the most up-to-date version of the Ventilator-Associated Pneumonia (VAP) Prevention Bundle Guidelines – MMC NICU
    ii. Utilize the VAP Prevention Bundle Bedside Visual from intubation through extubation

m. **Chest tube**: Infants with air leak syndrome may need needle aspiration as an immediate intervention before thoracotomy tube placement. A chest tube will allow decompression of the

pneumothorax or evacuation of large amounts of pleural fluids and subsequently re-expand the affected lung.

i. Symptoms of a pneumothorax:
    1. Abrupt change in respiratory status marked by increased work of breathing;
    2. Increased respiratory rate
    3. Restlessness, irritability, or lethargy
    4. Cyanosis
    5. Decreased breath sounds
    6. Asymmetrical chest rise

ii. Nursing care of the infant with a chest tube:
    1. Provide pain management as ordered
    2. When a chest tube to **suction** is ordered:
        a. **Maintain suction source vacuum to -80 mmHg or higher**.
        b. **Suction regulator in the drainage system is pre-set to -20 cmH20**.
            i. You know suction is working when suction bellows expand to the ▲ mark or beyond when suction is connected and operating at a regulator setting of -20 cmH20 or higher.
                1. If the bellows is expanded but less than the ▲ mark, increase the suction source to vacuum to -80 mmHg or higher.
    3. When a chest tube to **water seal** is ordered:
        a. Turn off the wall suction
        b. Disconnect the suction tubing from the drainage system, but store cleanly close by incase suction needs to be re-started.
    4. Maintain a safety tab on tubing near the junction of the chest tube and tubing; using a Kelly clamp or safety pin, attach to the mattress near the infant. This will pre-vent pulling on the site of the chest tube and promote drainage by avoiding dependent loops in the tubing.
    5. To promote air evacuation, maintain elevation of the head of the bed at a 30- to 45-degree angle, as appropriate.

6. Always place chest drain below the patient's chest in an upright position
    a. It can be placed on the floor and taped down
    b. It can be hung from the bed with hangers provided
7. Patient tube connections, water seal, suction regulator and bellows should be checked regularly to confirm proper operation
8. A rubber-tipped hemostat or Kelly-clamp and Vaseline gauze should be kept at the bedside or be immediately available at all times while the chest tube is in place.
    a. In the event the chest tube becomes disconnected from the drainage system, the rubber-tipped clamp may be placed on the chest tube to prevent air from being pulled into the pleural space. The chest tube should be clamped only for a short amount of time and reconnected with the drainage system to allow air or fluid removal as indicated. The provider should be notified immediately.
    b. In the event of an unplanned removal of the chest tube, Vaseline gauze should be used to cover the hole left in the chest. The provider should be notified immediately
9. Initial assessment for the shift:
    a. General respiratory assessment
    b. Chest tube site
        i. Check for signs of infection or drainage from the site and security of the dressing.
        ii. Maintain an airtight dressing. Dressings should not be changed unless integrity is compromised.
    c. Presence of bubbling in the water seal chamber of the drainage system
    d. Amount of suction being applied
        i. Wall
        ii. Chamber
    e. Amount of drainage in the collection chamber, if any

10. Ongoing assessments:
    a. Frequent respiratory assessment, according to the infant's condition
    b. Pain assessment and management
    c. VS every 2–4 hr with continuous monitoring, including pulse oximetry, in place
    d. Monitoring of blood pressure via arterial or peripheral access
    e. Monitoring of drainage and replacement of drainage system as necessary and per provider's orders

iii. Considerations:
1. Inserting and removing a chest tube is performed by a Neonatal provider.
2. Milking or stripping of the chest tube is generally unnecessary.
    a. Presence of clots or other debris may require gentle kneading of the chest tube and should be performed only with a written order.
3. Bubbling in the drainage system after a period of cessation is reason to troubleshoot the system; check all connections and assess for dislodgment of the chest tube. An X-ray may be necessary to assess for re-accumulation of pneumothorax.
4. Replace chest drain if damaged or when collection volume meets or exceeds maximum capacity
5. If transport of the infant is necessary, the chest tube drainage system may simply be disconnected from wall suction, and a Heimlich valve may be used. Clamp only to test for tolerance before chest tube removal or if the drainage system becomes disconnected.

iv. Documentation:
1. All patient assessments, placement of the chest tube, and tolerance in the medical record
2. A site assessment at least every 12 hr and any necessary dressing changes in the medical record
3. The presence or absence of bubbling, the suction level, and the security of the dressing during every shift
4. The drainage in the water seal system, noted in the medical record as output. (If the drainage or fluid in the

drainage system is being replaced, this is documented as well but is not usually counted in the intake.)

16. **Blood Product Administration** –
Please refer to Blood Bank Obtaining Blood and Returing Blood Products MMC Policy for details on obtaining/returning blood from blood bank. The following SOC align with the MMC Transfusion Therapy & Transfusion Reaction Policy.
    a. **Considerations:**
        i. Parental/legal representative must sign a *Blood Transfusion Consent* (Form # 3157) prior to blood transfusion
            1. Consent expires after 30 days or at discharge
        ii. In case of refusal a *Refusal to Permit Blood Transfusion* (Form # 0318) must be signed
            1. Refer to the policy Managing Refusal of Blood Transfusion for more detail
        iii. Blood products should NOT be administered with other medications or IV solutions
            1. Blood may be infused in the second lumen of a UVC while dextrose is running in primary lumen
            2. Blood can be infused in a UAC **with physician/NNP order**
            3. If available IV sites are problematic, ask physician/NNP for orders to alternate blood and glucose infusions with strict glucose monitoring
            4. If an arterial or venous catheter is in place, blood samples should not be drawn during infusion as abnormal results may be obtained
        iv. GTABS is required on all patients except in emergency situations
            1. In which case emergency O- blood would be requested
            2. GTABS is valid for up to 4 months in the Neonatal patient, or until they are discharged
        v. If a blood component is not administered or is damaged it must be returned to the Blood Bank and document the reason
        vi. The patient will be NPO for a total of 9 hours: 3 hours prior to blood transfusions, 3 hrs during transfusion, and 3 hours post transfusion

1. This applies to all patients unless otherwise indicated by the provider.

b. **Process:**
   i. Temperature, pulse, respirations, and blood pressure must be taken no more than one hour before beginning the transfusion
      1. If temp 38.8°C or greater, notify ordering provider before obtaining blood component.
         a. An elevated temp is not a contraindication to the transfusion but it may complicate assessment of a transfusion reaction
   ii. Verify that patient has **patent** IV site prior to obtaining the blood product
   iii. **Large bore extension tubing** is required for blood product administration
   iv. *When obtaining blood via the pneumatic tube*, a Blood Products Send Order must be completed.
      1. Click on the appropriate icon on the PAL.
   v. An active transfusion order is validated at the bedside during the two-person verification process
   vi. **If there are any discrepancies between the Blood Transfusion Record, blood bag, or patient identification band, the unit cannot be administered.** Return the blood to the Blood Bank and complete a VOICE report.
   vii. A blood component **must be started within 30 minutes from the time of receipt** or it must be returned to the Blood Bank.
      1. Blood ***cannot*** be stored on the unit
      2. The exception is fresh frozen plasma which can be maintained up to 4 hours at 20-25°C (68-77°F)
   viii. The patient's name and medical record number must match the identification number on the Blood Transfusion Record. An identification band must be on all patients receiving blood
      1. Do not remove any patient identification bands during transfusion
   ix. The Provider will include the duration of administration in the order
      1. A unit of blood and its associated filter/tubing should not hang for longer than four (4) hours
      2. If more than 30 minutes elapse between subsequent transfusions, discard the tubing

x. Administer blood using an infusion pump
xi. Frequent assessment of patient tolerance to the procedure is required. Frequency of vital signs is based on patient clinical status and must be frequent enough to provide for assessment of physiologic status.
    1. The nurse should remain with the patient for the first fifteen (15) minutes after beginning the transfusion, at a slow rate, to observe for signs of a transfusion reaction.
    2. If the patient is tolerating the procedure vital signs should be taken a minimum of 15 and 30 minutes into the procedure and at the completion of the transfusion
xii. Upon completion of the transfusion:
    1. Flush the IV site with Normal Saline
    2. Discard the bag and tubing using Standard Precautions

c. **Transfusion Reaction:**
    i. Symptoms of a **Transfusion Reaction** include
        1. Temperature elevation (1° C during or within 2 hours of transfusion)
        2. Chills
        3. Tachycardia
        4. Tachypnea
        5. Rash
        6. Wheezing
        7. Hypotension progressing to shock
        8. Hematuria
        9. Nausea
        10. Cardiac arrest
        11. TRALI (TRansfusion Associated Lung Injury) - Typically marked hypoxemia, hypotension, fever, and severe bilateral pulmonary edema
    ii. If a transfusion reaction is suspected:
        1. Immediately stop the transfusion by disconnecting the blood tubing from the IV and cap with a sterile cap.
        2. Convert the IV to an INT-lock and begin an infusion of 0.9% normal saline until the situation can be assessed.
        3. ***Do not discontinue the IV***
    iii. Notify the Provider and the Blood Bank
    iv. Complete the *Reaction Transfusion Reaction Investigation* Form (# 2874)

1. Pending results, the Blood Bank will notify the nursing unit on how to proceed

d. **Documentation:**
   i. Document the following in the appropriate location of the medical record
      1. Transfusion amount
      2. Patient education
      3. Response to therapy
      4. Vital signs
      5. Blood unit information

17. **Safe Sleep** –

To provide nurses with guidelines to maintain a safe sleep environment for hospitalized infants and to aide in discharge teaching for families.

a. **Considerations:**
   i. Refer to hospital policy: Patient Care Newborn Guidelines: Safe Sleep and Infant Safety
   ii. Nurses should educate families about safe sleep throughout hospital stay.
   iii. Nurses should model safe sleep practices as soon as the infant is stable (ie: does not medically require side or prone positioning to maintain an airway).
   iv. Allow infant 1-2 weeks to become acclimated to recommended sleep position prior to discharge

b. **Process:**
   i. Encourage skin to skin care immediately following birth, if infant and mother are both medically stable
   ii. Encourage breastfeeding or provision of expressed milk (unless contraindicated), as it is associated with a reduced risk of SIDS
   iii. Use a firm sleep surface for all infants.
      1. Ensure that the mattress is covered with a fitted sheet
      2. Exceptions may include infants requiring a pressure reducing surface such as a z-flow mattress or a positional device to correct head shaping. Use of these items should be discontinued prior to discharge.
   iv. Keep soft objects and loose bedding away from infant's sleep area, as they can be hazardous
      1. If using developmental positioning aides, these should be discontinued as soon as medically appropriate

v. Place infants supine for sleep from at least 32 weeks gestation and beyond
vi. Head of bed should be lowered to flat at least 1-2 weeks prior to discharge
    1. Infants on reflux precautions should be given ample time to become acclimated. If the infant does not tolerate a flat, supine position, this should be discussed with the provider.
vii. When an infant can be dressed, avoid loose clothing and blankets.
    1. Infants should be dressed for the environment with no more than 1 additional layer of clothing than an adult would be wearing.
viii. If an infant is swaddled, they should **always be placed in a supine position**. The swaddle blanket should be snug around the chest with ample room at the hips and knees
ix. Consider pacifier use during periods of sleep, as this has been shown to have a protective effect against SIDS
x. If infant falls asleep in a swing or other sitting device, they should be removed and placed in their bed in a supine position
xi. If a parent becomes too sleepy while holding their infant, the infant should be placed back in bed in a safe sleeping environment
xii. Ensure that parents watch the educational video *7 Steps to Reduce the Risk of SIDS* prior to discharge, and answer questions as needed

c. **Documentation:**
    i. Document infant's tolerance to position and HOB elevation changes.
        1. Include discussion with provider if infant does not tolerate flat, supine positioning
        2. Document safe sleep education for families in discharge pathway and in electronic medical record

18. **Breast Milk Guidelines** –

Refer to the MMC Policy Handling of Stored Breast Milk in NICU and C3 for details on how to store and handle breast milk.

a. **Considerations:**
    i. Human milk is the preferred feeding for all infants.

b. **Indications for use of donor breast milk:**
    i. Parental consent is needed prior to administering donor breast milk to a patient
    ii. Provider order the feeding to include what is to be fed
    iii. Donor milk is available to patients whose mothers have chosen to exclusively breastfeed and a supplement is needed
    iv. Late preterm infants and babies at risk for hypoglycemia are the most likely to need supplementation
    v. A readmitted baby whose mother's milk has not come in yet and has not received any formula may receive donor breast milk
    vi. NICU patients who need to receive donor breast milk as part of the MMC NICU feeding protocol based on their gestational age and or birth weight
c. **Nursing Knowledge:**
    i. Diagnoses supporting use of donor human milk (DHM) (preventive and healing):
        1. Prematurity or birth weight less than 1,750 g
        2. Feeding intolerance, necrotizing enterocolitis
        3. Postsurgical nutrition such as patent ductus arteriosus ligation, bowel surgery
        4. Malabsorption or short-gut syndrome
        5. Fetal distress or hypoxia with low Apgar scores
        6. Renal failure
        7. Cardiac problems
        8. Bronchopulmonary dysplasia
        9. Inborn errors of metabolism
        10. Immune disorders
d. **Process:**
    i. Wash hands prior to handling breast milk
    ii. At all times, all containers (syringes, volufeeds, etc.) must be labeled with an infant identification label including infant's name and medical record number
        1. Unlabeled breast milk MUST be discarded
    iii. Prior to infant feeding, verify the physician order for amount and/or additives. When adding fortifier to breast milk, do not shake vigorously to mix
    iv. Milk warmers will be used in NICU to thaw/warm breast milk. Do not place breast milk in boiling water or microwave. Breast

milk that has been frozen and thawed should never be refrozen
v. Prior to transfer of breast milk to any other container and before administration, the infant's name and medical record number must be verified by two licensed personnel
vi. When the feeding has been determined to be completed immediately discard any leftover breast milk

e. **Process for Administration of Breast Milk to the Wrong Patient:**
i. Notify the Provider
ii. Notify the Manager on Call (MOC)
iii. Notify Infection Prevention
iv. Notify Risk Management to ensure that the donor mother is not charged for the lab tests
v. Submit a VOICE file
vi. Donor mother to be tested for HIV

f. **Documentation:**
i. Two patient identification of breast milk with additional person
ii. Type of feeding
iii. Amount of feeding
iv. Additives
v. Duration of the feeding
vi. How the patient tolerated the feeding

19. **Internal Shunt Care** –
a. **Purpose**: To provide guidance in the care of reservoirs or shunts placed for cerebral spinal fluid (CSF) drainage
b. **Considerations:**
i. It is preferable to avoid intravenous (IV) insertion on the scalp for infants who have a reservoir or shunt. If an IV must be inserted, it never should be placed in the general area of the shunt or reservoir
ii. Measure head circumference serially. If it is increasing, measure head circumference at greater frequency (this is necessary before and after shunt or reservoir placement)
1. Providers should order desired head circumference frequency
iii. Possible causes of shunt malfunction: obstruction; mechanical disconnection, displacement, or migration; failure of shunt system; infection; and over-drainage

1. Symptoms of increasing intracranial pressure:
    a. Increasing head circumference
    b. Full or tense fontanel
    c. Sutures palpably more separated
    d. High-pitched, shrill cry
    e. Change in neurologic status
    f. Poor feeding or feeding intolerance
    g. Nystagmus
    h. Sunset sign of eyes
    i. Shiny scalp with distended vessels
2. Signs of infection with ventriculoperitoneal shunt:
    a. Redness or drainage at site
    b. Hypothermia or hyperthermia
    c. Lethargy or irritability
    d. Poor feeding or weight gain
    e. Pallor
3. Signs of peritonitis with ventriculoperitoneal shunt:
    a. Abdominal pain or tenderness
    b. Erythema, warmth, and tenderness over the shunt tubing

c. **Process**:

i. Position the infant
    1. Place the infant on the unaffected side until the incision is well healed. After this time, the infant may be positioned on the shunt with a pressure-reducing device or donut under the head for short periods of time
    2. Keep the head of the bed flat or elevated no more than 30 degrees to prevent rapid fluid loss
    3. Carefully support the head when moving the infant
    4. Turn every 2 hr from the unaffected side of the head to the back

ii. Watch for symptoms of excessive CSF drainage:
    1. Sunken fontanel
    2. Increased agitation or restlessness
    3. Increased urine output
    4. Increased sodium loss

iii. Observe for and report any seizure activity or paresis

iv. Observe for signs of ileus:
    1. Abdominal distension
    2. Absence of bowel sounds

3. Increased loss of gastric content through emesis or an orogastric tube

v. Perform range-of-motion exercises on all extremities

d. **Documentation**:

i. All assessments
ii. Head circumference
iii. Intake and output
iv. Condition of incision site if not well healed

Procedures –

1. **Blood Draws** –

e. **Considerations**:

i. Each infant should be assessed individually to choose the optimal blood sampling method.
ii. Venous blood sampling has been shown to be less painful than heel stick sampling, even with the use of sucrose.
iii. It is recommended that volumes greater than 1 ml be drawn via venipuncture.
iv. Venipuncture should be performed in the most distal sites first to preserve venous access.
v. Fingertips, toes, or earlobes of infants should not be used as blood sampling sites.
vi. Non-pharmacologic comfort measures should be provided to neonates undergoing painful procedures.
vii. The recommended sampling site for neonates is on the lateral plantar surface beyond an imaginary line drawn posteriorly from between the fourth and fifth toes to the heel and medially from the middle of the great toe to the heel.

1. 

viii. Heel warming before a heel stick does not yield more blood. Factors such as site, lancet device used, and positioning of the heel may be more important

f. **Contraindications**:

i. Bruising or hematoma on the feet
ii. Feet that are edematous, are injured, have poor perfusion, or are infected;
iii. Feet with anomalies on which pressure should be avoided

g. **Supplies Needed**:
   i. Venipuncture:
      1. Nonsterile gloves
      2. Alcohol swab
      3. 23- or 25-gauge safety engineered venipuncture needle
      4. Appropriate-size syringe for amount of blood needed
      5. Specimen collectors as appropriate
      6. Tourniquet (or direct pressure)
      7. Sucrose (if not NPO)
      8. Pacifier
      9. Blanket for swaddling
      10. Specimen labels
      11. 2 × 2 gauze
      12. Assistant for 2-person care
   ii. Capillary heel stick sampling:
      1. Nonsterile gloves
      2. Alcohol swab
      3. Heel warmer
      4. Automated heel lancing device (appropriate size for infant)
      5. Cloth or pad to protect bed linens
      6. Sucrose
      7. Pacifier
      8. Blanket for swaddling
      9. Specimen collectors as appropriate
      10. Specimen labels
      11. 2 x 2 gauze
      12. Assistant for 2-person care
   iii. Lancets sizes:

Description	Depth	Length	Color	Indications*
Tenderfoot Micro-Preemie	0.65mm	1.40mm	Blue	<1000 grams
Tenderfoot Preemie	0.85mm	1.75mm	White	low birth weight 1000g–2500g
Tenderfoot Newborn	1.00mm	2.50mm	Pink/Blue	birth to 6 months 2500g–9kg

iv. Order of Microtainer Collection:

Tube Color	Additive
1. Lavender	K2 EDTA
2. Dark Green	Lithium Heparin
3. Mint Green	Lithium Heparin and Gel for plasma separation
4. Grey	NaFl/Na2 EDTA
5. Gold	Clot Activator ad Gel for serum separation
6. Red	None

h. **Blood Draw Volumes**:
   i. See NICU Lab Blood Draw Volumes Reference sheet

i. **Process**:
   i. Follow standard precautions while performing all steps of the procedure unless directed to use sterile precautions.
   ii. Ensure proper identification of the infant following MHC Patient Identification for Laboratory Specimen Collection Policy
   iii. Provide pain management
      1. Provide developmental care with facilitated tucking or blanket swaddling and nonnutritive sucking.
      2. Provide the infant with a pacifier dipped in sucrose at least 2 min before beginning the procedure; (if not NPO).
   iv. **Venipuncture blood sampling**:
      1. Verify orders for blood sampling.
      2. Obtain equipment, including lab labels, and prepare at the bedside.
      3. Obtain assistance from a second person.
      4. Provide developmental positioning and pain management as described above.

5. Select the site for obtaining the sample; apply a tourniquet as desired.
6. Disinfect the sample site and allow it to dry.
7. Using aseptic technique, cannulate the vessel and obtain the blood sample.
8. Remove the safety needle.
9. Apply gentle pressure with a gauze pad to the blood sampling site until hemostasis occurs.
10. Fill appropriate specimen containers.
11. When a hematologic specimen is needed, gently agitate the tube 10 times to activate anticoagulant.
12. Label specimens following MHC Laboratory Specimen Labeling Policy

v. **Capillary heel stick blood sampling**:

1. Verify orders for blood sampling.
2. Obtain equipment, including lab labels, and prepare at the bedside.
3. Provide developmental positioning and pain management as described above.
4. Assess the sampling site and select an area without excessive previous punctures, hematomas, or infection.
5. Disinfect the site for sample collection and allow it to dry.
6. Position the heel and prepare for the heel stick.
7. Use an automatic heel stick device. Follow the manufacturer's instructions for the chosen device.
8. Using a dry gauze pad, gently wipe away the first drop of blood.
9. During specimen collection, allow capillaries to refill by applying gentle pressure and then releasing. Avoid excessive squeezing of the heel.
10. Fill specimen containers to the specified volume.
11. Allow blood drops to fall freely into the tube. Avoid scooping or scraping blood from the heel, because small clots can form in blood on the skin that can stimulate platelet aggregation and alter lab results. Cap the tube when it is filled.
12. When a hematologic specimen is needed, gently agitate the tube 10 times to activate anticoagulant.
13. Apply pressure to the heel stick site with a dry gauze until hemostasis occurs. Avoid using adhesive

bandages. Provide comfort measures during and after the procedure.

14. Label and submit specimens following MHC Laboratory Specimen Labeling Policy

vi. **Peripheral Arterial Line (PAL) blood sampling**:

1. Collect the specimen from the transducer set-up the same as you would from an umbilical arterial catheter (UAC).
    a. Refer to the NICU Central Line Policy for more specifics on PAL set-up, maintenance, and removal.

j. Special testing:
    i. Newborn Screens (NBS): Refer to *Procedures* section for NBS information

k. Special consideration:

    i. For all patients born less than 30 weeks gestation, labs will be hand delivered to the Lab for the first 2-weeks of the patient's life

2. **Car Seat Fit & Angle Tolerance Test** –
    a. Refer to Car Seat Fit and Angle Tolerance Testing for NICU, Maternity, and C3 Procedure
3. **Cardioversion for SVT** –
    a. **Purpose**: To describe the various procedures for treating abnormally fast cardiac rhythms (tachyarrhythmias)
    b. **Considerations**:
        i. Vagal maneuvers for supraventricular tachycardia (SVT) include the option to stimulate a gag, suction the nasopharynx, or apply an ice pack to the nose and forehead area
        ii. Specific dysrhythmias that are amenable to cardioversion include SVTs and wide-complex ventricular tachycardias. These dysrhythmias are characterized as follows
            1. Probable SVT: vague and nonspecific compatible history, absent or abnormal P waves, unvarying heart rate faster than 220 beats per minute (bpm) at rest
            2. Possible ventricular tachycardia (with a pulse): wide-complex tachycardia (more than 0.08 s)
        iii. Specific dysrhythmias that are amenable to defibrillation include ventricular fibrillation and ventricular tachycardia (without a pulse)

c. **Equipment**:
    i. Ice pack method
        1. One cup crushed ice
        2. Snap-lock plastic bag
        3. Thin linen cloth
    ii. Adenosine method
        1. Emergency drug calculator
        2. Secured and patent intravenous (IV) access (central or peripheral)
        3. Pharmacist (if able to assist)
        4. Vial of IV adenosine
        5. Sterile normal saline as a diluent for adenosine may be needed
        6. Vial or bag of sterile normal saline or flush solution for the IV line
        7. Appropriate sizes of Luer lock syringes
        8. Calculator
        9. Medication label and pen
    iii. Electrical method (cardioversion or defibrillation)
        1. Emergency drug calculator
        2. Defibrillator with fully charged battery, with attached or attachable pediatric electrocardiographic leads and cable, pediatric defibrillator electrode pads, and pediatric accessible paddles
        3. Pads
d. **Nursing Knowledge**:
    i. The RN should be knowledgeable about the recommended initial dosages for cardioversion (0.5–1 joule/kg) and defibrillation (2 joules/kg)
e. **Process**:
    i. Maintain the infant on a cardiorespiratory monitor with printout capability before, during, and immediately after the procedure
    ii. Consider sedation and pain management with cardioversion
    iii. Take universal precautions during the performance of all steps of the procedure unless directed to use sterile precautions
    iv. Check for proper patient identification

v. **Upon recognition of an arrhythmia, the RN notifies a Provider as soon as possible, and when able prints a strip with the rhythm on it**
    1. Print to PDF from Clinical Access into SpaceLabs.
vi. When the decision is made to convert a rhythm, the RN assists as needed
vii. Ensure that all emergency equipment is available for immediate use during the procedure
viii. **Ice pack method**:
    1. Place crushed ice in a plastic bag and snap it closed
    2. Wrap the ice bag in thin linen cloth
    3. Apply the ice bag to the nose and forehead for 15 s or less (if the SVT stops). Maintain the baby's patent airway. **Do not occlude the nose or mouth**
    4. Print a strip that includes the tracing prior to the conversion, and at least one minute after conversion to sinus rhythm, checking for return to SVT.
    5. Continue cardiorespiratory monitoring
    6. Notify the Neonatologist if further interventions are needed
ix. **Adenosine method**:
    1. Dilute (as indicated on the emergency drug calculator) and prepare the adenosine dose as ordered. An RN, physician, or AHP may administer adenosine
    2. The preferred IV site for adenosine is as close to the heart as possible, which may be a central or peripheral IV
    3. **Adenosine must be administered very quickly because of its short half-life**
    4. Immediately follow the adenosine **push with 1–3 ml saline flush administered rapidly**
    5. If conversion to sinus rhythm does not occur within 2 min of the adenosine administration, the dosage may be increased and repeated according to physician or AHP orders
    6. Continue to monitor the infant and repeat adenosine doses as ordered
x. **Electrical method (synchronized mode of defibrillation)**:
    1. Start the rhythm strip printout to record before, during, and after each attempt

2. Select and apply appropriately sized adhesive pads or paddles according to manufacturer's instructions
3. Consider IV sedation and analgesia for the infant, but do not delay cardioversion while awaiting administration if unstable
4. Place the defibrillator in the synchronized mode
    a. Indicated by hash marks above each QRS wave
5. Select joule dose of 0.5–1 joule/kg as ordered, announce "charging," and charge according to manufacturer's instructions
6. Call "clear" before delivering the charge and ensure all persons are clear of the infant
7. Deliver shock according to manufacturer's instructions
8. If the charge is not effective in converting to sinus rhythm, reset to synchronized mode. Increase to 2 joules/kg as ordered and repeat above sequence
9. Continue to monitor the infant

xi. **Postcardioversion care**:

1. Assess and support airway, oxygenation, and ventilation
2. Assess and maintain adequate blood pressure and perfusion
3. Continue to monitor vital signs including heart rate and rhythm
4. Report any further arrhythmia to the provider

f. **Documentation**:

i. Include printouts of abnormal rhythms in the medical record, associated clinical signs, interventions, and follow-up rhythm
ii. If CPR is initiated, a Code Blue record should be initiated with concurrent documentation whenever possible

3. **Central Line Placement** –
    a. Refer to Central Line Policy MMC-NICU
4. **Chest Tube Placement** –
    b. Refer to the MMC Chest Tubes – Insertion and Care procedure
    c. Infants with air leak syndrome may need needle aspiration as an immediate intervention before thoracostomy tube placement. A chest tube will allow decompression of the pneumothorax or evacuation of large amounts of pleural fluids and subsequently re-expand the affected lung.
        i. Symptoms of a pneumothorax:

1. Abrupt change in respiratory status marked by increased work of breathing;
2. Increased respiratory rate
3. Restlessness, irritability, or lethargy
4. Cyanosis
5. Decreased breath sounds
6. Asymmetrical chest rise

ii. Supplies:
   1. Needle aspiration kit: (*If necessary per Provider*)
      a. Betadine swabs (2)
      b. Alchohol swabs (2)
      c. Tegaderm
      d. 23-gauge butterfly needle
      e. 30 ml lure-lock tip syringe
      f. 3-way stopcock
   2. Chest tube:
      a. Atrium Oasis Dry Suction Water Seal Chest Drain
      b. Turkel Chest Tube insertion tray (*at provider's preference*)
      c. Fuhrmann / pig-tail chest tube (*at Provider's preference*) with insertion kit
         i. Fuhrmann Insertion Kit:
            1. (2) – Sterile towels
            2. (3) – Betadine single swabs
            3. (1) – 20 ml syringe
            4. (1) – 3-way stopcock

iii. Process:
   1. Follow standard precautions while performing all procedure steps unless directed to use sterile precautions.
   2. Check for proper patient identification and observe pre-procedural timeout per MMC *Universal Protocol: for Surgical and Non-Surgical Invasive Procedures*
   3. Provide pain management as ordered
   4. Prepare the drainage system and set up for the procedure
      a. Remove drain from sterile packaging
      b. Fill Water Seal chamber to 2 cm line using water from the back of the drain (*keep water and port sterile*)

i. Do not overfill water seal above the 2 cm fill line

c. Connect suction to chest drain using the same port that you placed the water into

5. Position the infant for easy access to the pneumothorax site, either with one side upright or with the infant lying flat with the head of the bed elevated. Immobilization of the infant's extremities is necessary.
6. Once Provider has successfully inserted the chest tube connect chest drain to patient **PRIOR TO INITIATING SUCTION**
    a. **Keep end of drain tube that connects to the patient (blue cap) STERILE**
7. Turn suction on
    a. **Increase suction source vacuum to -80 mmHg or higher**.
    b. **Suction regulator in the drainage system is pre-set to -20 cmH20**.
        i. Suction bellows will expand to the ▲ mark or beyond when suction is connected and operating at a regulator setting of -20 cmH20 or higher.
            1. If the bellows is expanded but less than the ▲ mark, increase the suction source to vacuum to -80 mmHg or higher.
8. Tape connection site of chest tube to drainage tube
9. Place a safety tab on tubing near the junction of the chest tube and tubing; using a Kelly clamp or safety pin, attach to the mattress near the infant. This will prevent pulling on the site of the chest tube and promote drainage by avoiding dependent loops in the tubing.
10. To promote air evacuation, maintain elevation of the head of the bed at a 30- to 45-degree angle, as appropriate.
11. Always place chest drain below the patient's chest in an upright position
    a. It can be placed on the floor and taped down
    b. It can be hung from the bed with hangers provided

12. When the chest tube has been placed, a chest X-ray should be taken to confirm proper placement. In addition, assessment should include blood gas, vital signs (VS), and auscultation of breath sounds with comparison to pre-procedure breath sounds.
13. Patient tube connections, water seal, suction regulator and bellows should be checked regularly to confirm proper operation
14. A rubber-tipped hemostat or C-clamp and Vaseline gauze should be kept at the bedside or be immediately available at all times while the chest tube is in place.
    a. In the event the chest tube becomes disconnected from the drainage system, the rubber-tipped clamp may be placed on the chest tube to prevent air from being pulled into the pleural space. The chest tube should be clamped only for a short amount of time and reconnected with the drainage system to allow air or fluid removal as indicated. The provider should be notified immediately.
    b. In the event of an unplanned removal of the chest tube, Vaseline gauze should be used to cover the hole left in the chest. The provider should be notified immediately

iv. Considerations:
    1. Inserting a chest tube is an invasive procedure requiring sterile technique. Each person assisting must wear a gown, sterile gloves, mask, and cap.
    2. Inserting and removing a chest tube is performed by a Neonatal provider.
    3. Milking or stripping of the chest tube is generally unnecessary.
        a. Presence of clots or other debris may require gentle kneading of the chest tube and should be performed only with a written order.
    4. Bubbling in the drainage system after a period of cessation is reason to troubleshoot the system; check all connections and assess for dislodgment of the chest

tube. An X-ray may be necessary to assess for re-accumulation of pneumothorax.
5. Replace chest drain if damaged or when collection volume meets or exceeds maximum capacity
6. If transport of the infant is necessary, the chest tube drainage system may simply be disconnected from wall suction, and a Heimlich valve may be used. Clamp only to test for tolerance before chest tube removal or if the drainage system becomes disconnected.

v. Documentation:
1. All patient assessments, placement of the chest tube, and tolerance in the medical record
2. The presence or absence of bubbling, the suction level, and the security of the dressing

5. **Circumcision** –

a. Considerations:

i. Circumcision should be performed after 6 hr of life, preferably after 24 hr of age
ii. Before circumcision, a nurse should complete an initial assessment and history
iii. Physician's patient history and physical should also be completed and recorded in the medical record
iv. Informed parental consent should be obtained and signed before the procedure
v. The clinician performing the circumcision should notify the assisting nurse of the pending circumcision before the procedure to facilitate analgesic administration
vi. The physician performing the procedure is responsible for ongoing care related to the procedure and should be notified of any problems that arise after the procedure
vii. It is particularly important to report and document the following conditions, which may contraindicate the procedure:
3. Obvious congenital or other related anomalies of the genitourinary tract
4. Bleeding disorder or family history of bleeding diathesis (or if infant did not receive vitamin K)
5. Signs or symptoms of infection
6. Respiratory distress
7. Hypothermia

viii. The infant should weigh a minimum of 1,600 g and have achieved cardiovascular and respiratory stability
ix. Ideally, the infant should have nothing by mouth for 1 hr prior to the procedure
x. Nurses should be able to identify post-procedure complications, including bleeding, infection, injury, adhesions, necrosis, and lack of voiding

b. Supplies:

i. Sterile circumcision tray
ii. Sterile circumcision instrument as ordered
    8. Gomco Clamp
    9. Mogen Clamp
iii. Vaseline gauze
iv. Sterile gloves
v. Sterile scalpel
vi. Povidone-iodine
vii. Sterile water (to wipe off povidone-iodine)
viii. Positioning device
ix. Pads/blankets
x. Items needed for pain management
    10. Pacifier
    11. Sucrose

c. Process:

i. Assemble supplies
ii. Perform pre-procedural timeout verification according to the Universal Protocol for Surgical Services: Verification/Validation Process for Surgical/Invasive Procedures
    12. Verify that consent for the procedure has been obtained
iii. Protectively contain the infant on the chosen positioning device
iv. Assist with the procedure as requested
v. Follow the Evidence Based Nursing Practice Guidelines to reduce pain
    13. Provide oral sucrose to the patient
        a. 3 minutes prior to the poke
        b. To the anterior tip of the tongue
        c. Repeat every 4-6 minutes
    14. Set a timer to wait for 5 minutes after the block to start the procedure

15. Use padding under the patient's back and bottom
16. Turn on the warmer as needed
17. Swaddle the patient's upper body
18. Cover the patient's eyes during the procedure to decrease noxious stimuli
19. Bundle and hold the patient after the procedure is complete
20. Administer Tylenol after the procedure as ordered

vi. Provide care after the circumcision
21. Maintain Vaseline gauze or antibiotic ointment on the tip of the penis for the first 3 days
22. Check the circumcision for bleeding every 15 min x 2; then Q 30 min x 1; then Q 1 hr x 1; and then with diaper changes until healed or discharge
23. The infant should not be discharged sooner than 2 hr after circumcision or before the first void

vii. If bleeding or oozing occurs
24. Apply pressure for 5–10 min
25. If bleeding cannot be stopped, apply topical oxidized cellulose (Surgicel)
26. If bleeding does not stop after this, notify the physician

viii. If active bleeding or hemorrhage occurs, notify the physician immediately

ix. Conduct parent teaching:
27. Explain to parents the proper care of the circumcision
    a. Maintain Vaseline gauze or antibiotic ointment on the tip of the penis for the first 3 days
    b. Check the circumcision for bleeding with diaper changes
        i. If bleeding or oozing occurs apply pressure for 5–10 min

x. Demonstrate and ensure that parents return demonstrate

xi. Document in the medical record

6. **Critical Congenital Heart Disease (CCHD) Screening** –
    a. Refer to MMC Evaluation and Management of Infants with Pulse Oximetery for Critical Congenital Heart Disease (CCHD) Policy
    b. For patients in NICU the following amendments to the policy apply:
        i. Infants with a previous ECHO or known CCHD diagnosis do not require screening.
        ii. Patient is at least 35 weeks gestation

1. If D/C prior to 35 weeks gestation the screening will be done as close to D/C as possible

iii. Infants requiring oxygen during NICU stay should be screened 24 hours after weaning to room air
1. Requiring no supplemental O2 or respiratory support

iv. Infants going home on oxygen – consider ECHO if not already completed

c. Documentation:
i. Document CCHD screens in PowerChart → AdHoc → NICU → CCHD Initial Screen Form
1. This form needs to be completed even if the CCHD initial screen is NOT performed in the NICU prior to discharge of the patient.
2. Patients requiring a CCHD rescreen will need to be documented from the PAL task for the CCHD Rescreen Powerform

7. **Eye Examinations** –

To ensure that neonates who meet criteria receive timely eye exams for retinopathy of prematurity (ROP). These neonates should also receive timely follow-up and treatment to prevent blindness

a. **Considerations**:
i. The following infants should receive retinal screening exams:
1. Infants with birth weight <1500gm or gestational age 30 weeks or less
2. Selected infants between 1500 and 2000gmat birth or gestational age > 30 weeks with an unstable clinical course, including cardiorespiratory support, and are believed to be at high risk

ii. The timing of first eye exam is based on gestational age at birth

iii. A retinal screening exam consists of pupillary dilation using binocular indirect ophthalmoscopy or digital retinal photography

iv. Refer to the Guidelines for preventing and treating pain from NANN Newborn Pain Assessment and Management Guideline for Practice 3rd edition (2012) for appropriate pain interventions

v. Proper eye drop administration technique is important in preventing adverse effects

b. **Equipment**:
    i. Sucrose and pacifier
    ii. Eye drop medications as ordered by provider
        1. Phenylephrine 2.5% and/or Tropicamide 1%
    iii. Eyelid retractor, speculum and scleral depressor
    iv. Blanket for swaddling
    v. Reduced lighting and noise
    vi. Eye cover
c. **Process**:
    i. Verify that infant meets criteria for eye exam
    ii. Follow standard precautions unless directed otherwise
    iii. Verify correct patient by using 2 patient identifiers
    iv. Perform a procedural timeout with ophthalmologist
    v. Provide pain management
    vi. When notified by ophthalmologist, RN instills eye drops as ordered
        1. Generally 30 - 45 minutes prior to eye exam:
            a. Phenylephrine 2.5%: 1 drop in each eye q 5 min x 2 occurrences
            b. Tropicamide 1%: 1 drop in each eye q 5 min x 2 occurrences
    vii. Provide gentle pressure over the nasolacrimal duct during and for at least 2 min after instilling the drops, to minimize systemic absorption
    viii. Provide non-pharmacological comfort measures
        1. swaddling
        2. pacifier
        3. sucrose
    ix. Monitor infant during the exam and stop the procedure if infant has significant changes in heart rate, respiratory rate, or oxygen saturation.
        1. Allow for a recovery period if needed, before examining opposite eye
    x. Keep lights dim or eyes covered for 4-6 hrs after exam
d. **Documentation**:
    i. Document infant's vital signs and pain score before starting and after completing the eye exam
    ii. Document timeout procedure
    iii. Document pain interventions provided
    iv. Document medications provided

v. Document infant's vital signs and pain score before starting and after completing the eye exam
vi. Ophthalmologist should document findings from exam

8. **Eye Surgery (Laser)** –
To provide guidelines for the care of infants receiving laser surgery to prevent further vessel proliferation and possible retinal detachment in the presence of ROP
   a. **Considerations**:
      i. Reference the ROP pre-op/post-op checklist for neonates receiving laser surgery
      ii. Infant should be placed on an adjustable warmer in a quiet, dark area with cardiorespiratory and pulse oximetry monitors in place
      iii. Signs should be posted on the door to the room in which surgery is occurring to warn that a laser is in use.
         1. Any person entering the room should wear appropriate eye protection
      iv. An anesthesiologist or neonatologist who is able to resuscitate and provide an airway should be available throughout surgery
      v. Document vital signs q 5 min during the procedure
   b. **Equipment**:
      i. Radiant warmer
      ii. Cardiorespiratory monitor and pulse oximeter
      iii. Suction or bulb syringe
      iv. Oxygen and flow meter, with bag and mask available
      v. Emergency drug calculator for infant's current weight
      vi. Neonatal crash cart
      vii. Mayo stand or table at the bedside for laser equipment
      viii. Laser equipment requested by the ophthalmologist
      ix. Sterile speculum and depressor
      x. Topical dilating and anesthetic eye drops
      xi. Eye protection (for all staff in the room)
   c. **Process**:
      i. Verify correct patient by using 2 patient identifiers
      ii. Perform procedural timeout
      iii. Patient to be intubated by NICU Provider
      iv. Follow standard precautions unless directed to use sterile technique

v. Ensure that operative consent has been signed by a parent or legal guardian
vi. Ensure that pre-operative checklist has been completed
vii. Check blood pressure before administering ophthalmic drops and after completion of all 5 doses
viii. Upon notification of physician, begin administering eye drops
    1. Eye drops ordered by Dr Thuente and instilled about 1 hour prior to procedure
        a. Give cyclopentolate and phenylephrine as ordered, providing gentle pressure over the nasolacrimal duct during and for at least 2 min after instillation of drops to minimize systemic absorption
    2. Protect dilated eyes from light with a darkened environment or eye covers
ix. Place infant in a developmentally supportive position
x. Anesthesia will come to the NICU to transport baby to OR
    1. Laser eye surgery performed in OR (possibly in NICU)
xi. Provide intraoperative care:
    1. Team approach of Anesthesia MD, CRNA and NICU MD and nurses
        a. speak up if needed
    2. With the OR team, assist with laser operation and perform safety checks
    3. Anesthesia staff will be present throughout procedure to give medications and monitor infant. Opioid narcotics and a systemic sedative may be needed to manage infant's pain
    4. Assist physician as needed by holding infant during surgery
xii. Provide postoperative care:
    1. Ensure infant remains NPO until stable (usually 2-3 hrs)
        a. Restart feedings per provider's orders
    2. Follow procedure for post-operative checklist recovery as for any surgical procedure
    3. Administer post-op drops of Tropicamide and prednisolone
        a. 4 per day for 4 days
    4. Observe infant closely for 24 hr after surgery for arrhythmic and bradycardia

5. Assess eyes for drainage
    a. They will be red and puffy
6. Cover eyes for at least 6 hr after surgery

d. **Documentation**:
    i. Document infant's vital signs and pain score before starting and after completing the eye exam
    ii. Document procedural timeout process for the intubation
    iii. Document pain interventions provided
    iv. Document completion of procedure and infant's tolerance
    v. Ophthalmologist should document findings from exam

9. **Eye Injection (Avastin)** –

To provide guidelines for the care of infants receiving eye injections (anti-VEGF) for ROP. Anti-VEGF injections are sometimes used as a secondary treatment option in infants who later undergo laser surgery for ROP

a. **Considerations**:
    i. Infant should be moved to NICU procedure room on a Giraffe or Panda warmer
    ii. Position infant with head being closest to the monitor
    iii. Resume continuous cardio-respiratory monitoring
    iv. Be sure that informed consent has been signed by parent or guardian
    v. The RN should have an assistant available to help hold infant securely during procedure
    vi. The ophthalmologist will usually request supplies from the OR the day prior to giving injections

b. **Equipment**:
    i. Ophthalmic betadine
    ii. 2 forceps
    iii. 2 calipers
    iv. 30g needles
    v. 4 packs cotton tipped applicators
    vi. 2 sterile drapes
    vii. 2 pairs sterile gloves, size 8
    viii. Sterile water
    ix. Sterile gauze
    x. Avastin (Lucentis) syringes for injection
        1. keep refrigerated until needed
    xi. Proparacaine eye drops for ophthalmologist to administer
    xii. Eye cover

xiii. Pacifier
xiv. Sucrose
xv. Swaddle blanket

c. **Procedure**:
   i. Follow standard precautions unless directed otherwise
   ii. Verify correct patient by using 2 patient identifiers and perform a procedural timeout
   iii. Provide comfort measures for infant (swaddling, pacifier, sucrose). If needed, provide pre-procedure pain medication as ordered
   iv. Assist ophthalmologist as indicated
   v. Keep infant's eyes covered for 4-6 hrs after the procedure

d. **Documentation**:
   i. Document infant's vital signs and pain score before starting and after completing the procedure
   ii. Document completion of procedure and infant's tolerance
   iii. Document completion of the timeout in PowerChart
   iv. Document medications administered
   v. Document pain interventions administered
   vi. Ophthalmologist should complete documentation of treatment

10. **Exchange Transfusion** –

a. **Considerations:** Must be performed by a physician or NNP
   i. **Double-volume** exchange transfusions may be performed for alloimmune hemolytic disease of newborns, DIC, congenital leukemia, metabolic toxin removal, removal of antibodies and abnormal proteins, and correction of severe hyperbilirubinemia
   ii. **Partial-volume** exchange transfusions may be performed to decrease the hematocrit in polycythemic newborns or to correct severe anemia from acute blood loss
   iii. To minimize blood pressure changes, blood should be withdrawn and reinfused in 5-ml aliquots every 3 min. A double-volume exchange should take a minimum of 60 min
   iv. Do not feed infant before the procedure. If infant has eaten recently, insert a gastric tube and aspirate stomach contents
   v. Ensure that a blood type and cross match (GTABS) has been performed, or is available, prior to ordering blood products

vi. Follow standard precautions throughout procedure, unless directed otherwise
vii. Once initiated, the transfusion should be completed without interruption except for emergencies
viii. Monitor infant for signs of feeding intolerance or gastric bleeding after the exchange transfusion

b. **Equipment:**
   i. Exchange transfusion checklist
   ii. Crash cart (available nearby)
   iii. Sterile disposable exchange transfusion tray
   iv. Umbilical line tray and catheters
   v. IV start kit
   vi. IV Dextrose and tubing
   vii. Alcohol swabs, betadine and saline wipes
   viii. Extra extension tubing
   ix. Sterile drapes, gloves, gown, mask
   x. Radiant warmer bed, cardio-respiratory monitor, Neopuff and suction setup
   xi. Glucometer and supplies
   xii. Blood warmer and tubing (stored in Maternity OR)
   xiii. Lab tubes and microtainers
   xiv. Sterile water for irrigation
   xv. Soft restraints
   xvi. Informed consent form
   xvii. Ordered blood product and blood bank documentation
   xviii. NICU Exchange Transfusion Record (accessible here, or in file cabinet)

c. **Pre-procedure Preparation:**
   i. Verify patient using 2 patient identifiers and perform a timeout
   ii. Ensure that an informed consent has been signed by a parent or legal guardian
   iii. Assign a dedicated RN and provider to the infant for the exchange procedure
   iv. Place the infant under a radiant warmer and keep a temperature probe in place throughout procedure
   v. Attach the infant to a cardiorespiratory monitor and pulse oximeter for continuous monitoring
   vi. Place a blood pressure cuff on the patient's upper extremity and program monitor to cycle blood pressure at set intervals (e.g., q 5 min)
   vii. Insert an NG or OG and aspirate gastric contents if needed.

1. Infant should remain NPO during the procedure and for at least 4 hours afterward for a double-volume exchange

viii. Restrain extremities with soft restraints
    1. Monitor patient closely
ix. The provider will select the appropriate method for the exchange (e.g., via arterial and venous umbilical catheters, single umbilical line with stopcocks, or isovolumetric exchange with a peripheral venous catheter and peripheral arterial catheter).
x. Provide additional IV access, if needed, and infuse dextrose according to provider orders.
xi. Request blood from Blood Bank by right-clicking and selecting "*Chart Done*" on the blood drop on the PAL.
xii. Verify blood components with a second RN, as per hospital policy.
xiii. The volume for a partial-volume exchange transfusion should be split into 3 or 4 equal aliquots of 5-10ml/kg, not to exceed 20ml.
xiv. Labs are usually collected either before the exchange transfusion begins or on the sample obtained from the first draw of the exchange. Additional labs may be needed based on the infant's condition.
    1. CBC (central draw)
    2. Electrolytes, calcium, glucose
    3. Blood gas
    4. Bilirubin
    5. Coagulation panel
    6. Newborn screen if not already obtained (especially if < 24 hrs old)
xv. At a minimum, obtain a glucose level before, q 1 hr during, and immediately after the exchange transfusion.
    1. Hypoglycemia and hyperglycemia are complications of a double-volume exchange

d. **During the Procedure:**
    i. Set up all necessary equipment using sterile technique when indicated
    ii. The assisting RN should attach the blood filter in the exchange transfusion tray to the blood product and prime

tubing for the blood warmer according to manufacturer instructions.
    1. Ensure that the temperature on the blood warmer is set to 37 C

iii. The assisting RN should remain at the bedside continuously
iv. Gently agitate the blood product periodically to prevent red cells from settling
v. Send blood tests every 10 cycles (approx. q 1 hr)
    1. Use "waste" blood for labs:
        a. Creatinine
        b. Sodium
        c. Potassium

vi. Document procedure on NICU Exchange Transfusion Record, including amount and route of blood in and out with each cycle
vii. In E-MAR, document vital signs q 15 min. Include the following:
    1. Heart rate and rhythm
    2. SpO2
    3. Skin temp
    4. Respiratory rate and work of breathing
    5. Blood pressure
    6. Infant's color, tone, and behavior
    7. Blood warmer temperature (maintain at 37)

viii. RN to report end balance, and on **last** aliquot of blood use waste blood to perform:
    1. Creatinine
    2. Sodium
    3. Potassium
    4. Magnesium
    5. Calcium
    6. Glucose
    7. ABGs

e. **Post-procedure Care:**
    i. Continue NPO status for at least 4 hr post procedure.
    ii. Record vital signs q 30 min x 4 hr post procedure
    iii. Send any necessary blood tests after the procedure. These are usually processed on the last aliquot of blood drawn from the infant. Hematocrit should be drawn after the transfusion has been completed and repeated 3-4 hr later.

iv. Continue hourly glucose checks until stable
v. Continue phototherapy as indicated
vi. Calcium gluconate 100mg/kg may be given per a provider order halfway through the procedure or at the end, depending on the preservative in the banked blood, because preservative may cause serum calcium levels to rise.
vii. Document procedure including start and end time, and full name of provider

11. **Hearing Screening** –
    d. Refer to the MMC Newborn Hearing screening Test Procedure
    e. For readmissions in the first month of life for all infants (NICU or well infants), when conditions associated with potential hearing loss (e.g. hyperbilirubinemia necessitating exchange transfusion or culture-positive sepsis) exist, a repeat hearing screening is recommended before discharge
    f. Equipment
        ii. Hearing screening device (ABR)
        iii. Associated equipment
        iv. Hospital-approved cleaning solution
        v. Crib
        vi. Quiet location
    g. Process: infant should be quiet, recently fed, and in an open crib before hearing screening is performed
        vii. Identify the infant with two patient identifiers
        viii. Follow manufacturer's instructions on performing screening
            3. Refer to the MMC Newborn Hearing screening Test Procedure
    h. Provide education to patient's Parents or Caregivers
12. **Infant Massage** -
    a. **Purpose**: To improve feeding tolerance; promote weight gain, organize motor activity, and sleep; decrease preterm infants' stress levels and length of stay; decrease maternal anxiety; and facilitate parental bonding and interaction through infant massage
    b. **Considerations**:
        i. Infant massage may be performed for 10-15 minutes at a time three to four times per day on infants deemed medically stable by a provider.
        ii. An infant's individual response to massage should guide the treatment course.

iii. A period of 5-10 days has been shown to result in positive outcomes such as improved weight gain and shorter hospital stays.
iv. Only individuals trained in Infant Massage can perform infant massage
    1. This includes parents who have been trained by a person trained in Infant Massage

c. **Inclusion criteria**:
    i. The infant must be more than 48 hrs old
    ii. Have stable vital signs for a minimum of 12 hrs before the massage
d. **Contraindications**:
    i. Infants requiring:
        1. Respiratory support
        2. Surgery
        3. Antibiotics
        4. Phototherapy
    ii. Infants with:
        1. Fractures, wounds, incisions, IVs
        2. Immunizations within the last 48 hours
        3. Skin disorders
        4. Intraventricular hemorrhage
        5. Genetic anomalies, congenital heart malformations
        6. Central nervous system dysfunction
e. **Equipment**:
    i. Incubator, radiant warmer, or heat source only if they require heat to maintain normothermia; otherwise can perform in a crib
    ii. Lotion or oil containing no perfumes or dyes
        1. Earth Mama: Calendula Baby Oil has been approved for use
f. **Process**:
    i. Follow universal precautions while performing all steps of the procedure
    ii. Properly identify patient
    iii. Ensure that infant's temperature is within normal range (36.5 °C–37.4 °C (97.7 °F – 99.3 °F)
    iv. Warm hands and decrease environmental stimuli prior to starting the massage. Contain infant with hands, blanket, or developmental aid

v. Provide 10-15-minute massage session approximately 30 minutes before a feeding, using firm, slow, steady, rhythmical pressure
vi. Note infant responses and adjust strokes throughout
vii. Promote bonding by incorporating family (must receive instruction from a healthcare professional educated and trained in massage)
viii. The massage should be discontinued if:
    1. The infant has apnea, bradycardia, or oxygen desaturations
    2. Irritability, stress cues, or other discomfort behaviors are noted

g. **Documentation**:
    i. Document the infant massage session, including infant tolerance and parent education

13. **Lumbar Puncture** –
    a. **Considerations**:
        i. An LP is performed by a Provider
        ii. A platelet count greater than 50,000 and correction of any clotting factor deficiencies are desirable before an LP is performed.
        iii. An LP should be deferred for infants who are not stable. Appropriate therapy, including antibiotics, should be initiated if indicated.
    b. **Indications**:
        i. To obtain cerebrospinal fluid (CSF) to aid in the diagnosis of infectious, inflammatory, oncologic, and metabolic processes.
        ii. Therapeutic indications include the delivery of chemotherapy, antibiotics, and anesthetic agents; to drain CSF in the presence of hydrocephalus; or to avoid elevated intracranial pressure (ICP).
    c. **Supplies**:
        i. Lumbar Puncture Tray
        ii. Sterile gloves
        iii. Saline or sterile water wipes
    d. **Nursing Knowledge**:
        i. At least one assistant is needed to hold the infant during the procedure

ii. All syringes on the sterile field are to be labeled, as required by the Joint Commission
iii. Once the specimens are collected they are to hand-delivered and signed into the Lab, they should **NOT** be sent through the pneumatic tube system.

e. **Process**:
i. Follow standard precautions while performing all steps of the procedure unless directed to use sterile precautions.
ii. Verify infant's identity using two identifiers.
iii. Provide pain management as ordered
iv. Verify that informed consent has been obtained as required by hospital policy
v. Assemble equipment
vi. Open spinal tray and sterile gloves using aseptic technique if the provider does not do this
vii. Conduct a Universal Protocol "time out" according to policy before initiating the procedure
viii. Position the infant in the lateral decubitus (side-lying) or sitting position, with the spine flexed.
1. An intubated infant must be positioned in the lateral decubitus position
2. Avoid flexion of the neck; this increases the likelihood of airway compromise
ix. The infant is at risk of cardiorespiratory compromise due to the positioning required to obtain a successful LP. The nurse should monitor carefully for apnea, bradycardia, and desaturation during the LP.
x. After the procedure, apply pressure with sterile 2 × 2 gauze.
1. Cleanse the area with saline or sterile water wipes to remove any residual disinfectant
2. Apply a small adhesive dressing over the puncture site
xi. Label the tubes according to physician or order.
1. Ensure that all specimens have a patient identification label
2. Label all specimens with the date, time, and initials of the person collecting the specimen
xii. Spinal fluid specimens need to be HAND DELIVERED and signed into the Lab
1. **DO NOT** send specimens through the pneumatic tube system.

f. **Documentation**:
    i. Document the infant's response to the procedure, appearance of CSF, condition of the infant, and tolerance to the procedure

14. **Newborn Screen** –

Is a public health program required by Michigan law to find babies with rare but serious disorders that require early treatment. Refer to NICU NBS Collection Algorithm for visual information on if/when a screen should be collected

a. Blood specimens should be collected at 24-36 hours of life, ideally 24-30 hours and air dried a minimum of three hours
b. The NBS program will notify the primary care provider or NICU identified on the specimen card if the specimen is
    i. Positive for a disorder
    ii. Unsatisfactory for testing
    iii. Early (collected before 24 hours of lie)
c. Considerations:
    i. 1st NBS (blue card) is to be done at 24-30 hours of life
    ii. 2nd NBS (pink card) is to be done at 30 days of life or at discharge which comes first. If the baby is discharged prior to the 8th day of life a second specimen is not needed
    iii. Baby transferred from another hospital will have 1st NBS will be done at the birth hospital regardless of age. If the 1st screener was done before 24 hours, a repeat (pink) NBS will need to be done at 24-30 hours
    iv. Transfusions:
        1. In those rare cases when the first sample specimen cannot be collected prior to RBC transfusion
            a. A first sample specimen should be collected 28 hours post RBC transfusion start time
            b. A repeat sample specimen should be collected at discharge or 30 days of life, whichever comes first
            c. Another repeat sample specimen should be collected 90 days following the last RBC transfusion
        2. If the first sample is collected prior to RBC transfusion but less than 24 hours of life (early screen)
            a. A repeat sample specimen should be collected at 28 hours post transfusion start time

b. Another repeat sample should be collected at discharge or 30 days or life, whichever comes first

v. Clinical circumstances:
   1. Collect an early specimen prior to
      a. Red blood cell transfusion
      b. Surgery
      c. Initiating extracorporeal member oxygenation (ECMO)
   2. If a newborn is unlikely to survive the first 24 hours of life, a NBS specimen should be collected at the parent's discretion
      a. The NBS program should be notified if a newborn has died or is expected to die
         i. NBS Follow up program (fax 517-335-9419 or 517-335-9739)

vi. Process:
   1. Ensure NBS card has been accurately and legible completed in all fields
   2. Check the expiration date of the card before use
   3. Check for Michigan BioTrust for Health consent on back sheet
   4. Obtain specimen and apply to NBS card, noting on card collection type
   5. Ensure not to layer sample and that both sides of paper circles are filled
   6. Remove yellow carbon copy from card and leave on NICU UC clerk desk
   7. Take to OB Main Desk to dry on their rack

vii. Documentation:
   1. In PowerChart, document the card number and collection time and date.
   2. Document on discharge education sheet completion of NBS

15. **Peripheral Blood Culture Collection** –

In order to decrease peripheral blood culture contamination rates of samples drawn in the MMC NICU, a standardized peripheral blood culture collection procedure has been created to minimize the potential of 'false-positive' peripheral blood cultures. This process change will result in decreased antibiotic usage, length of stay, and cost.

a. **Individuals Needed**:
    i. 1 RN to obtain specimen
    ii. 1 RN to assist with timing and maintaining sterility
b. **Supplies Needed**:
    i. Povidone-iodine swab
    ii. Alcohol swab *(2)*
    iii. Timer
    iv. Tourniquet
    v. 3 ml syringe
    vi. Needless transfer device *(2)*
    vii. Butterfly needle/Insyte needle
    viii. Blood culture bottle
    ix. Sterile towels
    x. Sterile gloves *(Obtainer)*
    xi. Clean gloves *(Assister)*
c. **Procedure**:
    i. Review order for appropriate lab, route, and patient
    ii. Gather supplies
    iii. Wash hands (Obtaining and Assisting RN)
    iv. Verify proper patient using two patient identifiers and compare that information to the patient label
    v. Once site for collection has been chosen, **Obtaining RN** prepares sterile field
    vi. Needle device and sterile collection syringe dropped onto sterile field by **Assisting RN**
    vii. **Obtaining RN** performs hand wash/cleanses with sanitizer then dons sterile gloves
    viii. **Assisting RN** places needless transfer device onto sterile syringe being held by **Obtaining RN** and then replaced onto sterile field
    ix. **Assisting RN** will open and offer povidone-iodine swab to **Obtaining RN**
    x. **Obtaining RN** then cleanses site with povidone-iodine swab and allows 60 second dry time.
        1. Assisting RN will utilize a clock or APGAR timer to ensure time requirement met
    xi. Once dry, **Assisting RN** offers alcohol swab to **Obtaining RN**
    xii. **Obtaining RN** cleanses site with alcohol swab and allows to fully dry.

1. During this time assisting RN will cleanse the top (injection port) of the opened blood culture bottle with an alcohol swab and leave alcohol swab covering injection port until needed

xiii. Once dry, obtain the specimen.
1. A **minimum** of 1ml of blood needs to be collected for each blood culture bottle that is sent

xiv. Specimen is then handed to **Assisting RN**. **Assisting RN** will remove used transfer device and replace with new, sterile device

xv. Alcohol swab is removed from top of culture bottle by assisting RN and specimen is inserted into the bottle

xvi. Note time, date, and specimen source on lab label, and apply lab label to specimen bottle in front of patient per MHC Laboratory Specimen Labeling Policy

d. **Documentation**:
i. Document amount of blood loss in I&O tab in PowerChart
ii. Document pain assessment and interventions

16. **Pre-op/Post-op Care** –

To provide standardized and evidence-based care of surgical neonates with the overall goals of infection prevention, nutritional balance, pain management, achievement of age-appropriate health status, and provision of family-centered care

a. **Considerations**:
i. Whenever delivery of an infant with a defect necessitating surgical correction is anticipated, a full and experienced resuscitation team should be available at the delivery
ii. If the surgery will take place in the operating room, prepare for transport of the neonate to the operating room
iii. Standard Protocol (SP) has become the preeminent national safety intervention. Established by The Joint Commission as part of the National Safety Goals for hospitalized patients, the SP includes
1. A pre-procedure verification process (e.g., surgical checklist)
2. Marking the procedure site
a. Site marking is not recommended for premature neonates because of the risk of a permanent tattooing effect when the skin is marked. An

alternative method must be developed; this may include use of a colored arm or leg band on the surgical side.
b. Surgeries without sidedness do not require marking.
c. Site marking is to be completed by the surgeon before making the incision

3. A formal timeout just before beginning the procedure

iv. Frequent pain assessments and adequate pain management are essential for optimum recovery (refer to Pain and Sedation section of SOC)
v. If a patient is being **admitted from home to the NICU** on the day of surgery please utilize the Pre-Op Admission Checklist as well

b. **Process**:
i. Basic care of all surgical patients
1. For infants awaiting surgery, reduce risk of hypothermia by maintaining a neutral thermal environment
2. Monitor fluid status before, during, and after surgery. Infants will be without enteral nutrition for a minimum period dependent on the type of surgery and the anesthesia administered
a. Maintain intravenous access as needed before, during, and after surgery
b. Maintain strict intake and output before, during, and after surgery
c. Weigh the infant daily unless the infant's condition does not allow it. Discuss with the NICU Provider if postponing weighing is a consideration
3. Gastric decompression as ordered
4. Stabilize the infant as needed with indicated cardiorespiratory support. Support will continue postoperatively as indicated or ordered
a. Maintain patency of the natural nasal and oral airway with oral care and suctioning as needed to clear secretions
b. Careful attention is necessary for potential or actual fluid loss in the presence of open defects
c. Thermoregulation is also challenging in the presence of open defects

d. Place the urinary catheter for drainage as ordered
e. Perform laboratory studies as ordered
f. Assist with ultrasound and radiological studies as ordered
g. Broad-spectrum antibiotic coverage may be indicated
    i. Administer as ordered

5. Family education and family-centered care
    a. Ensure informed consent is obtained
    b. Support parents by allowing time with their infant as much as possible and keeping them informed of the infant's condition
    c. Provide education on all therapies and medications
    d. Provide support for expression and saving of breast milk

c. **Recovery and postoperative care of the surgical neonate**:
    i. All infants undergoing surgery receive post anesthesia care in the NICU
    ii. For infants who were transported to the operating room, a postoperative handoff report should be provided to the physician or registered nurse. The report should include:
        1. Medications given and reaction to medications
        2. Abnormal occurrences during surgery
        3. Any other additional pertinent patient information
    iii. Infant assessment, including pain assessment, vital signs, and oxygen saturation, will be done every 15 min four times and every 30 min twice, then hourly until stable or consistent with postoperative recovery monitoring
    iv. Ensure the infant is developmentally supported and positioned for comfort.
    v. Monitor and treat for pain as indicated
d. **Documentation**:
    i. Specific forms as identified by an individual facility should be completed. These may include:
        1. pre-operative checklist
        2. timeout form (completed by surgical team)

ii. Documentation during surgery should be completed by the anesthesiologist, including vital signs and medications administered as well as total blood loss
iii. Postoperative documentation should include vital signs during the recovery period, blood glucose screening postoperatively, and regular pain assessments and reassessments, and any medication given or treatment provided and the response
    1. Refer to post-operative checklist

17. **Urinary Catheterization** –

To obtain a sterile urine specimen, maintain an accurate record of output (using a closed indwelling urine drainage system), relieve urinary retention, or instill contrast agent to perform cystourethrography

a. **Considerations**:
    i. The infant should not have voided within 1-2 hours of the procedure
    ii. Portable ultrasound may be helpful to determine whether there is adequate urine in the bladder
    iii. Use of a feeding tube as a urinary catheter may increase the risk of coiling and should be avoided
    iv. Foley catheters should not be used with younger infants and neonates due to risk for serious urethral injury if the balloon is inflated in error while still in the urethra
    v. The longer the catheter is in place, the higher the risk for infection
    vi. Use the smallest diameter catheter to avoid complications
    vii. Recommended length of insertion for intermittent urinary catheterization
        1. Female
            a. Neonate: 5 cm
            b. Infant: 5 cm
            c. Extremely-low-birth-weight infants weighing less than 750 grams: Less than 2.5 cm
        2. Male
            a. Neonate: 6 cm
            b. Infant: 6 cm
            c. Extremely-low-birth-weight infants weighing less than 750 grams: Less than 5 cm
b. **Equipment**:

i. Three povidone-iodine impregnated swabs
ii. Closed-system indwelling urinary catheter kit for continuous bladder drainage
iii. Sterile towels for draping
iv. Sterile gloves
v. Sterile container
vi. Water-soluble lubricant
vii. Size 3.5 Fr silicone urinary catheter for infants weighing less than 1,000 grams
viii. Size 5 Fr silicone urinary catheter for larger infants
ix. Sterile cotton-tipped applicators
x. Saline or sterile water wipes

c. **Nursing Knowledge**:
i. Avoid vigorous cleansing of the perineum to prevent introduction of bacteria into the urinary tract
ii. Avoid wide separation of the labia-minora to prevent tearing
iii. Insert the catheter only as far as necessary to obtain urine
iv. Recommendations to prevent catheter associated UTIs when using closed system indwelling urinary catheter
1. Maintain unobstructed urine flow
2. Keep the catheter and collecting tube free from kinking
3. Keep the collection bag below the level of the bladder at all times.
d. Do NOT rest the bag on the floor
4. Empty the collecting bag regularly, using a separate clean collecting container for each infant; avoid splashing, and prevent contact of the drainage spigot with the nonsterile collecting container
5. Use standard precautions, including the use of gloves and gowns as appropriate during any manipulation of the catheter or collecting system
6. Do NOT clean the periurethral area with antiseptics to prevent CAUTI while the catheter is in place.
e. Routine hygiene is appropriate
7. Clamping indwelling catheters before removal is not necessary
v. Process:

1. Follow standard precautions while performing all steps of the procedure unless directed to use sterile precautions
2. The procedure will be preceded by proper patient identification
3. Provide pain management
   a. Refer to the Pain and Sedation section for more detail
   b. Provide developmental care with facilitated tucking or blanket swaddling and nonnutritive sucking
4. Set up a sterile field using an infant/pediatric catheterization kit
5. Select the appropriate catheter size to avoid trauma
6. Position the infant supine with knees bent and legs apart. Developmentally support the infant as necessary
7. Perform hand hygiene and don sterile gloves
8. Place the hub of the catheter into the specimen container to maintain sterility or connect it to a closed system for an indwelling catheter
9. Drape a sterile towel across the lower abdomen and the patient's legs
10. Cleaning of meatus
    a. Female: Separate the labia with a thumb and index finger
        i. Clean the urethral meatus with povidone-iodine from front to back
        ii. Wipe once downward over the meatus, then once on either side of the meatus with each swab
        iii. Do not wipe a swab over the same area more than once
    b. Male: with one hand holding the penis upward
        i. Use the other hand to clean the glans with povidone-iodine
        ii. . The foreskin of uncircumcised males must be partially retracted to locate the meatus (do not force retraction of the foreskin)

iii. Wipe in a circular motion over the glans, beginning over the meatus and ending at the proximal penile shaft

11. Lubricate the catheter with a water-soluble lubricant and insert it into the meatus, just until urine returns. Refer to *considerations* section above for recommended length of insertion
    a. If resistance is met, hold the catheter in place, using minimal pressure. The spasm should relax after a brief period, allowing easy threading of the catheter. Stop the procedure if obstruction is suspected and notify the MD/NNP
    b. If the infant is crying or straining, pause the procedure and attempt to calm the infant before continuing
    c. Do not insert more than the recommended length
    d. To prevent trauma do not move the catheter in and out
    e. If the catheter is indwelling, connect it to a closed urinary-draining system
    f. If the catheter is to be removed, gently withdraw when urine flow ceases
    g. Secure and stabilize the catheter to the inner thigh
        i. routine catheter care as needed to decrease risk of infection
    h. In male infants, the catheter may be taped to the lower abdomen
12. If collecting a culture, obtain necessary urine via a catheter draining into a sterile container
13. Gently cleanse the area to remove povidone-iodine with saline- or sterile-water wipes
14. Replace the diaper and developmentally reposition the infant
15. Ensure the specimen is properly labeled and submit for testing as indicated
16. Remove the catheter and discard per standard precautions

vi. Documentation:
    1. Document the procedure, including the size of the catheter used; the distance inserted; the amount,

color, and appearance of urine obtained; the infant's tolerance of the procedure; and specimens sent
2. Document urinary output every 3-4 hours
3. Document periurethral care per shift

18. **Vascular Access** –
    a. **Central Line Access:**
        i. Refer to the MMC Central Line NICU Policy for unit specific information regarding the following devices:
            1. UAC
            2. UVC
            3. PICC
        ii. Utilize the Central Line Maintenance Checklist when any of the above devices are in place
    b. **Peripheral Intravenous (PIV):** To provide guidelines for the placement, assessment and daily management of PIV catheters
        i. Considerations:
            1. Avoid placement in areas of poor skin integrity or areas of infection
            2. Avoid placement in areas of extremities with flexion
            3. Avoid potential PICC sites (brachial, cephalic, saphenous…)
        ii. Equipment:
            1. Catheter placement
                a. IV catheter (24g or 22g)
                b. Tegaderm
                c. Clear tape
                d. Arm board (size appropriate)
                e. Alcohol (or betadine if drawing blood culture)
                f. Tourniquet
                g. Normal Saline flush
                h. Primed t-connector
                i. Gloves (sterile if drawing blood culture)
                j. Transilluminator if desired
                k. Developmentally appropriate pain management measures (pacifier, sucrose, swaddling, containment etc..)
            2. IV infiltrate or extravasation: supplies as needed per severity of infiltrate (see chart below)
            3. Notify Provider if Stage 2 or greater
        iii. Nursing Knowledge/Management:

1. At least **hourly** assessment and documentation of PIV site:
   a. cannulation site
   b. surrounding tissue
   c. volume of infused fluid
2. No higher than 12.5% Dextrose and amino acid concentration no higher than 2% infused via PIV
3. No prolonged use of tourniquet. If used, apply immediately prior to insertion of catheter
4. If using transilluminator, follow manufacturer's recommendations
5. Place catheters in the same direction as blood flows
6. Infiltration defined as: leakage of *non-vesicant* fluid from a vein
7. Extravasation defined as**:** Leakage of fluid or medication that is *toxic* to tissue from a vein
   a. See below table for extravasation management (Table 1 and Figure 1)
8. Refer to MMC IV Therapy Administration and Monitoring policy for the most up-to-date information on how long administration sets can hang before needing to be replaced.

Table 1: Staging of Extravasation

Table 1. Staging of Extravasation

Stage of Extravasation	Observation	Treatment Options
Stage 1	• Painful intravenous (IV) site • No erythema • No swelling	1. Generally, only supportive care is needed. 2. Elevate the extremity. 3. Apply a skin protectant ointment to damaged skin.
Stage 2	• Painful IV site • Slight swelling (0%–20%) • No blanching • Good pulse below infiltration site • Brisk capillary refill below infiltration site	1. Generally, only supportive care is needed. 2. Elevate the extremity. 3. Apply a skin protectant ointment to damaged skin.
Stage 3	• Pain at site • Marked swelling (30%–50%) • Blanching • Skin cool to touch • Good pulse below site • Brisk capillary refill below site	1. Administer an antidote. 2. After a saline washout, apply a skin protectant ointment to the damaged area and cover with 2 × 2 gauze. 3. 24 hr later, apply hydrocolloid to the injury. 4. Change the dressing daily. 5. Rinse with normal saline at dressing changes.
Stage 4	• Painful IV site • Very marked swelling (50%) • Blanching • Skin cool to touch • Decreased or absent pulse • Skin breakdown or necrosis • Capillary refill time >4 seconds	1. Administer an antidote. 2. After a saline washout, apply a skin protectant ointment to the damaged area and cover with 2 × 2 gauze. 3. 24 hr later, apply hydrocolloid to the injury. 4. Change the dressing daily. 5. Rinse with normal saline at dressing changes.
Stage 5	• Any or all Stage 4 signs and • Extensive wounding, involving most of the extremity or • Very deep wounding	1. Administer antidote. 2. Follow the hydrogel wound care protocol. 3. Change the dressing daily. 4. Rinse with normal saline at dressing changes.

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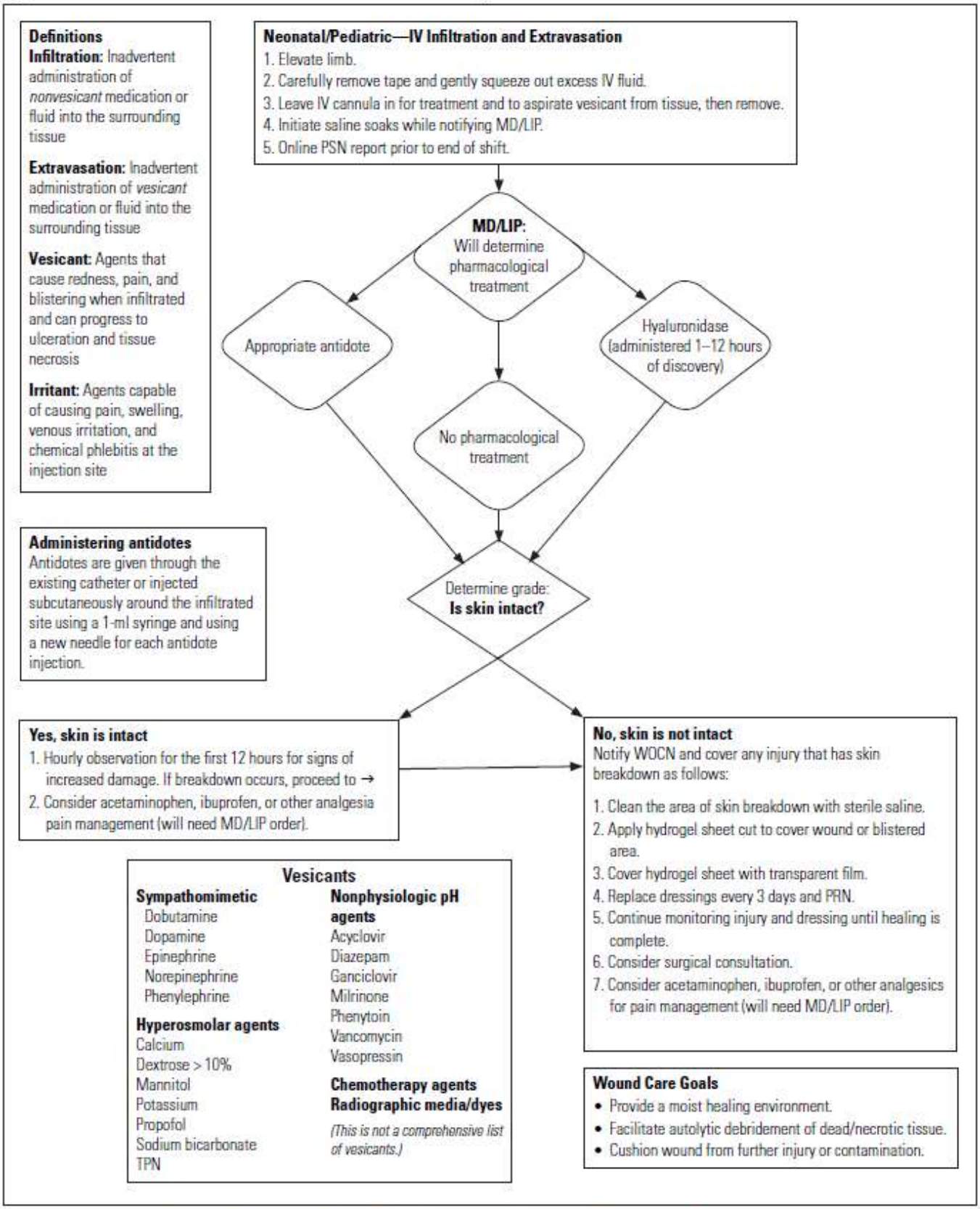
Figure 1. Diamond Children's IV Infiltration and Extravasation Algorithm



Note: LIP—Licensed Independent Practitioner; MD—Medical Doctor; WOCN—Wound, Ostomy, and Continence Nurse.

iv. Process:
1. Follow universal precautions when placing IV unless directed to use sterile precautions (i.e., obtaining blood culture with IV start)
2. Verify patient identification (name band)
3. Provide comfort/pain management
4. PIV catheter placement
   a. Gather all needed equipment (including helper if needed)
   b. Perform two-patient identifier process
   c. Explain procedure to parents if at bedside
   d. Wash hands and don gloves
   e. Use developmentally supportive techniques
   f. Assess sites for PIV placement using transilluminator/tourniquet as needed (as briefly as possible)
   g. Prepare the site with skin antiseptic (alcohol or betadine if blood culture)
   h. Apply a tourniquet or encircle the extremity with fingers/hand to achieve venous distention
   i. Insert the catheter a few millimeters below the intended insertion site with the bevel of the needle facing up @ 15-25 degree angle.
   j. Advance the needle until blood appears in the catheter
   k. If vein not penetrated, slowly withdraw the catheter to just below the skin and advance the needle again.
   l. If attempt unsuccessful or hematoma develops, apply pressure until bleeding stops.
   m. If attempt successful, remove tourniquet if used, remove the needle and carefully connect the t-connector to the hub and gently flush with normal saline to ensure patency. If surrounding tissue swells, apply pressure just above insertion site, remove the catheter, and apply pressure until bleeding stops.
5. Dressing the PIV:

a. If flushes without difficulty apply the Tegaderm over the catheter and insertion site
b. Provide padding under the PIV hub with gauze to protect patient's skin and prevent a hospital acquired pressure injury from occurring
c. Secure to arm board with double backed tape as needed making sure that tape is not encircling extremity or too tight and that assessment of the site and surrounding tissue is not obscured.

6. Dispose of the needle in sharps container after engaging the safety mechanism
7. Document the date, time, catheter size, location, and patient's tolerance of procedure in the EMR.

v. PIV catheter care:
1. Assess the site for patency and possible complications at least hourly during infusions.
a. Observe for any s/s of:
i. redness
ii. edema
iii. pain with flushing
iv. increasing pump pressure reading
v. increased resistance when flushing the catheter
2. Maintain catheters used intermittently as follows:
a. Flush with 0.5-1ml of NS flush every 4-6 hours.
i. Flushing the catheter with a final 0.5ml while applying the clamp or withdrawing the needle may prevent blood backflow into the catheter and backflow prevention devices, prolonging the catheter dwell time.
b. No benefit has been found in heparin use either 10units/ml or 1 unit/ml, in prolonging the dwell time of the PIV.

vi. Infiltration/Extravasation:
1. If there is redness, swelling, coolness, blanching, discoloration, or blistering of skin, **IMMEDIATELY** stop the IV fluids.
2. Notify the MD/NNP and parents

3. Disconnect IV tubing and attempt *gentle* aspiration of the residual fluid/medication.
4. Consider elevation of extremity for 24-48 hours.
5. Assess and document the condition of the site
6. Take photograph of the wounded area and repeat photos weekly to document healing progress. ****See Table 1 and Figure 1 (above) to stage and treat the extravasation.**

Developmental Care –

1. **Small Baby Interactions** –
    a. All hands-on care for the small baby will be rendered with 2 people.
        i. One to provide care/treatment and one to support infant and monitor for signs of stress.
        ii. Some situations may require more assistance.
    b. Two-person care is expected beginning at birth and extending until infant has demonstrated self-regulating behaviors.
    c. Routine provider (physician or APP) daily exam will occur during patient care rounds, regardless of infant cues by one provider. Second person to contain and provide facilitated tucking.
2. **Cue-Based Care** –
    a. Provide infant with support and stability to decrease stress response level
    b. **Care is always done on the infant's schedule and not on our schedule**
    c. Interactions, starting and stopping, are done **according to the infant's awake time and cues**
    d. Goal is to discontinue cue-based care when infant is exhibiting self-regulatory behaviors, no longer having multiple desaturations, bradycardias and NPASS score is less than 3
        i. Typically around 30 weeks (CGA) or 1500g
    e. Hands-on care/assessment done with baby cues at minimum each task should be done within 6 hours if infant has not shown awake cues
        i. Temperature
        ii. Move sat probe
        iii. Diaper change
        iv. Reposition
        v. Mouth care

vi. Auscultation
vii. Tactile examination of IV lines

f. Examples of Cues:
   i. Awake Cues:
      1. Changes in respiratory pattern
      2. Changes in heart rate and pattern
      3. Changes in facial expression
      4. Increased movement
   ii. Time-out Cues:
      1. Facial grimacing, eye clinch or gaze aversion
      2. Halt hand or hunger posture
      3. Hypertonic and hypotonic
      4. Finger and toe splay and making fists
      5. Sneezing, hiccoughs and yawning
      6. Desaturations and color changes
      7. Flailing or struggling movements
      8. Apnea
      9. Tongue protrusion
      10. Crying, whining or fussing
      11. Spitting up or vomiting
   iii. Infant State Cycles
      1. Sleep/wake cycles do not start to develop until the 3rd trimester
      2. Prior to 3rd trimester, infant displays sleep transitions and wakefulness every 15-60 minutes

3. **Two-Person Care** –
   a. **Purpose**: to provide physical support, comfort, and neurodevelopmental protection using facilitated tucking during care to
      i. Improve the infant's ability to exhibit self-regulatory behaviors and better tolerate caregiving activities
      ii. Guide the caregiver's actions to be in sync with infants physiologic and behavioral responses
      iii. The goal is to remove the second person when there are no longer stress and defense behaviors noted such as desaturations, bradycardia or NPASS scores of 3 or more
         1. Typically corrected gestational age of 30 weeks or weight of 1500g however should be individualized to infant
   b. **Process**:

i. One person will provide care, second person will support and contain infant to mimic uterine wall
    1. **("Facilitated tucking is defined as gentle positioning of preterm infants with arms and legs in a flexed, midline position close to the body.")**
    2. Second person may suggest when to pause and restart based on infant stress and self-regulatory cues
ii. Before starting care, both caregivers should discuss goals of interaction
    1. Second caregiver will gently contain infant prior to starting care and wait for infant to reach a calm and regulated state
    2. Gentle period of containment should be done at the end of care as an "All done" cue again waiting for infant to reach recovery

c. **Technique**:
    i. Facilitated tucking consists of slow and purposeful movements, turning, and position changes necessary to help the infant gain and maintain behavioral organization
    ii. Response:
        1. Care is based on continual assessment of cues
        2. Care should remain cue based and not be rushed
            a. Care may last 45 minutes or longer with needed breaks based on infant tolerance and recovery
        3. Examples:
            a. Contain arms and bring to midline
            b. Cup head
            c. Maintain neck flexion
            d. Flex legs and brace feet
            e. Side-lying or prone
                i. In supine, maintain round shoulders and tilt pelvis forward
    iii. Consistent Touch:
        1. During care, support person should have at least one hand on the infant
            a. Flexion support
            b. Hands midline
            c. Legs flexed
            d. Foot bracing
    iv. Relaxed caregiver hands

1. Tension in hands may be translated to baby

v. Alignment
   1. Midline alignment is necessary for comfort which will decrease the infants stress response

vi. Frequent breaks
   1. May be necessary during one care session
   2. Evaluate the necessity of the task.
      a. Can the task wait until the infant has recovered?
   3. Provide continuous containment during pauses in care
   4. If infant cannot recover after frequent breaks in care, care should be stopped

vii. Shield Eyes
   1. Immature eyes do not have the ability to constrict in response to light until 30 weeks

4. Infant Positioning Assessment Tool –

a. Philips Infant Positioning Assessment Tool (IPAT)
   i. A valid and reliable tool that uses pictures to serve as:
      1. A reference and educational tool for teaching
      2. An evaluation instrument
      3. A method of standardizing best positioning practices of premature infants in the NICU
   ii. Evaluates posture in 6 areas
      1. Head
      2. Neck
      3. Shoulders
      4. Hands
      5. Hips/pelvis
      6. Knees/ankles/feet
   iii. 2-points scoring system is used in each area of the body, with 2 = best, 1 = acceptable, 0 = unacceptable (Asymmetrical positioning is scored as 1; a full score of two is never granted for asymmetry).
      1. 12 = ideal positioning
      2. 9-11 = acceptable
      3. ≤ 8 = unacceptable, repositioning is needed

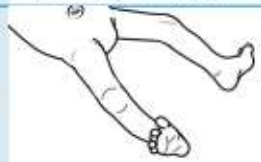
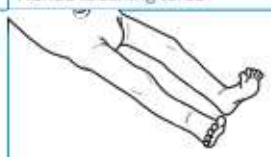
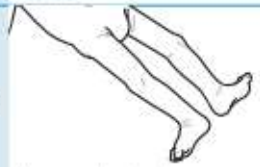
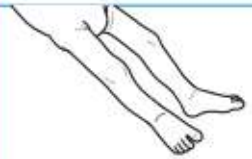
b. Location of IPAT resource
   i. In document file cabinet
      1. Paper copies of the IPAT are available for use

Infant Positioning Assessment Tool (IPAT)

Patient's name: _____ Birth gestational age/corrected gestational age: _____

Clinician's name: _____ Date/time of assessment: _____

Infant position: ☐ Supine ☐ Side-lying ☐ Prone

Indicator	0	1	2	Score
Head	 Head rotated laterally (L or R) > 45° from midline	 Head rotated laterally (L or R) 30 – 45° from midline	 Head aligned (L or R) 0 - 30° from midline	
Neck	 Neck in hyperextension or hyperflexion	 Neck neutral	 Neck neutral, aligned, head slightly flexed forward 10°	
Shoulders	 Shoulders retracted	 Shoulders aligned, flat to surface	 Shoulders rounded forward towards midline	
Hands	 Hands away from body	 Hands touching torso	 Hands touching face	
Hips/pelvis	 Hips/pelvis abducted, externally rotated	 Hips/pelvis aligned but extended	 Hips/pelvis aligned and softly flexed	
Knees/ ankles/feet	 Knees extended, ankles and feet externally rotated	 Knees, ankles, feet aligned but extended	 Knees, ankles, feet aligned and softly flexed	
12 = ideal cumulative score. 9 – 11 = acceptable cumulative score. ≤ 8 = need for repositioning.			**Total cumulative score**	

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Processes –

1. **Handling of Stored Breast Milk** -
    a. Refer to the Handling of Stored Breast Milk in NICU and C3 policy for details
2. **Donor Human Milk Use** –
    a. **Purpose**: To provide guidelines for the safe use of donor human milk (DHM) products
    b. **Considerations**:
        i. Banked DHM is considered the "first alternative" when maternal milk is unavailable or undesirable
        ii. Parental consent is to be obtained before administration
        iii. The U.S. Food and Drug Administration recommends that donor milk come only from a source that screens donors and provides other safety precautions such as appropriate pasteurization and testing of donated milk. Acquiring donated milk directly or through the Internet is discouraged
            1. Use of human milk from a donor should come from a Human Milk Banking Association of North America (HMBANA) bank or a licensed milk bank
            2. Prolacta Bioscience, a licensed for-profit milk bank, provides human milk fortifier and has its own screening and collection methods
    c. **Equipment**:
        i. Refrigerator and freezer space dedicated to the storage of human milk with thermometers for temperature monitoring
    d. **Nursing Knowledge**:
        i. Diagnoses supporting use of DHM (preventive and healing)
            1. Prematurity or birth weight less than 1,750 g
            2. Feeding intolerance, necrotizing enterocolitis
            3. Postsurgical nutrition such as patent ductus arteriosus ligation, bowel surgery
            4. Malabsorption or short-gut syndrome
            5. Fetal distress or hypoxia with low Apgar scores
            6. Renal failure

7. Cardiac problems
8. Bronchopulmonary dysplasia
9. Inborn errors of metabolism
10. Immune disorders

ii. Parental consent is to be obtained before administration

e. **Process**:

i. DHM management

1. The need for DHM is identified according to hospital or unit policy
2. Informed parental consent is obtained and documented according to hospital policy
3. A physician or allied health professional orders the feeding to include what is to be fed
4. DHM is shipped and stored frozen. When the shipment arrives at the hospital, the person receiving the shipment should inspect the bottles for thawing and leakage or broken bottles. If bottles are found to be thawing or leaking, they should be discarded
5. A log should be maintained showing each lot number of milk received and bottle designation. When bottles are used, they should be logged out to the infant who receives the milk.
6. Use a designated area for milk preparation and clean the area before preparing each feeding

ii. Thawing DMH:

1. Frozen DHM may be thawed in a Milk Warmer before being placed in the refrigerator
    a. If for some reason Milk Warmers are not available for use the following two methods can be employed to thaw DMH:
        i. Frozen DHM may be thawed in a warm water bath before being placed in the refrigerator. Ensure that the lid does not contact the water. Use the minimum time necessary, and remove the container from

the warm water when the milk is liquid but still chilled.

ii. Milk also may be slowly thawed at room temperature and refrigerated before it is completely thawed, while ice crystals are still present.

2. Human milk should be provided in a manner that ensures that nutrients, particularly fat, are delivered to the infant
    a. Bolus feedings are preferred to minimize fat losses and bacterial growth
    b. When continuous feedings are indicated, use tubing that is as short as possible and place the syringe in an upright position
    c. Administration of human milk should not exceed 4 hr. Both syringe and tubing must be changed at least every 4 hr
    d. Equipment used for enteral feedings should be distinct from that of parenteral use
3. Weaning off DHM should be based on the infant's clinical status and maternal milk availability as opposed to gestational age and weight criteria. In some cases, DHM may be prescribed for postdischarge feedings
4. Lactation consultants and unit-based registered dietitians should be available and used as resources

f. **Documentation**:
    i. Informed parental consent must be documented in the infant's medical record
    ii. Maintain DHM logs in a designated location, which may be electronic
    iii. Document administration of DHM in the infant's medical record, including the lot number of the DHM.

3. **Human Milk: Pumping, Use, and Storage** –
    a. **Purpose**: To provide guidelines for the safe collection, storage, and handling of human milk in the hospital setting.

b. **Considerations**:
    i. Human milk is given according to a feeding protocol or an order by a Provider
    ii. In general, use the first 2 weeks of human milk in chronologic order of expression
        1. Freshly expressed milk is ideal, followed by refrigerated and then frozen
        2. The collection and storage process may affect the final product in caloric content, immunological function, and nutritional value. Factors include cleanliness, method of expression, storage containers, temperature, and time
c. **Equipment**:
    i. Electric hospital-grade breast pump, with the ability to clean pump kit parts after each pumping
    ii. Storage containers
    iii. Labels with two patient identifiers and area for date and time
    iv. Facilities for mothers to wash their hands before and after pumping
    v. Refrigerator and freezer space dedicated to the storage of human milk with thermometers for temperature monitoring
d. **Nursing Knowledge**:
    i. Human milk is a body fluid and should be handled with personal protective equipment
    ii. Skin creams including paraffin or any other product unsuitable for digestion should be avoided because milk contamination may occur
e. **Process**:
    i. Follow standard precautions while performing all steps unless directed to use sterile precautions
    ii. Use a designated area for milk preparation and clean the area before preparing each feeding
    iii. Label all milk containers with two unique patient identifiers and the date and time collected, thawed, warmed, or fortified as applicable

iv. Collection:

1. Human milk is pumped into and stored in sterile containers
2. Parents are provided with information about pumping and storage of milk upon admission to the neonatal intensive care unit or as soon as possible
3. Mothers are instructed to pump at least eight times in 24 hrs at approximately 2- to 3-hr intervals, with at least one pumping at night. Double pumping for approximately 15 min is recommended
4. A sterile accessory kit and containers for milk (clean, dry, nonsterile, BPA-free with seal) are issued to the mother, or she is informed where to obtain them
5. Combining milk expressed at different times (layering) for storage is not permitted for hospital use
6. Milk may be stored as colostrum, mature milk, or hind milk
7. The mother is provided with infant labels with two infant identifiers for use in labeling pumped milk
8. The mother is instructed to write the date and time of milk expression on the bottle label and any medications she is taking at the time of the pumping
9. The parent is asked to relabel any bottles that are not properly labeled at the time of delivery; milk must be discarded if not properly labeled
10. Milk pumped at home is transported to the hospital in a cooler tightly packed with frozen gel packs. Regular ice should not be used
11. Properly labeled human milk is stored in the designated refrigerator or freezer. All milk for one infant is kept together in a bin labeled with the infant's information
12. Pump kit parts are cleaned with soap and water after each pumping
    a. Take apart breast pump tubing and separate all parts

b. Rinse under running water to remove remaining milk. Parts should not come in contact with sink
c. Clean by hand by placing parts in clean basin that is used only for infant feeding. After soap and hot water are added, items are scrubbed and rinsed before air drying thoroughly on a clean towel. Clean basin and brush by rinsing after each use and washing them every few days

v. Storage:
1. Those handling human milk containers should wash their hands and wear gloves
2. Human milk should be stored as follows or according to the latest recommendations from the Human Milk Banking Association of North America and Centers for Disease Control and Prevention
a. **At room temperature**: Use or refrigerate within 4 hrs of pumping. With preterm or sick infants, it is safest to refrigerate milk immediately
b. **Refrigerated**: Human milk may be safely refrigerated 4 days (96 hrs) from fresh expression. Thawed, fresh frozen, or pasteurized milk must be refrigerated and used within 24 hr. Thawed milk is never refrozen
c. **Frozen**: Use within 6–12 months. Containers should be filled no more than ¾ because of expansion. In the event of a freezer failure, each milk container should be examined individually. If ice crystals are present, the milk is considered partially thawed and may be refrozen. Containers without ice crystals should never be refrozen
3. Human milk should be stored only in refrigerators and freezers designated for that purpose. Refrigerator temperature should be monitored every 24 hours and

maintained at 4 °C (39 °F) and freezer temperatures maintained at −20 °C (−4 °F)

vi. Fortification:
    1. Human milk may need to be fortified with a commercially prepared or human milk fortifier that adds needed protein, calories, electrolytes, and minerals
    2. Fortification should be done by following recipes provided by physician or AHP orders, registered dietitian consultations, or manufacturer's directions
    3. Powdered bovine additives such as Similac human milk fortifier and Enfamil human milk fortifier should be handled using aseptic technique
    4. Fortifiers should be added to milk at room temperature
    5. The appropriate calorie content from fortification on the milk container label should be noted
    6. Colostrum should never be fortified
    7. Human milk that has been fortified expires 24 hr after fortification or at its previously noted expiration date and time, whichever comes first

vii. Thawing human milk:
    1. Frozen human milk may be thawed in a Milk Warmer before being placed in the refrigerator
        a. If for some reason Milk Warmers are not available for use the following two methods can be employed to thaw DMH:
            i. Frozen DHM may be thawed in a warm water bath before being placed in the refrigerator. Ensure that the lid does not contact the water. Use the minimum time necessary, and remove the container from the warm water when the milk is liquid but still chilled.
            ii. Milk also may be slowly thawed at room temperature and refrigerated before it is

completely thawed, while ice crystals are still present.

2. Human milk is labeled to indicate its expiration 24 hrs after it is completely thawed; follow current recommended practice standards from the Human Milk Banking Association of North America
3. The container of milk must be completely thawed and gently agitated in order to ensure uniform distribution of the nutrients

viii. Warming human milk:

1. A Milk Warmer may be used according to the manufacturer's instructions
    a. If for some reason Milk Warmers are not available for use milk may be warmed in a warm water bath for a short time, with care taken to protect the milk from exposure to the water. This method is known to result in unpredictable milk temperatures
2. A microwave oven should never be used to warm milk
3. Unused portions of human milk should not be refrigerated

ix. Administration of human milk feedings:

1. Before feeding, the infant and milk match should be verified, using two patient identifiers. This may be accomplished by using a double-check. Meticulous attention is needed to ensure the correct milk is given to the infant.
2. Feedings should not be prepared more than 24 hrs in advance
3. Human milk should be provided in a manner that ensures that nutrients, particularly fat, are delivered to the infant
    a. Bolus feedings are preferred to minimize fat losses and bacterial growth

b. When continuous feedings are indicated, use tubing that is as short as possible and place the syringe in an upright position
c. Administration of human milk should not exceed 4 hr. Both syringe and tubing must be changed at least every 4 hrs
d. Equipment used for enteral feedings should be distinct from that used for parenteral feedings

4. In the event that milk is provided to an infant from a source other than the infant's own mother, or human donor-banked breast milk, the following actions should be taken
    a. The physician or AHP should be notified as soon as the error is identified
    b. The incident should be documented in the infant's chart, and a VOICE report should be filed
    c. Both mothers should be provided with appropriate information from the most current edition of Best Practice for Expressing, Storing and Handling Human Milk in Hospitals, Homes, and Child Care Settings
    d. Lab tests should be performed as ordered on the donor mother or the infant who received another mother's milk. These may include testing for the following:
        i. HIV on the donor mother or infant
        ii. Human T-lymphotropic virus on the donor mother
        iii. Hepatitis B on the donor mother
        iv. Hepatitis C on the donor mother
        v. Cytomegalovirus on the donor mother

Discharge Process –

To ensure all necessary documentation, tasks and evaluations are completed prior to infant discharge from the NICU.

1. **Task to be completed prior to D/C** -
    a. **Immunizations**:
        i. Up to date as applicable and completed green immunization record and discharge checklist
        ii. Synagis if applicable during RSV season
        (2nd week of November to April 1)
            1. Will be completed **on day of discharge**
            2. Indications
                a. <29 weeks gestation
                b. Chronic lung disease <32 weeks and 0 days gestation and a requirement for >21% oxygen for at least 28 days after birth
                c. Hemodynamically significant heat disease
                d. Neuromuscular disease

    b. Circumcision with signed consent (as applicable):
        i. Refer to Circumcision section for more details
    c. **Patient Caregiver Education**:
        i. Encourage parental/guardian viewing and demonstration of infant CPR
        ii. Period of purple crying
        iii. Safe sleep
        iv. Immunizations
        v. Feeding schedule/recommendations
        vi. Signs and symptoms of illness and/or infection
        vii. Breast/bottle feeding techniques
            1. Storage and handling of breastmilk or formula
        viii. Use of the bulb syringe
        ix. Positioning for safety and development
        x. Car seat safety brochure with emergency sticker
        xi. Patient Satisfaction Survey will be sent to them in the mail
    d. **Follow up appointments and referrals**:
        i. Primary Care Provider, Eye Exam, Cardiology, Neurology, Developmental Assessment Clinic (DAC), Speech Therapy, Feeding Clinic, Hearing Clinic, etc.
        ii. Enrollment with
            1. WIC-prescription sent as applicable
            2. Healthy Futures
            3. Early on

e. Measure and document length, head circumference, and weight on day of discharge
    i. weight needs to be documented within 8 hours of discharge
f. NICU infant ID form completed including
    i. Infant footprints and parental/guardian fingerprints
        1. (palm prints may be substituted for any medical problems that prohibits footprints)
    ii. Parental/guardian picture ID documented
g. Repeat NBS if ≥ 8 days old per protocol:
h. Hearing screening:
    i. Refer to Hearing Screen section for more details
i. Hugs tags removed at time of discharge

2. **Required Documentation for Discharge** -

a. **Discharge Education**:
    i. Feeding, including formula preparation as applicable
    ii. Basic infant care (bathing, skin, umbilical cord, genital care, temperature measurement, dressing, and comforting)
    iii. Infant safety precautions (safe sleep practices, proper use of car seat or car bed)
    iv. Understanding of early signs and symptoms of illness
    v. Infant CPR as indicated
    vi. Administration of medications and understanding of side effects

b. **Ensure the following has been completed and/or documented, as applicable, prior to discharge**:
    i. CCHD screening
    ii. Newborn state blood screening
    iii. Hearing test
    iv. Informed Consent to Refuse Standard Newborn Treatments signed by parents and faxed as appropriate
    v. All immunizations given
    vi. Family has an approved car seat for the infant
        1. Car seat fit and angle tolerance test per protocol
    vii. Discharge assessments; vital signs; and weight, length, and head circumference on day of discharge
        1. Weight needs to be documented within 8 hours of discharge
    viii. WIC forms have been provided
    ix. Prescriptions given to patient

x. Education has been completed, documented, printed and given to patient
xi. Consults have been completed as needed
xii. Completed Interdisciplinary Plan of Care (IPOC) goals have been documented
xiii. Discharge or transfer order has been reviewed and noted
xiv. Discharge instructions have been reviewed, printed, discussed with and given to patient
xv. Hugs tag has been discharged, removed, and sensor placed in designated area
xvi. Ensure all charges have been documented
xvii. Take charts to Unit Clerk and inform when documentation is complete for the patient to be discharged out of the system

c. Completion for footprints and fingerprints with identification
d. Discharge Note
    i. The name of person to whom the infant was discharged
    ii. The instructions that were provided
    iii. Confirmation that instructions were comprehended
e. Discharge to others than parents or Guardian
    i. Refer to MMC Procedure Discharge of Minor to Other that Parent or Guardian
    ii. If a parent, or legal guardian, requests that a minor child (newborn or registered patient) to be discharged to someone other than the parents
        1. Complete Discharge of Minor to Other than Parent or Guardian form
        2. A written letter or other form that contains the same information and parent/guardian signature is acceptable; unless there is documentation that either parent's custody rights have been restricted
        3. The authorization for release of information should be completed and signed by the parent or legal guardian in order for health status and teaching information to be given to the person picking up the child
    iii. If the Department of Health and Human Services (DHHS) has temporary guardianship through Michigan Child Protection Law and/or Probate Court order and a minor patient is to be discharged to a representative of the DHHS, staff must secure the following documents for the chart prior to discharging the child:
        1. A copy of the DHS documents and/or Probate Court document granting temporary guardianship and custody of the child.

2. A copy of the representative's or the guardian's identification (driver's license, agency business or identification card with individual's name imprinted). No additional release of information is required to give information to the DHS staff.
3. A foster parent who has been assigned care by the DHS can be given the information necessary to care for the child.
4. Do not give information regarding the background or health status of the child's parents to a foster caregiver, unless specifically authorized by the parent or the DHS. The authorized person signs the discharge documents per usual procedures for patient discharge.

iv. Discharge for adoption:
1. Refer to MMC Procedure Discharge of Newborn for Adoption
2. When a birth mother requests release of her newborn to a child placing agency, the staff must confirm that the following required documents are on the infant's chart prior to discharge
   a. The agency must have secured the birth mother's signature on forms giving the agency temporary custody of the child and authorizing release of healthcare information pertinent to the infant's current and future health care. A copy of each should be retained in patient's chart
   b. Munson's forms Discharge of Minor to Other than Parent or Guardian and Authorization for Release of Information can be utilized if the agency does not have their own forms
   c. A copy of the agency representative's identification should be made and included in the chart. Acceptable evidence includes an employment identification card, an agency business card with the individual's name imprinted or agency name badge matching driver's license
   d. The agency representative signs discharge document per usual infant discharge procedure
3. When a birth mother requests release of her newborn child to an individual(s) intending to legally adopt the child through direct placement adoption, the hospital

staff must confirm that each of the following required documents is on the child's chart prior to discharge

a. If a **child placing agency** arranges placement with prospective adoptive parents:
    i. Copy of Family Division Circuit Court Form 329 Statement of Parent/Guardian authorizing Temporary Placement of Child for Adoption
    ii. Copy of Family Division Circuit Court Form 331 Statement of Child Placing Agency Transferring Physical Custody of Child for Adoption
    iii. Copy of Family Division Circuit Court Form 332 Statement of Prospective Adoptive Parent Transferring Physical Custody of Child for Adoption
    iv. Original Affidavit of Child Placing Agency as to residency of adoptive parents
    v. Copy of the Child Placing Agency representative's identification
    vi. Original Munson form #2368 *Direct Placement Adoption Consent and Release*.
        1. This and the Authorization to Release Information are the only forms supplied by Munson, presented to birth mother by Munson staff and witnessed by Munson staff.
b. If an **attorney** arranges placement with the prospective adoptive parents:
    i. Copy of Probate Court Form 330 Statement of Parent/Guardian Transferring Physical Custody of Child for Adoption
    ii. Copy of Probate Court Form 332 Statement of Prospective Adoptive Parent Transferring Physical Custody of Child for Adoption
    iii. Original Affidavit of Adoptive Parents as to residency
    iv. Copy of the attorney's identification (license or Michigan Bar Association card) with license number, P_____)

v. Original Munson form #2368 Direct Placement Adoption Consent and Release.
    1. This and the Authorization to Release Information are the only forms supplied by Munson, presented to birth mother by Munson staff and witnessed by Munson staff.

Resolve Through Sharing: Neonatal Death –

To augment end-of-life and palliative care for the newborn as well as meeting the needs of the bereaved family.

1. **Palliative Care:** should begin upon diagnosis of a life-limiting condition and should coexist with curative care, with emphasis on minimizing suffering
    a. **Pain and sedation should be measured using NPASS** (See Pain/Sedation section in Procedures for more information):
        i. Pain in neonates is real and must be treated
        ii. End-of-life symptoms such as seizures and gasping also must be treated
    b. **Nursing care for infant receiving palliative care**:
        i. If possible care should be given in a private location within the NICU or nearby with a goal of keeping the family together
        ii. Infants should have access to kangaroo care
        iii. Infant should be bathed, dressed and held
        iv. Infants should be taken outside into sunlight if possible
        v. Visitors should be welcomed
        vi. Spiritual support should be included in family care
        vii. If family members are not available, a nurse, or provider should hold and comfort infant
    c. **Process**:
        i. When a transition to palliative end-of-life care is made, a quiet and comforting environment is created
            1. Alarms are turned off. Pagers are turned off to avoid disturbing those in attendance
            2. Routine vital sign measurement and lab analyses are ceased

3. Pain assessments should be continued and may need to be done more frequently to identify infant distress
4. No painful assessments (heel sticks, blood gases) are done
5. Access to medications is essential, whether intravenous, rectal, buccal, or topical
6. Relevant medications include analgesics, anticonvulsants, hypnotics, antianxiety, antipyretics, and anticholinergics
7. Contact NICU Manager on Call or Administrator on Call to help waive visiting hours and sibling restrictions for this situation

ii. Care of family is a central focus
    1. Physical, emotional, and spiritual comfort is provided
        a. Remember that everyone grieves differently
        b. Some parents may prefer gentle touch, others may not
        c. Remain sensitive to nonverbal cues per FICare psychosocial and therapeutic communication presentations
    2. Making memories is an important part of palliative and end-of-life care
        a. Family photographs have been found helpful, photographs of the child can be kept on file for families who may not wish to have them at the time of death
    3. Handprints, footprints, and locks of hair can be given to families
    4. Special spiritual or religious ceremonies can provide comfort
    5. Introducing the infant to the extended family can be important
    6. Kangaroo care has provided family comfort
    7. On occasions with multiple births in which some infants die and some infants live, photos of all infants together may provide comfort
        a. Defer to parent's preferences for photographing infants together

iii. Patient care decisions and interventions will remain within the nursing scope of practice

1. Withdrawal of life support decisions are made by the Parents and Providers
2. Pronouncement of death is only completed by the Provider

iv. Removal of ventilator support
1. Before life-sustaining technology is removed, a plan should be in place for the eventuality that the infant continues to breathe independently. When ventilator support of an infant is removed, caregivers should attend to the following concerns:
    a. The infant's parents should decide who will be present
    b. Infants should be weaned off any neuromuscular-blocking agents
    c. Vasopressors and antibiotics may be ceased
    d. Parents can decide who should be present and how the process will go
    e. Nurses should explain the process to parents, including as many details as the parent wishes to hear
    f. Infants should be held in a parent's or staff member's arms. Some parents may not wish to hold a dying infant
    g. Gentle suction of the endotracheal tube may be done and the endotracheal tube is removed
    h. Tape and additional lines can be removed
        i. IF an autopsy is **NOT** going to be performed
        ii. Utilize adhesive remover
    i. Frequent pain and symptom assessment continues
    j. If respiratory discomfort exists, medication such a morphine should be given. Oxygen usually is not given
    k. Medication for respiratory distress and/or to prevent discomfort are given in normal milligram/kilogram doses and may be repeated if necessary. Bolus medication in larger-than-normal doses are not appropriate

l. Decisions regarding artificial nutrition and hydration in infants should be made based on information on infant risk and benefits
m. It is appropriate to offer small amounts of oral fluids as a comfort measure
n. Mouth care and other symptom management should continue

2. **Infant Death:**
   a. Refer to MMC Procedure Fetal/Neonatal Death for more detail and institution requirements
   b. **Burial**:
      i. Arrangements made by parents with the funeral home of their choice
      ii. Memorial service may be held at any time the parents wish
      iii. Parents may attend or have their own religious counsel attend if they choose a memorial service
      iv. Organ Donation- Momentary Live Births and Neonatal Deaths Only
         1. Prior to death: Notify "Gift of Life" (1-800-482-4881). Gift of life will determine if the baby is a candidate for organ donation (see MMC protocol for "Gift of Life")
            a. Call must be completed prior to sending "MMC Record of Death" to Nursing Administration office (NAO)
      v. Immediate In-house Notification of Death
         1. Notify NAO of the death
   c. **Extended Visitation**:
      i. Parents may wish for additional time with their baby
      ii. Refrigeration is most beneficial to keep integrity of the infant. Cuddle cot is available to keep the infant cool and with the family
      iii. Recommend that baby be kept until last visitation completed
   d. **Photographs**:
      i. Refer to MHC System Procedure Patient Photography for institution requirements
      ii. Take great care to conceal deformities to present the best possible memory
      iii. Benefits
         1. Make baby's life and death real to parents

2. Validate feelings
3. Affirmation of parenthood

e. **Hand and footprints**:
   i. Should always be attempted
   ii. Crayola clay may be used for imprints, make imprints and air dry
      1. Located in the "computer room" in OB, (storage room next to the scrub sinks in OB)

f. **Baptismal Certificate or Blessing Cards**:
   i. Based on parents' desire
   ii. Baptismal certificate is to be completed and given to the family.
      1. Blessing cards and Baptismal certificates available in the RTS bereavement file
      2. A duplicate can be made if families request one for their church's records
   iii. Nursing staff may baptize an infant or child in an emergency when clergy is not available
      1. Wet gauze with sterile water
      2. Slowly squeeze water from gauze over the forehead of the infant stating "I baptize thee (name of infant) in the name of the Father, Son and Holy Spirit. Amen."
      3. Document the event in the medical record on the Fetal/Neonatal Bereavement Band in iView
   iv. When an infant is going to be baptized by clergy, assist him/her with scrubbing and obtain materials needed. Complete complimentary baptismal form and have clergy sign. Record in medical record.

g. **Autopsy**:
   If substance use, motor vehicle accident, or potential accident/homicide is being considered as cause of death an autopsy will occur according to the law.
   i. It is the primary care provider's responsibility to discuss and obtain consent for autopsy whether ordered or requested by family
   ii. Parent education handouts available
      1. Parent education handouts are available in the RTS bereavement file.
   iii. Parents sign Authorization for Autopsy if Munson Medical Center autopsy is desired

1. Authorization for Autopsy is sent to the lab (If lab is not open, send to NAO)

iv. Autopsy options are available at DeVos and University of Michigan

v. All "tubes" must remain if an autopsy is to be done

h. **Organ Donation** – Momentary Live Births and Neonatal Deaths
   i. Prior to death (if possible): Notify "Gift of Life" 1-800-482-4881
      1. Gift of Life will determine if the baby is a candidate for organ donation
   ii. **Gift of Life call MUST be completed** prior to sending "MMC Record of Death" to the Nursing Administration Office

i. **Morgue Transport**:
   i. Funeral home staff will pick up body from unit directly
      1. Infant remains on OB unit in recovery room refrigerator
      2. Funeral home may pick up baby from unit with funeral home director and charge nurse
   ii. If autopsy or hospital disposition notify ortho tech for transport to morgue

j. **Additional Procedures**:
   i. Notify admitting and unit census

k. **Documentation**:
   i. MMC Record of Death (MMC form #0444)
      1. NICU RN to complete (No provider signature needed)
      2. Complete top section as much as possible
      3. Under comment list
         a. Gestational age
         b. Cause of death
         c. Primary care provider
      4. Send to NAO immediately upon completion
   ii. Certificate of Death (Form DCH 0615)
      1. Provider to complete certificate and cause of death sections
      2. Mail to State of Michigan

3. Bereaved Family:

a. Refer to the MMC Procedure Helping the Bereaved Family for institution requirements

b. **Infant preparation**:
   i. Remove medical devices if no autopsy is to be done

c. **Family needs**:
   i. Give the family as much time as they need

1. Allow the family to hold/bathe/dress child if possible
2. Allow siblings/other family members to be present

ii. Offer hospital support services (pastoral, medical social services
   1. MSW can assist with funeral arrangements
   2. Child life specialist or family support specialist to support the infant's siblings
   3. A lactation consultant to assist mothers who want to donate breast milk at the end of life and to help mothers manage cessation of lactation at the end of life

iii. Follow up cards and/or calls will be made at intervals of 2, 6, and 12 months
   1. Calling the next day is helpful
   2. Sending a card from the staff is appreciated
   3. Continued contact on anniversaries of the infant's birth or death, as the family wishes, has been found to be comforting
   4. Introducing the family to a member of the local support group after infant death is very helpful:
      a. Michael's place
      b. Resolve Through Sharing (RTS)
      c. Helping Hands
      d. Pregnancy and infant loss support (www.nationalshare.org)
      e. Pregnancy Loss and Infant Death Alliance (www.plida.org)

iv. Giving the parents a gift such as a stuffed teddy bear to take home allows them to leave the hospital without empty arms

d. **Documentation**:
   i. Document postmortem care, family interventions and disposition of body

e. **Healthcare Team**:
   i. Support services should be offered to all members of the healthcare team
   ii. Facilitated debriefing after difficult death is essential

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More to come

Philips Monitoring System (MUNSON)

Philips Monitoring System (MUNSON)

Introduction

Central Monitoring System

The Philips Patient Information Center is a regulated medical IT system that:

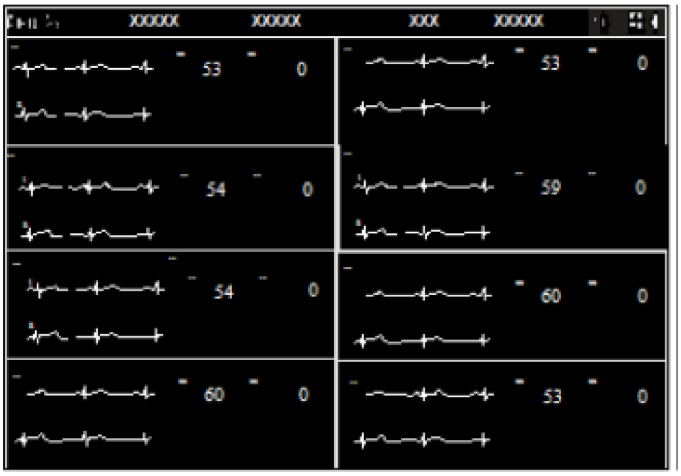
- Provides continuous monitoring of patient vital signs from admission to discharge.
- Consolidates and communicates vital signs data from monitors and third-party devices to caregivers and to the Electronic Medical Record (EMR) for a complete patient record.
- Supports industry standard interfaces to integrate into existing hospital IT infrastructure and EMR systems while meeting requirements for manageability, serviceability, and security.
- Meets the needs of caregivers on the go by means of remote access to patient vital signs for information anywhere.

Through a combination of advanced alarm management, mobility, and clinical decision support, Philips Patient Monitoring Systems enable reduction of non-actionable alarms, improve workflow efficiency, and facilitate early intervention of patient deterioration to improve patient care and outcomes.

The Information Center software runs on a PC workstation with one or two displays for viewing patient data and accessing clinical applications. A mouse and keyboard are provided for entering and changing patient data and other information. If you position the cursor on a labeled application button and click, the application is immediately displayed on the screen. Note that an on-screen keyboard is not available.

With a touchscreen, you can access patient data by either using the mouse or by touching the item on the screen with your finger or a stylus. The mouse is best for making precise selections and measurements, such as using calipers. The touchscreen is best for actions such as acknowledging alarms, accessing application windows, or recording strips. When using a touchscreen, keep the area free of items that can inadvertently touch the screen. If the touchscreen becomes unavailable for any reason, you can access patient data by using the mouse and keyboard.

The Main Screen displays real-time waves, numerics, and alarms from multiple patients. It can be configured to show up to 64 waves, and contains the following elements:



1 Caption Bar

2 Patient Sectors

 Select the Patient Window button to open the Patient window to Display a real-time view of the current patient's data. You also can choose to do an ECG analysis to view all available ECG leads. The Patient Window provides a real-time view of the patient's waves and numerics. You can view patient data and perform all tasks in the Patient Window. In addition to the waves and numerics, the Patient Window contains the following items:

- The Bed Label Pane - Displays the bed label and ID for the currently selected patient. Select the down arrow to select another patient to view.
- The Print Icon to start a printout of the Patient summary report.
- The Help Icon.
- Alarm message areas – All active alarms and technical alarms display on the top right of the patient window. Status messages are color-coded to indicate the message severity. Orange background indicates high severity. Black background indicates low severity. Select the status message to open System Help in the application window. The Help contains a list of status messages with the possible causes and recommended actions for each message.
- Patient Name - Displays the patient's name. Depending on the length of the complete string and the amount of available space, a minimum number of characters is shown, ending with an ellipsis (...). Three question marks (???) precede the patient's name when there is a problem identifying the patient. For example: Patient data between the Information Center and the bedside does not match. All required information was not entered when the patient was admitted.

Buttons in the sector become visible when you move the cursor into the sector or, if using a touch screen display, when you first touch the sector with a stylus or the tip of your finger. When you place the cursor inside a patient sector, the sector is outlined in an orange border. You can minimize the buttons by moving the cursor into the sector and holding down the **Ctrl** key. While the cursor is inside the sector, the buttons remain minimized until you press the **Ctrl** key again. If you move the cursor out of the active sector and move it back in, the buttons become visible.

 Select the Manage Patient icon, which will allow you to:

- Admit, discharge, and transfer patients.
- Enter or update patient demographic information.
- Manage the equipment associated with the patient.
- Temporarily place the bed in standby.
- Enter a temporary transport location, and/or select the patient's equipment to place in standby.
- Export ECG waveform data to a Philips Holter system for analysis.

To Admit a Patient: Use one of the following methods:

- Manually enter new patient information in the fields in the **Patient Demographics** section by typing a 1-30 character first and last name in the appropriate fields. You can use the TAB key to move from field to field. You can also admit a new patient by entering the MRN.
- Use the **Find Patient...** option to find a patient who is being monitored in another Information center or who has been recently discharged.

You can then choose the patient's gender from a drop-down list. It will default to Male while performing a 12-lead if not assigned. It will default to Female while measuring STE if not assigned. Specify the patients birth date by entering it on the calendar. This will update the age field. Enter the patient's height in the appropriate field. This can be in inches or centimeters according to your policy. Enter the Patient's weight using pounds or kilograms according to your policy. Select "Apply" after verifying all information is correct.

Read all confirmation messages and check patient alarms, settings, and paced status when automatic admission, discharge, or transfer is complete.

Viewing and Adjusting Waves:

When the ECG measurement is on, the first wave displayed is the primary ECG wave. The primary wave is always used for ECG analysis. A rhythm status message displays in the upper right corner of the wave, and an arrhythmia status message displays above and in the center of the wave.

Pleth waves on an Efficia monitor are labeled as SpO2.

Wave Adjustments

You can adjust waves in the patient sector or Patient Window layout by selecting a wave then selecting one or more options described below.

- Change Wave – Select a wave from the list. You cannot select the primary ECG wave.
- ECG Analysis – Available if you select an ECG wave. Select to access the ECG Analysis application.
- Primary Lead – Available if you select the primary ECG wave. Select the primary led from the list.
- Size up or Size down - Select to increase or decrease the size (gain) of the wave (if available).
- Set up ECG – Available if you select an ECG wave. Select to access the **Measurements** application ECG page, where you can change heart rate limits and asystole thresholds.

Manually Transferring a Patient to a New Bed: Transfer data for a patient by performing the following steps:

- Use one of the following methods to open the **Manage Patient** In the sector for the bed that you want to transfer, select the name field or select the **Manage Patient** shortcut button. In the application window task bar, select the **Manage Patient** button.
- Select the **..** button. The **Transfer Patient** dialog box displays a list of available beds in the institutions and units.
- To transfer this patient to another bed within this unit, select the bed from the list of beds in your unit. To transfer this patient to a bed in another unit, first select the unit name, then select a bed from the list.
- Specify whether to clear the sector (remove the bed from the sector) upon transfer by selecting or clearing the **Clear Sector** check box. The system can be configured so that the check box is selected by default. Depending on your unit practices, you may want to clear the check box so the sector is not cleared and the equipment remains assigned to the sector.
- Select "OK".
- Confirm the transfer by selecting the orange "TRANSFER" button.

To Discharge a Patient: Use one of the following methods to discharge a patient.

- Manually discharge a patient in the **Manage Patient** application.
- Discharge a patient directly from the hospital information system or bed management system.

Considerations

Before discharging a patient, note the following:

- Discharging the patient at the Information Center also discharges the patient from the bedside monitor. All monitor and MMS settings (including arrhythmia settings) reset to their defaults.
- When you discharge a patient, the Information Center saves the patient data for all admitted patients. The system stores seven days of data and purges the stored data seven days after discharge.

You can search discharged patient data without readmitting for up to seven days.

- If you readmit a patient, the discharge data is overwritten by new monitoring data as it occurs, and you will only see the full disclosure amount of data.
- Monitoring devices may be set up with predefined configurations called *profiles*. When you discharge a patient, the profile reverts to the default profile configured for the device. Refer to your monitoring device documentation for details. When

you discharge an admitted patient at the Patient Monitor, the Information Center discharges the patient and saves the data.

- *Important* — For MRx monitors, turning off the bedside monitor for more than 10 seconds discharges the patient at the MRx monitor and resets defaults, but it does not discharge the patient from the Information Center; the patient is still admitted at the Information Center. It is important to discharge the patient before turning the monitor off to avoid data being associated with the wrong patient.
- Patients that are discharged while the Information Center is in Local/Disconnected mode will be synchronized upon connection to the primary server.

Warning

Read all confirmation messages and check patient alarms, settings, and paced status when automatic admission, discharge, or transfer is complete.

Measuring ECG:

The electrocardiogram (ECG) measures the electrical activity of the heart and displays it on the

Information Center as a waveform and a numeric. In order to compare measured ECG signals, the electrodes are placed in standardized positions, forming "leads". To obtain ECG signals optimized for use in diagnosis and patient management in different care environments, different lead placements can be used.

Selecting the Primary and Secondary ECG Leads

The telemetry device or patient monitor uses the primary and secondary lead selected at the

Information Center to compute HR and to analyze and detect cardiac arrhythmias.

You should choose a primary and (if using multi-lead monitoring) secondary lead that have the

following characteristics:

- the QRS complex should be either completely above or below the baseline and it should not be biphasic
- the QRS complex should be tall and narrow
- the T-wave should be less than 1/3 the R-wave height
- the P-wave should be less than 1/5 the R-wave height

Documenting Patient Events

Documentation of patient events and procedures is a necessary element of patient care. You can print reports from the PIC iX to paper, electronically via PDF, or both.

Create a Saved Strip

You can create a saved strip with the PIC iX electronic caliper (eCaliper) measurements and comments in any strip tile in Alarm Review, General Review, or specialty review applications.

Note —You must have Full Permission Access to annotate and save a strip to the database.

- Select the strip that you want to annotate.
- Select the Annotate icon. The Saved strip dialog box opens. You can move the dialog box as needed.
- Select a label from the drop-down list to add labels. This field can be customized as needed in Alarm Review.
- Enter text in the second field, up to 30 characters. This value displays in the Comment field for the strip.
- Add eCaliper measurements. Consider changing the wave speed to 50 mm/sec. (Select the speed on the bottom right of the strip, then select a speed from the list.) Click and drag in the strip to and from the desired location in the wave. The measurement is displayed between the vertical lines. In the dialog box, click the measurement label to add the measured value. *Note* — Double-click the measurement to see the caliper bars at any time.
- Select another strip and repeat these steps as needed.
- When you are done, select Save. The measurements are saved to the strip.

Reviewing ECG Waves

Depending on the number of ECG leads and licensing, 3 to 12 waves are available for review. These waves can be reviewed with the other data tiles, such as with events and alarms.

Alarms:

Quickly Viewing Target Events - When reviewing patient data, it is often helpful to quickly view specific types of alarms or events.

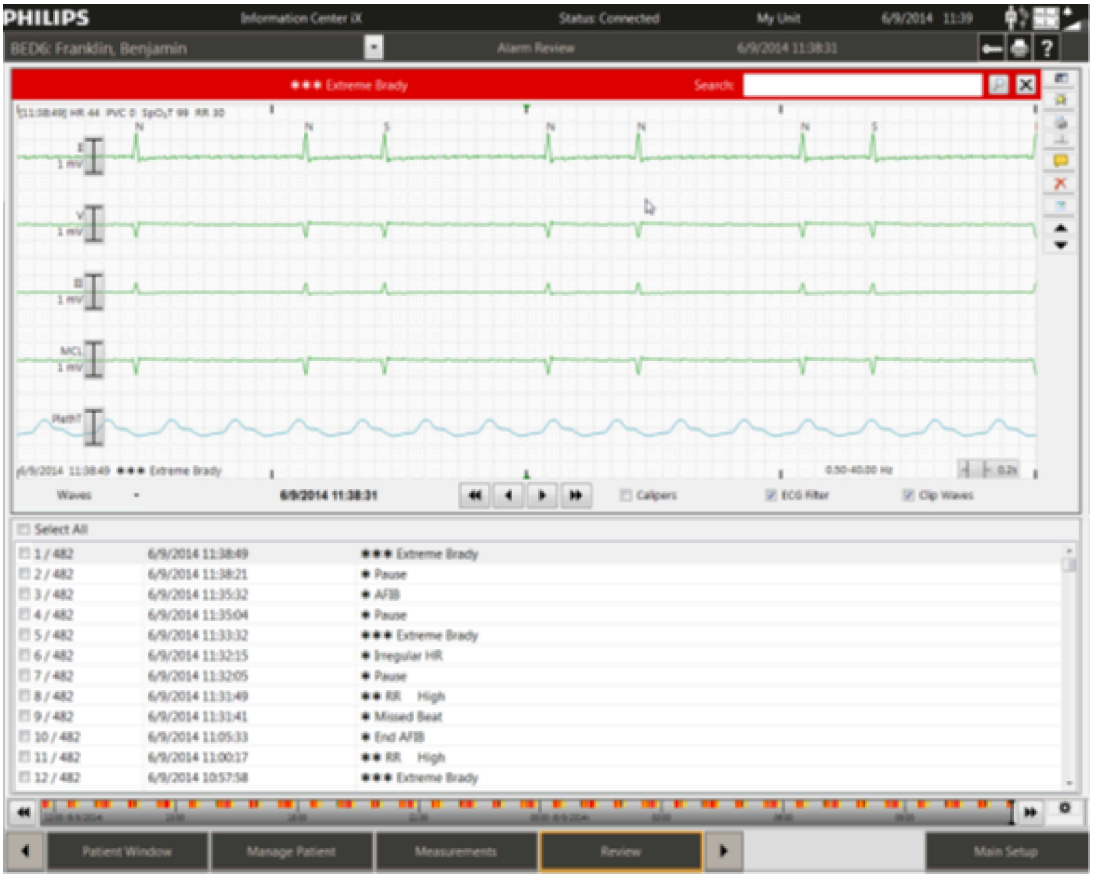
Fast Alarm Review - Select either the Acknowledge key, or the alarm banner in the sector to see alarming waves prior to being available in other applications. Alarm strips can be printed, annotated, or discarded. If you are using secondary notifications, such as with Philips CareEvent, you can manually page an alarm from this application.

Note — The Silence key is called the Acknowledge key.

Alarm Review

Alarm Review always opens with the most recent alarm strip. To review alarms, open Alarm Review from the Review sector button, if configured, or you can open Alarm Review from the main Setup menu or from the Review application menu in any open application. Use the toggle icon to switch between the three different tiles. The tile you prefer can be set up as a default on each host.

- **Tabular** tile – shows a detailed strip with multiple waves and a tabular list of alarms. Use the up and down arrow keys to quickly view alarm strips. This is the factory default tile.
- **Compressed** tile – shows 30 seconds of compressed waves for all strips.
- **Strip Window** tile – a combination of Compressed and Strip tiles.



Reviewing Alarms and Events in Other Applications

Within the factory default review applications (as well as custom applications that were created for your unit), there is a data type called the Event tile. You can use the Event tile to review alarms with other associated data, such as compressed wave storage or graphical trends. Arrhythmia events are also shown, even when a specific alarm is off, such as for yellow level ventricular alarms. The length of the colored box indicates the duration of the event.

- Open the review application. If opened from Alarm Review, the time focus is the selected alarm. If opened from another application, it opens at the current time minus the one minute for storage.
- The Event tile is highlighted below. Note the displayed number of events shown on the right. Alarms are shown with the corresponding color, and arrhythmia events are shown in cyan.

- Clear the check box next to the events you do not want to see. If licensed, specific events can be customized for each review application.
- Move the cursor over any alarm or event to see text that contains the details.
- Select the event to examine its associated waves, trends, and numerics.
- Use the arrow keys in the middle of the tile to quickly navigate to next or previous events.

 Alarms off. Displays next to the numeric when alarms are turned off for the numeric.

 Pause Alarms (Red and/or yellow). **PRESS THIS BUTTON AGAIN TO RESUME ALARMS!**

 Acknowledge/Review Button. Turns off the alarm sound and the sector background changes from blue to black.

 Volume icon. Select to adjust the alarm volume.

Physiological alarms are red and yellow alarms. A red alarm indicates a high priority patient alarm such as a potentially life-threatening situation (for example, asystole). A yellow alarm indicates a lower priority physiological alarm (for example, a respiration alarm limit violation). Additionally, there are short yellow alarms, most of which are specific to arrhythmia-related patient conditions (for example, ventricular bigeminy). Alarm message areas. All active alarms and technical alarms/INOPs display on the top right of the patient sector. A RED warning alerts you to a potential serious outcome, adverse event or safety hazard. Failure to observe a warning may result in death or serious injury to the user or patient. A YELLOW caution alerts you to where special care is necessary for the safe and effective use of the

product. Failure to observe a caution may result in minor or moderate personal injury or damage to the product or other property, and possibly in a remote risk of more serious injury. Technical alarms, or INOPs indicate that the monitoring device cannot measure or detect alarm conditions reliably. If a technical alarm interrupts monitoring and alarm detection (for example, LEADS OFF), the numeric is replaced by a question mark in the sector and Patient Window, and an audible indicator sounds. Technical alarms without this audible indicator indicate that there may be a problem with the reliability of the data, but that monitoring is not interrupted. Most technical alarms are light blue, however there are a small number of technical alarms that are always yellow or red to indicate a severity corresponding to red and yellow alarms.

There can be only one alarm sound annunciating at the Information Center at one time.

- If there is an unacknowledged red level alarm in the presence of any other level alarm, the sound for the red alarm annunciates.
- If there is no unacknowledged red level alarm condition and there is an unacknowledged long yellow alarm in the presence of any other yellow technical alarm (acknowledged or unacknowledged) the sound for the long yellow alarm annunciates.
- If there is no unacknowledged red level alarm or long yellow level alarm condition and there is an arrhythmia or nurse call event, the short yellow (*) alarm sound annunciates.
- If there are no unacknowledged red or long/short yellow alarm conditions and there is any bed with an unacknowledged technical alarm condition, the sound for the technical alarm annunciates.
- If multiple sectors are in alarm, once the highest level alarm is acknowledged in a sector the next highest alarm annunciates.
- An alarm tone indicates the alarm type. There is no sound for soft INOPs/technical alarms.

Other Buttons and Icons:

 **Battery icon.** If there is at least one battery-operated device assigned to this patient, the battery icon indicates the device with the least amount of battery strength. Move your cursor over the icon to view a list of equipment for this patient sorted from the lowest to highest battery charge. The battery icon has five levels: approximately 100% to 80%, 80% to 60%, 60% to 40%,40% to 20%, or -Replace Battery strength. The number of segments indicates the approximate power level.

 **Help icon**. Select to view the online Help application. The Help application is always available and provides context-specific information on using the Information Center applications.

 **Manage Patient icon**. Available in sectors not currently monitoring a patient. Select the icon to access the **Manage Patient** application where you can assign a monitoring device.

The Measurements Button: Provides access to the **Measurements** application, which allows you to:

- Change alarm limits for a patient.
- Turn specific alarms on or off for a patient.
- Adjust measurement settings within a profile.
- Set up telemetry devices.
- Designate which alarms will generate a recording or report or initiate a page.
- View or print an Alarm Summary.
- Configure criteria to trigger alarm advisor notifications.
- View active notifications.

Your choices in the application depend on how your unit is set up and the equipment assigned to the patient.

Paced Mode icon. Indicates the patient's current paced status.

-  On – The icon is white when **Paced Mode** is turned on.
-  Off – The icon is green with an X over it when **Paced Mode** is turned off.
-  Unconfirmed – A red question mark displays over the icon when the patient's paced mode is unknown or in conflict.

The pacer spike color is always white unless the ECG wave is white. If the ECG wave is white, then the pacer spike color is green. Pacer spikes may be configured to display with fixed amplitude for increased visibility.

Important — If **Paced Mode** is set to **Unconfirmed**, the ST/AR algorithm acts as though **Paced mode** is turned on. Select the icon to display a menu where you can turn **Paced Mode** on or off.

Warning - If the patient has a pacemaker, **Paced Mode** must be turned on, enabling the ST/AR algorithm to detect and reject pace pulses (spikes) from the HR count. Otherwise, pace pulses could be detected as beats and the monitor may not alarm for an asystole condition. If the patient does not have a pacemaker, turn **Paced Mode** off to allow the ST/AR algorithm to work most effectively.

 **Print/record Icon**. Depending on your system setup, select this icon to do the following:

- **Record All** — make a delayed recording for all sectors that currently have patient data.
- **Print All** — print a strip for all patients in the unit.
- **Save Strips —** create saved strips for all patients in the unit.

If you select this icon, a message asks you to confirm that you want to proceed with the action. Select **Yes** to confirm. Your system may be set up to just record, record and save a strip, or to just save a delayed strip.

Resuscitation Status Icons:

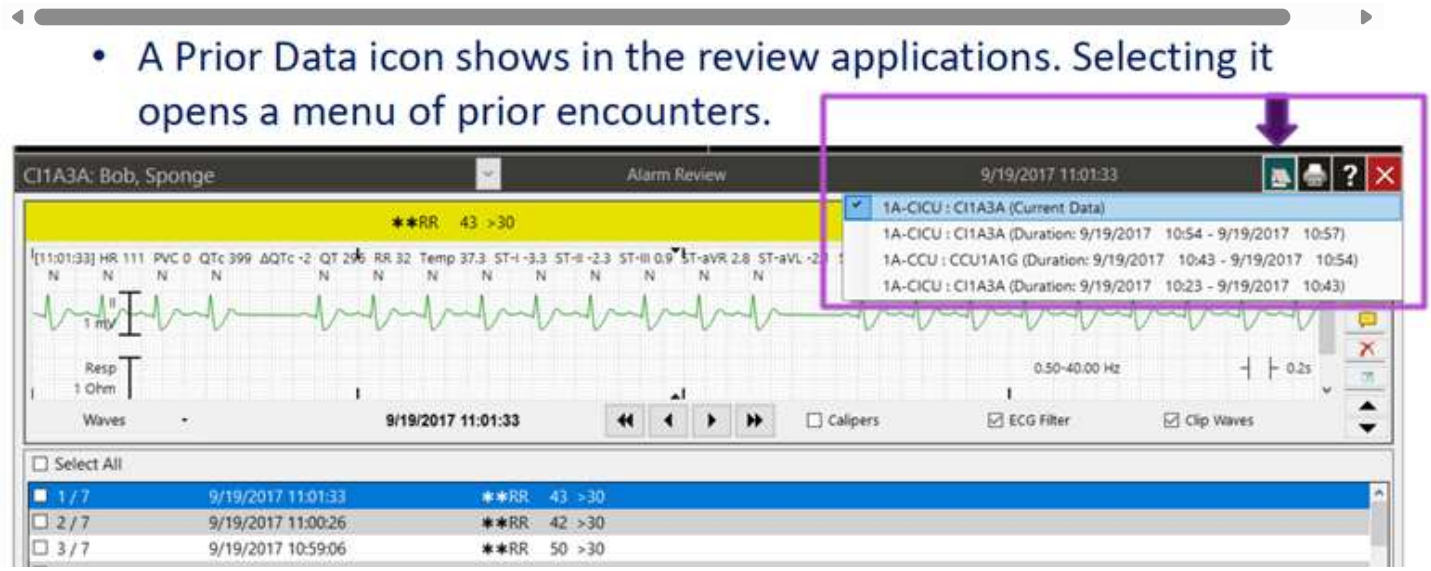
 Do Not Resuscitate. Resuscitation icon. Indicates the patient's current resuscitation status.

 Modified. The icon is solid white when the patient's resuscitation status is set to **DNR** (Do Not Resuscitate). The icon is a white outline when the patient's status is set to **Modified**. The icon does not display if the patient's resuscitation status is set to **Full**. Select the icon to access the **Manage Patient** application where you can change the resuscitation status.

<u>Prior Data:</u>

Patient data can be stored up to 7 days for each patient of Retrospective Review at Central Station. Data stored upon discharge, or from another unit with a transfer, will be shown separately from current data.

« SCROLL »



Once you are into this window –

- The Information Bar at the top turns teal green (states 'Prior Data')
- The only smart key on the bottom task bar will be 'Review'
- Main Screen button becomes 'Current Unit'
- To close the application, use the red X in the upper right or choose the Current Unit button

« SCROLL »

References:

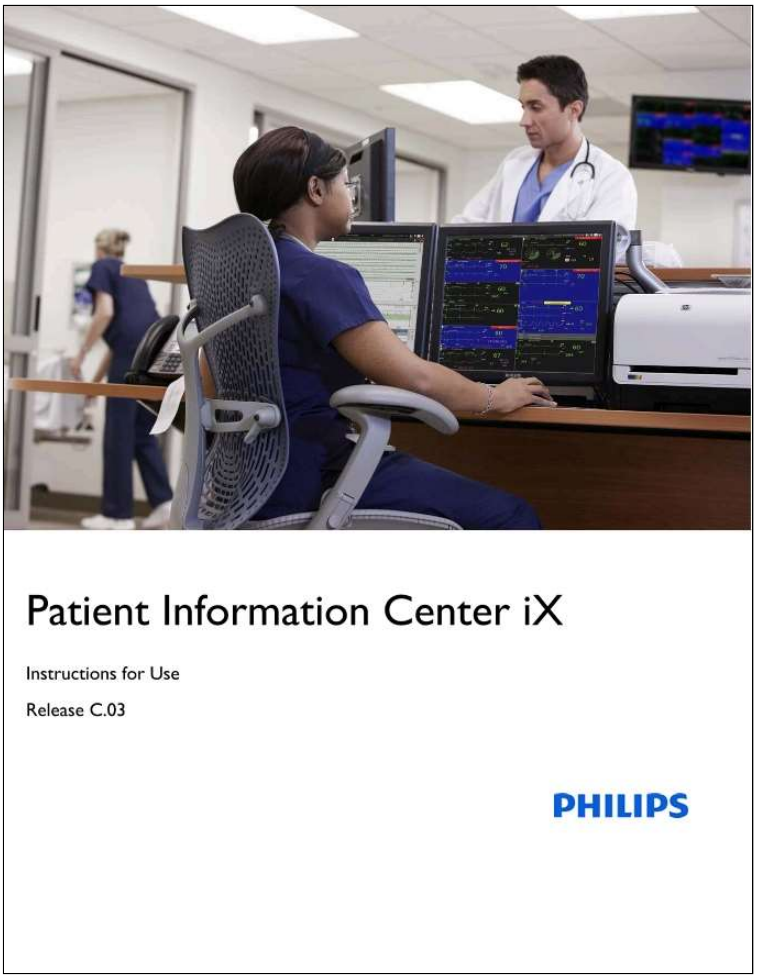
- MX Series QR Codes
- Central Monitoring Station PICiX
  - IFU_-_PIC_iX_Rel_C.03_-_English.pdf- Central station user manual
  - PIICiX Rev C.03 Patient Data Review
- MX40 Telemetry box
  - the MX40 IFU manual link
  - the MX40 quick card reference
- MX400 Large Mounted Monitor
  - IFU MX400-800_IVPM_N0x)Mar2019.pdf User manual
- Invasive pressure Guide
  - Invasive Pressure PDF
- Capnography
  - Capnography Application Guide

Notes

MX Series QR Codes

View image in PDF format.

Philips Monitoring System Manual



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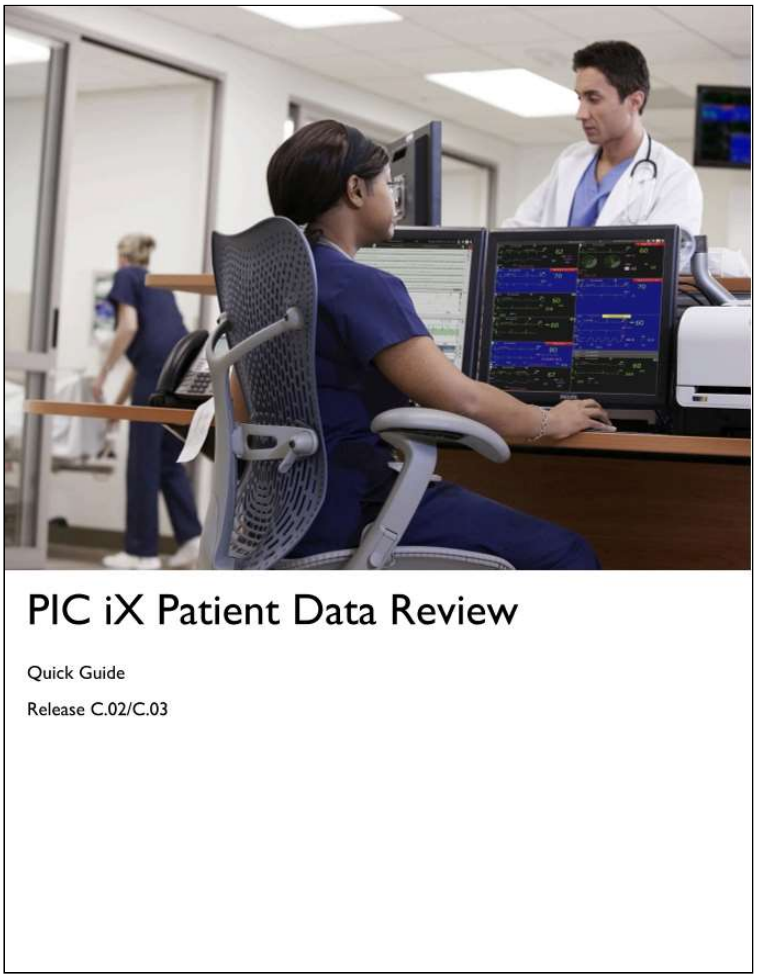

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Car Seat Quick Guide

Car Seat Assessment Record (CAR)
Quick Guide

1. Place baby in car seat.
2. Change Screen to **CAR SEAT TEST.**

3. Touch SmartKey – **START CAR.**
4. Select amount of time for Test Duration *(based on hospital protocol)*.

5. Touch **CONFIRM** key.

CAR is now in progress
Monitoring is continued during CAR.

6. If at any time during CAR you need to exit or stop – press the SmartKey **STOP CAR** and **CONFIRM**.

   At any time you can also switch back to your default monitoring screen by touching **Change Screen**, then touch the back arrow at the top of that menu. *CAR will continue to run in the back ground.*

7. When CAR is complete, the countdown timer (to the far right in the CAR Screen) will turn **RED**.

View image in PDF format.

Status Active PolicyStat ID 19532096

MUNSON MEDICAL CENTER
MUNSON HEALTHCARE

Origination	5/4/2020
Last Approved	12/22/2025
Effective	12/22/2025
Last Revised	6/30/2025
Next Review	12/21/2028
Owner	Marissa Loud: Resource Clinician
Area/ Department	Women & Children Services
Applicability	MMC

Ventilator-Associated Pneumonia Prevention Bundle Guidelines

Purpose

To provide evidence-based guidelines and practices which have been tailored to the Munson Medial Center (MMC) Neonatal Intensive Care Unit (NICU), to reduce the rate of ventilator-associated pneumonia (VAP) in the neonatal population.

Definitions

1. **Bundle:** The combination of multiple sources of evidence-based practices that, when applied as a single intervention (ie, the bundle), may result in an improvement that is greater than single evidence based practices.
2. **Circuit**: The tubing that connects the ventilator to the patient, as well as any devices that might be connected to the circuit. The most common devices include heaters and humidifiers, filters, suction catheters, and nebulizers.
3. **Closed (in-line) Suction Catheter (Ballard)**: A suction catheter that is enclosed inside a sterile sleeve.
4. **Endotracheal Tube (ETT):** A small plastic tube inserted into the trachea of a patient through their mouth or nose to maintain an unobstructed passageway to provide respiratory support, and to deliver oxygen or anesthesia to the lungs.
5. **Tracheostomy (Trach):** the surgical formation of an opening into the trachea through the neck especially to allow the passage of air.
6. **Ventilator-Associated Pneumonia (VAP):** Centers for Disease Control and Prevention (CDC) defines VAP as an episode of pneumonia in a patient who requires a device to assist or control respiration through an endotracheal tube or tracheostomy within 48 hours before the onset of infection.

7. **Ventilator (Vent)**: A device used to assist or control respiration inclusive of the weaning period, through an ETT or trach.

Background

VAP is defined by the CDC and National Healthcare Safety Network as new and persistent radiographic infiltrates and worsening gas exchange in infants who are ventilated for at least 48 hours, and who exhibit at least 3 of the following criteria: temperature instability with no other recognized cause, leukopenia, change in the characteristic of respiratory secretions, respiratory distress, and bradycardia or tachycardia (Azab, 2015). VAP in neonates may be responsible for as much as one-third of the hospital acquired infections in neonates (Garland, 2014). It has a large impact on neonatal morbidity, survival, hospital costs and duration of NICU stay (Azab, 2015). Organisms responsible for VAP can originate from endogenous sources (originating from **inside** the body) (Figure 1), or exogenous sources (developing from **outside** the body) (Figure 2), the most common source being healthcare workers' hands and the infants' gastrointestinal tracts (Garland, 2014). Prevention 'bundles' bring together a number of evidence-based practices that, when applied as a single intervention (ie, the bundle), may result in an improvement that is greater than single evidence-based practices (Garland, 2014). See figure 3 for a visual graphic explaining how the bundle impacts the pathogenesis of VAP.

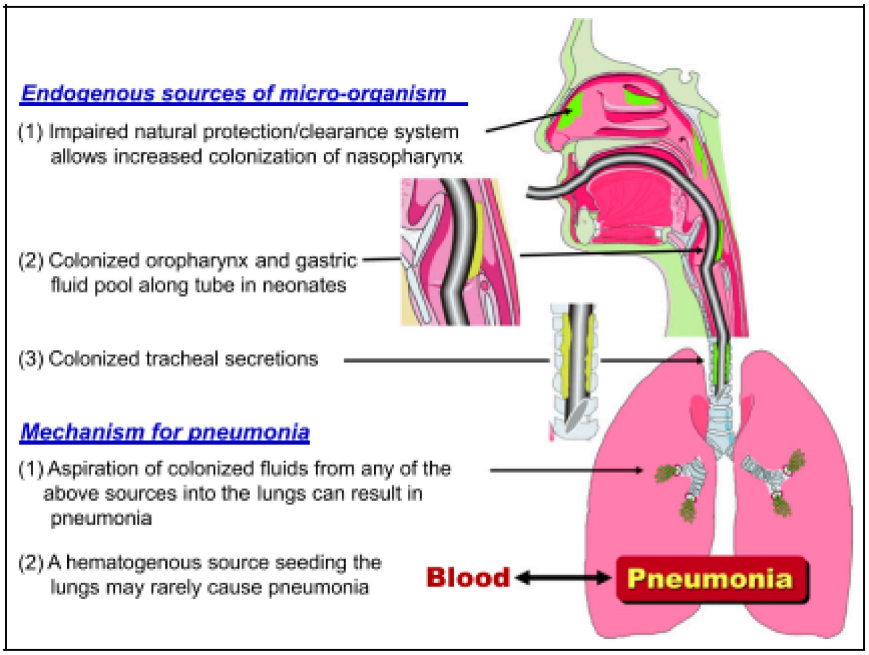

Figure 1. Endogenous sources of organisms responsible for ventilator-associated pneumonia (VAP). (Courtesy of Walt Earhart, Wheaton Franciscan Healthcare. From: NeoreviewsPlus© August 2010, Question 8, by AAP.)

(Garland, 2014)

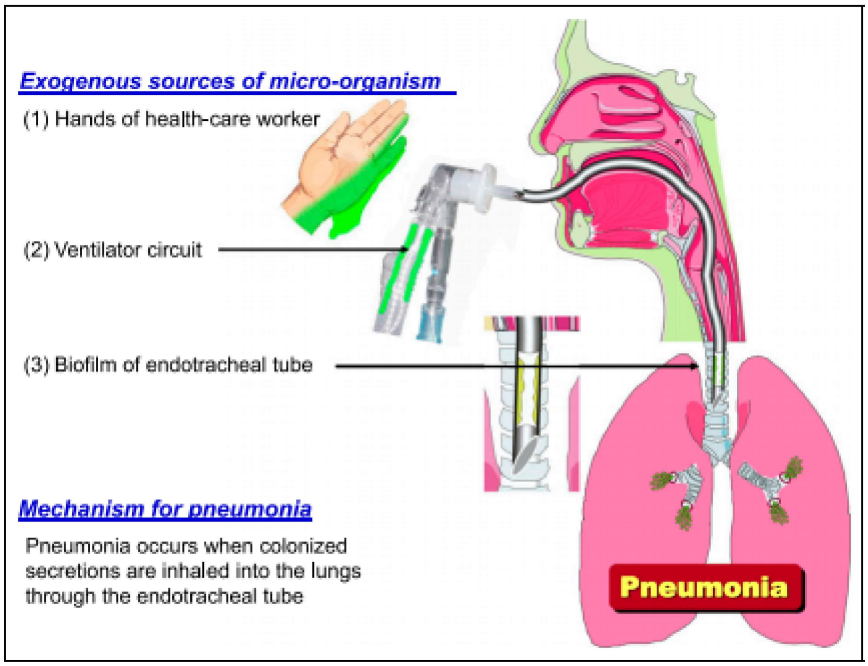

Figure 2. Exogenous sources of organisms responsible for ventilator-associated pneumonia (VAP). (Courtesy of Walt Earhart, Wheaton Franciscan Healthcare. From: NeoreviewsPlus© August 2010, Question 8, by AAP.)

(Garland, 2014)

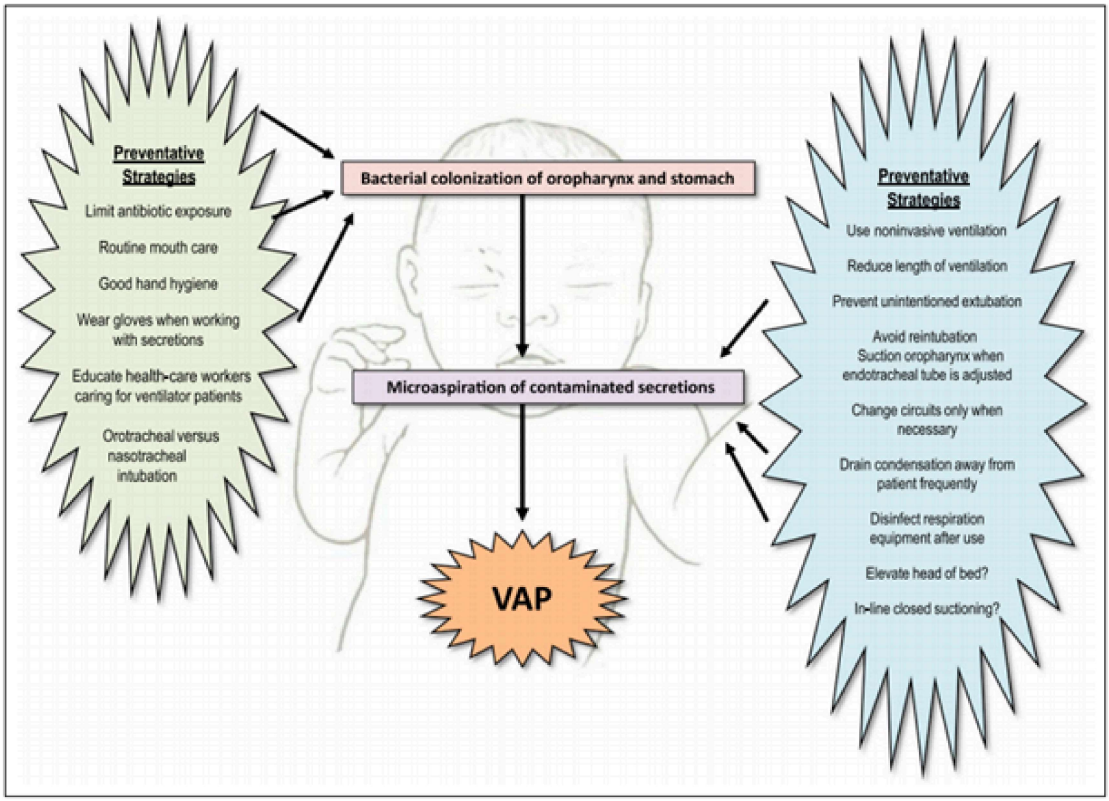

Figure 3. Relationship between preventative measures and pathogenesis of ventilator-associated pneumonia (VAP). (Adapted from Garland JS. Strategies to prevent ventilator-associated pneumonia in neonates. *Clin Perinatol*. 2010;37(3):638. Copyright 2010, with permission from Elsevier.)

(Garland, 2014)

Guidelines

Hand Hygiene

A. All individuals entering the NICU will adhere to the Neonatal Intensive Care Unit Hand Hygiene and Infection Control and the Hand Hygiene policies.

B. Clean gloves will be worn at all times when coming in contact with the patient

    1. Parents and patient visitors are not required to glove for patient contact; however they do need to observe good hand hygiene

C. Shirtsleeves will be pulled up above elbows (the care provider will have bare arms) when providing patient care or entering the patient's bed space

D. Patient care providers will wash-in & wash-out using soap and water, or the hospital provided hand sanitizer before and after donning/removing each pair of gloves

Patient Care

A. Avoid intubation if possible

    1. Discuss the need for continued intubation with the care team/Provider at least daily

2. Take steps to minimize unplanned extubations and reintubations

B. Elevate the head of bed

C. Alternate patient position between prone, supine, and left & right side lying

D. Provide oral care with colostrum/breastmilk/sterile water with routine hands-on care

1. Use a cotton tipped applicator dipped in fresh expressed colostrum; breast milk, or sterile water to coat the lips, buccal mucosa, & gums
    a. A new applicator should be used for each pass
    b. **Take care when providing oral care as this can be a noxious practice and lead to oral aversion if done too vigorously**

E. Utilizing the Neosucker, or a suction catheter, gently suction the oropharynx around the ETT before adjusting it, removing it, or suctioning the ETT.

1. Oral/Nasal suction catheters are single use, and need to be disposed of after use
2. Clear the Neosucker of secretions after use by flushing the device with sterile water
    a. Sterile water is only good for 48 hours after being opened, it needs to be refrigerated, labeled with a patient sticker and includes expiration date and time
3. The Neosucker should be stored in a clean manner using the cover it is packaged with
4. Neosuckers need to be **changed out every 24 hours** and labeled with a patient sticker, including expiration date and time
5. **Take care when providing oropharyngeal suction as this can be a noxious practice and lead to oral aversion**

F. Separate suctioning equipment should be used for tracheal and oral secretions

1. Suction canisters and tubing should be replaced DAILY and as needed (PRN) when full and labeled with a patient sticker, including expiration date and time
2. Suction tubing for ETT and oral use needs to be clearly labeled

G. Employ good antibiotic stewardship practices, as it is well known that extended or recurrent exposure to antibiotics often leads to the colonization of pathogenic, and potentially drug-resistant bacteria

H. Upon intubation a "**VAP Prevention Bundle Bedside Visual**" card should be placed at the bedside

1. Laminated cards are available for use and are located in the patient care file cabinet
2. VAP Prevention Bundle Bedside Visual is included with this guideline as an attachment

Vent Management

A. Assessing for extubation readiness should be done on a daily basis

B. Reintubation after extubation should be avoided if possible

C. Manage patients with as minimal sedation as possible

D. Respiratory tubing:

1. Tubing should be positioned so that **Blue is on Top, and White is on Bottom**.
    a. The Blue tube is the inspiratory line
    b. The White tube is the expiratory line

2. The flow of air in this direction helps to keep the moisture flowing away from the baby.
3. Respiratory tubing should be drained **AWAY** from the patient prior to performing cares and PRN to prevent aspiration of potentially contaminated condensate

E. Circuits do not need routine changing unless they become visibly soiled or they malfunction

1. In-line suctioning will be standard of practice for all intubated patients
    a. In-line suction catheters should be changed **Weekly**, or
        i. PRN when they become clogged
        ii. When the vent circuit is changed
        iii. In-line catheter is damaged (including a hole or tear in the plastic sleeve)
    b. In-line suction catheters will be labeled with day to be changed sticker provided by manufacturer
2. Respiratory Therapists will clean the sensor according to their Policy.
    a. This is not considered opening the circuit
3. Frequency of performing in-line suctioning:
    a. PRN for:
        i. Frequent desaturation
        ii. Deteriorating blood gas values
        iii. Requiring sustained increase in oxygen
        iv. Experiencing acute respiratory distress
        v. Visualization of secretions in the tube

vi. Deteriorating lung sounds

vii. Increasing vent alarms

b. **DO NOT** *ROUTINELY* instill/lavage sterile saline in the ETT in order to clear secretions

4. Change NeoPuff tubing when visibly soiled

Environmental Management

Every Shift

A. Clean high touch patient care surfaces at least once per shift with hospital and manufacturer approved disinfecting wipes, allow to dry per manufacturer's recommendations.

B. The RT will clean high touch surfaces on respiratory equipment at least once per shift with hospital and manufacturer approved disinfecting wipes, allow to dry per manufacturer's recommendations.

C. Equipment:

1. Isolette:

a. Wipe outside surfaces with hospital and manufacturer approved disinfecting wipes and allow to dry per manufacturer recommendations.

i. Hospital and manufacturer approved disinfecting wipes should not be used in close proximity to our patients. Wait until they are out of their bed to clean inside the isolette.

b. While infant is in the isolette, immediately clean any visibly soiled areas and spills with soap and water.

2. Stethoscope will be cleaned at least once per shift.

Every Two Weeks

A. Change out the closed isolette every two weeks if patient condition allows

1. Label with date to be changed

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Attachments

VAP Prevention Bundle Bedside Visual

Approval Signatures

Step Description	Approver	Date
System Policy Oversight Committee	Terri Fries: Document Mgmt Spec	12/22/2025
Interim CNO Patient Care Services	Shari Wilson: President Post-Acute Care	12/22/2025

Document Owner	Marissa Loud: Resource Clinician	12/22/2025

Applicability

Munson Medical Center

Standards

No standards are associated with this document

Status Active PolicyStat ID 17948440

Origination	12/13/2023	Owner	Jennifer Standfest: CNO
Last Approved	6/3/2025	Area/ Department	Nursing
Effective	6/3/2025	Applicability	MMC, Cadillac, Charlevoix, Grayling, Otsego
Last Revised	6/3/2025		
Next Review	6/2/2028		

Cardiac Telemetry Monitoring

Purpose

To enhance patient safety and clinical consistency by outlining continuous cardiac monitoring guidelines, arrhythmia detections and overall alarm management.

Definitions

1. **Cardiac Monitoring/Telemetry Monitoring:** Continuous cardiac rhythm display at the bedside and/or transmitted to a central monitoring console that can provide alarms or print/save rhythm strips.
2. **Telemetry Technician:** Licensed or unlicensed staff member with training and competency in electrocardiogram (ECG) rhythm interpretation.
3. **Telemetry Observer:** An individual assigned to listen for and/or observe specific visual cues with the intention of escalating information to a resource trained to assess and/or intervene in a specific situation.

Policy

A. An order is needed to initiate and discontinue cardiac monitoring. Orders should specify any parameters and any circumstances in which the patient can be temporarily or permanently removed from monitoring.

B. When initiating cardiac monitoring, the following identifiers are used:

   1. 10-digit account number
   2. Last Name, First Name (NOTE: This will automatically pull through ADT feed if 10-digit account number is entered correctly)

C. The Registered Nurse (RN) is responsible to:

1. Initiate and maintain continuous monitoring and to perform initial review and adjustment of settings and alarm parameters.
2. Regularly review and interpret cardiac rhythm and document findings in the chart.
3. Assess need for continued cardiac monitoring daily, using provider orders or protocol, where applicable.
4. Report clinically relevant abnormalities identified on review or by alarm/event review to the provider. Abnormalities include but are not limited to:
    a. Any new dysrhythmia (i.e., tachy or brady arrhythmia exceeding alarm)
    b. Heart block
    c. New atrial fibrillation or flutter or inadequate rate control of these rhythms
    d. Ventricular tachycardia/fibrillation
    e. Supra-ventricular tachycardia
    f. Any symptomatic patient with a dysrhythmia
    g. Any dysrhythmia requiring immediate treatment
5. Initiate code response or other facility specific rapid response protocols or appropriate emergency interventions
6. The RN may delegate tasks to appropriately trained support personnel. These may include, but are not limited to: equipment preparation, skin preparation, electrode application/reapplication, application of monitoring equipment.

D. Where present, telemetry technicians may review and adjust specific settings and alarm parameters and may interpret cardiac rhythms, complete specific documentation, and shall report abnormalities to the RN.

1. The technician will monitor each telemetry unit for ventricular tachycardia, ventricular fibrillation, asystole, tachycardia and bradycardia, low battery and lack of rhythm. The telemetry technician will contact the nurse with findings.
2. A telemetry log may be kept on each unit with pertinent info such as the patient's name, dominant rhythm, assigned nurse and the direct phone number(s) for the assigned care team.

E. A telemetry technician and/or any RN not directly responsible for the patient's care who observes events or responds to alarms at the bedside or central monitoring station will notify the primary nurse of any changes in the patient's condition, monitor settings, or alarm parameters.

F. Where present, telemetry observers are identified 24 hours a day. The telemetry observer may perform other clerical duties that do not remove them from direct view or audio of the monitor. The observer will arrange for another trained observer or nurse to fill the role temporarily if needed for breaks or to perform other job duties away from the area.

G. Any support personnel should consult with/notify the appropriate individual (eg., telemetry observer or technician, RN, etc.) prior to removing a patient from monitoring for showering,

procedures/testing or discharge.

Electrode and Lead Placement, Battery Replacement

A. Electrodes are applied according to Lippincott Procedures - Cardiac monitoring (lww.com) instructions found online. Electrodes shall be changed daily and as needed (PRN) or in accordance with manufacturer recommendations.

B. Lead placement should be confirmed at the beginning of each shift, along with verification the monitor / transmitter is functioning properly and that suitable battery life remains.

C. Battery change should occur minimally when “low battery” signal appears, or with approximately 25% battery life remaining.

Lead Selection

A. Lead II is generally selected as the standard monitoring lead.

B. For a standard 5 lead system, V1 is commonly selected as the second lead. An alternate lead may be selected based on which provides a clearer trace, more prominent or upright waves, or by which a particular area of the heart can be better monitored.

Cleaning

A. Upon discontinuation of telemetry monitoring, the telemetry unit and electrodes are cleaned per manufacturer instructions.

Cardiac Rhythm Waveforms and Documentation

A. A rhythm strip will be measured, interpreted, and documented per the following guidelines:

1. Rhythm interpretation is ongoing and documented as part of the nursing assessment
2. Inpatient care (critical, intermediate, or telemetry care departments) at admission, each shift with initial RN assessment, and with any significant change in rhythm or significant symptoms
3. Emergency Department (ED) at admission and with any life-threatening rhythms or significant changes in patient condition
4. Rhythm waveform documentation should include the name of identified rhythm, heart rate, PR/QRS/QT intervals where applicable, and the name of the RN or Telemetry Technician performing the documentation.

Monitoring Guidelines

A. HR alarms will be set appropriately to the patient's baseline HR, rhythm, clinical condition or treatment plan by an RN or Telemetry Technician.

B. If a monitored patient has a pacemaker, the pacemaker detection function of the cardiac monitor must be turned ON

Refer to Munson Healthcare (MHC) entity specific intravenous (IV) Medication Guidelines and/or consult with pharmacy for information related to risk of prolonged QT interval and for IV medication administration and required monitoring.

C. QT interval monitoring functions of the cardiac monitors may be utilized by the RN/Tele Tech as an adjunct to patient / rhythm assessment. A patient with a baseline prolonged QT or on a medication that has the potential of prolonging the QT interval may have orders for more frequent QT measurements.

D. ST segment monitoring and ST mapping functions of the cardiac monitors may be utilized by the RN/Tele Tech as an adjunct to patient assessment. (Note: some clinical conditions make it difficult to achieve accurate ST monitoring i.e., atrial fib or flutter with an irregular baseline, ventricular pacing, left bundle branch block. Consider turning ST monitoring off in these conditions).

E. Silencing Alarms:

    1. A trained telemetry observer or technician or a registered nurse may silence clearly erratic/false alarms such as those caused by motion or artifact while requesting evaluation by clinical personnel.

    2. A lethal rhythm alarm may be silenced by a Telemetry Technician or RN after the RN evaluates the rhythm and/or patient condition.

Alarm Settings and Clinical Management

A. The Clinical Engineering department has oversight for the testing and maintenance of clinical devices to ensure accurate settings, proper operation, and detectability of alarms.

B. Monitor settings are configured according to manufacturer recommendations to enhance patient safety. A copy of all configuration settings is maintained by the Clinical Engineering department. These settings may only be changed with approval of the Cardiac Monitoring Steering Committee or the Cardiac Monitoring Alarm Committee, with the endorsement of the Clinical Leadership Council.

C. Arrhythmia monitoring will be on and audible for all monitored patients, with the exception of patients who are receiving end of life care, where death is anticipated and an order for comfort care is present.

D. Alarm volume should be set audibly so that nursing staff is able to hear and respond appropriately to non-critical and critical alarms. It is the responsibility of the bedside nurses, the unit coordinator, and other clinical staff to maintain the appropriate alarm volume which decreases noise pollution for patients and visitors, while ensuring prompt staff notification of alarm situations.

E. Select alarm parameters are unlocked and able to be adjusted on an individual basis by the RN, Telemetry Technician, or other licensed clinician within their scope of service.

F. All monitor alarm settings should be adjusted to reflect patient or condition specific values and should be reviewed and adjusted (if indicated) at admission, each shift, and as needed by the RN and/or Telemetry Technician.

    1. The nursing staff member will determine the appropriate response to the alarm; however, the nurse is responsible to confirm findings, verify patterns, and evaluate

interpretations through patient assessment. The response to an alarm may include but is not limited to silencing the alarm, recording the strip, and/or initiating emergency interventions.

2. In the event of a Code Blue or Cardioversion, an event strip will be documented containing the initiation of the event and documentation of changes in rhythm continuing through termination of efforts. As an alternative, a strip from the defibrillator may be used to record the events of the Code Blue.

G. Patient care staff are familiar with alarm settings, policies and procedures.

Transfer/Discharge Procedure

A. At the time of transfer/discharge, the patient MUST be discharged from the bedside and/or central monitoring console, and when applicable, have their encounter be dissociated from the electronic health record (EHR).

B. Refer to manufacturer instructions for use for specific steps to transfer or discharge patient.

Transport Monitoring

A. An RN (or in some cases, a paramedic) shall accompany the patient for transport if the patient is in critical condition, hemodynamically unstable and/or on continuous vasoactive infusions.

B. Other monitored patients transported by unlicensed staff will be monitored remotely by the telemetry technician, telemetry observer, or RN. A portable phone will be assigned and in the possession of the staff member closest to/responsible for the patient at all times. Monitoring staff will use this phone to communicate emergency conditions and request immediate assistance for the patient.

Reference

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Keywords

Cardiac, Telemetry, Monitoring, Tele Tech

Approval Signatures

Step Description	Approver	Date
System Policy Oversight Committee	Terri Fries: Document Mgmt Spec	6/3/2025
CNO Council	Jennifer Standfest: CNO [AM]	6/2/2025

Document Owner	Jennifer Standfest: CNO [AM]	6/2/2025

Applicability

Cadillac Hospital, Charlevoix Hospital, Grayling Hospital, Munson Medical Center, Otsego Memorial Hospital

Standards

No standards are associated with this document

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MUNSON MEDICAL CENTER
MUNSON HEALTHCARE

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Effective	2/21/2025
Last Revised	2/21/2025
Next Review	2/21/2028
Owner	Marissa Loud: Resource Clinician
Area/ Department	Women & Children Services
Applicability	MMC

Central Line - Neonatal Intensive Care Unit

Purpose

To define standards of care for maintenance, utilization, and removal of temporary umbilical inserted central catheters and peripherally inserted central catheters (PICC)

Definitions

1. **Umbilical Inserted Central Catheters:**
    a. **Umbilical Arterial Catheter (UAC) -** A centrally placed vascular infusion device for the purpose of hemodynamic monitoring, blood sampling and for the infusion of intravenous (IV) fluids.
    b. **Umbilical Venous Catheter (UVC) -** A centrally placed vascular infusion device used for short term parenteral therapy, infusion of IV fluids and medications, blood sampling on occasion, and for performing a partial or double-volume exchange transfusion.
2. **Peripherally Inserted Central Catheter (PICC):**
    a. A single or multi-lumen catheter that is inserted percutaneously into a peripheral vein with the tip residing in the lower third of the superior vena cava, to the junction of the superior vena cava and right atrium.
    b. A Neonatal PICC is defined as a catheter that is 1.9 French or smaller.
3. **Peripheral Arterial Line (PAL):** A single lumen IV catheter that is inserted percutaneously into a peripheral artery.
    1. Most common site of PAL placement is the radial artery.
    2. It can also be placed in the posterior tibial artery

4. **Central Line Device Definitions:**
    a. **"Hub" of the central line:** the end of the actual central line where a connection is made to IV tubing.
    b. **Needleless Injection Port (End Cap):** term used to describe a needleless injection port, a device that can be utilized for accessing the line.
    c. **Dead End Cap:** used to cover a central line port, cannot be used for accessing the line (ie: on a transducer)
    d. **Add-on Devices:** single- and multi-lumen extension sets, needleless injection ports, inline filters, and stopcocks.
5. **Central Line Activity Definitions:**
    a. **"Opening" a central line:** A central line is "opened" when any portion of the line or tubing that it is
    connected to it is exposed to air. (see section - Administration Sets: 0.5.12. Maintenance 1. e. or 2. b.)
        i. Mask and sterile gloves are required when a line is opened.
        ii. Example: During an end cap or tubing change when the actual "hub" of the line is open to air.
    b. **"Accessing" a central line:** A central line is "accessed" whenever used for an intervention through
    an End Cap.
        i. The End Cap should be scrubbed thoroughly with a CHG wipe for 5 seconds and allowed to dry for 5 seconds prior to every access. (see section - Administration Sets: 0.5.12. Maintenance 1. f.)
        ii. Examples:
            1. Medication Administration
            2. Flushing/locking
            3. Drawing blood
            4. Changing IV tubing without removing the end cap
6. **Central Line Intervention Definitions:**
    a. **Lock Therapy:** Instilling a fluid into a line to maintain the patency of the line for future use e.g. Heparin or 0.9% sodium chloride.
    b. **Flush:** Administration of a fluid through the catheter to clear the line, such as 0.9% sodium chloride (either manually or with a IV pump).
    c. **Dwell/Instill:** Instillation of a fluid into a line for therapeutic use for a particular period of time.
        i. The fluid must be withdrawn and not pushed through the catheter e.g. reteplase, antibiotics, ethanol.

Policy

Indications for Use

UAC

A. Frequent arterial blood sampling
B. Continuous arterial blood gas monitoring
C. Continuous arterial blood pressure (ABP) monitoring
D. Vascular access for IV fluids when other sites are not available or suitable
E. Exchange transfusion

UVC

A. Emergency administration of drugs
B. Emergency measurement of partial pressure of carbon dioxide (PCO2) and potential hydrogen (pH)
C. Fluid administration
D. Medication administration
E. Exchange transfusion
F. Blood sampling when indicated (discuss with Provider)

PICC

A. Intermediate or long-term IV therapy (greater than 6 days)
B. Parenteral nutrition (especially if anticipated dextrose or osmolality requires central placement)
C. Antibiotic or other medicinal therapy
D. Difficult venous access
E. Irritating drug therapy
F. Very low birthweight infant (less than 1500g)

PAL

A. Need for frequent blood sampling and umbilical artery catheterization cannot be done or UAC has been removed
B. Need for continuous BP monitoring

Contraindications for Use

UAC/UVC

A. Abdominal wall defects
B. Necrotizing enterocolitis (controversial)
C. Vascular compromise below the level of the umbilicus
D. Omphalitis
E. Peritonitis
F. Parental refusal

PICC

A. Active bacteremia or sepsis (controversial). Consider deferring placement for at least 24 to 48 hours after antibiotic dosing is started.
B. Inadequate vessel for cannulation.
C. Anatomic irregularities in infant's extremities or chest that could interfere with proper insertion.
D. Avoid insertion in the right arm of infants with congenital heart defects resulting in decreased blood flow to the subclavian artery.
E. Line placement in a fractured limb.
F. The infant can be adequately treated with peripheral IV access.
G. Parental refusal.

Precautions

UAC/UVC

A. Maintain thermal homeostasis.
B. Monitor heart rate and oxygen saturation throughout the procedure.
C. Maintain aseptic technique.
D. While umbilical lines are in place monitor for secure connections throughout tubing set-up as line dislodgement or disconnection (especially a UAC) could result in exsanguination.
E. While umbilical lines are in place there is increased risk for vasospasm, embolism, thrombosis, and distal ischemia.
    1. Monitor closely, document significant findings, and notify the Provider immediately for any of the following:
        a. Blanching, cyanosis, and mottling of skin
        b. Sloughing of skin

c. Necrosis of extremities, possibly leading to loss of toes
d. Paraplegia
e. Intestinal necrosis and perforation

PICC

A. Assure that parental informed consent for PICC insertion has been obtained per Munson Medical Center (MMC) policy, prior to the procedure.
B. Monitor for bradycardia and hypoxia during procedure.
C. DO NOT measure BP on the extremity containing the PICC.
D. Ensure attention to pain management, developmental care, and thermal homeostasis.
E. Use larger-bore syringes* (greater than or equal to 5 mL) that generate less pressure:
    1. **WARNING**: Only syringes 5 mL or larger are to be used with this catheter. Smaller syringes can generate very high-pressures that may rupture a PICC even if it is not occluded.
    2. It is the bore size of the syringe that is important, not the volume quantity. 5 mL flushes in a 10 mL syringe bore size is appropriate.
    3. ***Exception**: medications received **from Pharmacy** in a less than 5 mL syringe CAN be administered through the PICC line.
        a. The medication should NOT be transfered into a larger syringe.
F. Infuse medication via medication infusion pump; avoid manual “pushes”.
G. Avoid tension on catheter and tubing.
H. Use caution in infants with coagulation disorders.
I. Use caution with high-frequency ventilation as pressure changes within the chest may lead to catheter migration, particularly with upper body insertions.

PAL

A. Avoid areas of skin breakdown or infection.
B. Use caution in infants with coagulpathy, who may bleed excessively.
C. Inadequate collateral artery bloodflow precludes placement in the radial or ulnar artery.
D. Limb malformation.

Register Nurse (RN) Role

Prior to Procedure

A. Assure that parental informed consent for PICC insertion has been obtained per MMC policy, prior to the procedure.
B. For patients less than 32 weeks gestation, or less than 1800 g, remove starter TPN from the

Pyxis refrigerator and warm to room temperature in one of the following manners:

1. Under your arm
2. Wrapped in a warm blanket
3. In an isolette set to 34°C on air mode

C. Gather line placement supplies:

1. Umbilical lines:
    a. 3.5 Fr. catheter for patients weighing less than 1500g; or 5 Fr. catheter for patients weighing greater than 1500g.
    b. Clarify with the provider if they would like a single or double lumen UVC.
    c. Umbilical line tray.
    d. (2) 10 mL syringe of 0.9% Sodium Chloride OR heparinized flush suitable to be placed on a sterile field.
    e. End Cap (enough to accommodate all of the Hubs on the catheter).
    f. Hydrocolloid dressing such as Duoderm.
    g. Umbilical line bridge.
2. PICC lines:
    a. 1.9 Fr. catheter
    b. PICC line insertion tray
    c. (2) 10 mL syringe of 0.9% Sodium Chloride OR heparinized flush suitable to be placed on a sterile field
    d. Stat-Lock
    e. (3) Introducers
    f. End Cap
    g. Clear occlusive dressing (Tegaderm)
3. PAL:
    a. 22-gauge over-the-needle IV catheter
    b. Betadine swabs
    c. Sodium Chloride flush with Heparin
    d. Tegaderm
    e. Tape
    f. Transilluminator (optional)
    g. Appropriately sized, padded arm board
    h. T-connector
    i. Stopcock (for flushing if your fluids are not yet ready to hang once placed)
    j. Transducer (per Provider preference)

k. Buretrol
l. Sterile gloves
m. Sutures (per Provider preference)
n. Pain/development management as appropriate: pacifier, oral sucrose, blankets for swaddling, and eye protection from bright lights

D. Provide prescribed pain medication, as ordered, prior to the initiation of the procedure.
E. Place the patient in a developmentally supportive position.
F. Provide a surface for sterile field; clean with hospital approved wipes and allow to dry as indicated on the container prior to opening supplies.
G. All persons participating in the procedure, with direct patient contact require the following:
    1. To perform a 3 minute scrub from the elbows to the fingertips with CHG soap
    2. Surgical cap
    3. Mask
    4. Sterile gown
    5. Sterile gloves
H. Participate in the 'Time Out' process; initiated by the Provider performing the procedure prior to needle insertion for PICC line placement, or prior to insertion of the umbilical line. (See the Munson Healthcare (MHC) Universal Protocol: For Surgical and Non-Surgical Invasive Procedures policy).

During Procedure

A. Assure that all others in contact with the sterile field have appropriate personal protective equipment (surgical cap, mask, sterile gown and sterile gloves) donned.
B. Monitor infant for procedure tolerance and assist as necessary with the procedure.
C. Speak up if you witness a break in the sterile field.
D. Enter the orders for X-Ray per Provider's verbal order (Excluding PAL placement).

Post Procedure

A. UAC/UVC:
    1. Verify line depth with Provider
    2. Label catheters accordingly
    3. Cut out a piece of hydrocolloid skin barrier, such as Duoderm, and apply it to the umbilical area where the lines will be secured
    4. Coil the lines in a way that the catheter markings can be easily visualized
    5. Secure with either an umbilical line bridge or a coil using the standardized procedure in the attachments

6. Flush catheter every 5 minutes until infusion is started
7. Label the line accordingly
8. Prepare fluid administration set (see section - Administration sets: 0.5.11 Set-up 1. or 2.)
9. Attach the administration and run the fluid as ordered
10. Document accordingly:
    a. Type of catheter
    b. Catheter size
    c. Distance catheter threaded
    d. Assessment of color, pulses, and perfusion to the lower extremities
    e. Patient tolerance
    f. Site: (color, temperature, presence of drainage, bleeding, edema, erythema)
    g. Patency
    h. Complications
    i. Infusion rate and site assessment hourly
    j. Document 'Time Out' (See Universal Protocol: for Surgical and Non-Surgical Invasive Procedures policy)

B. PICC:

1. Verify line depth with Provider
2. Flush catheter every 5 minutes until infusion is started
3. Prepare fluid administration set (see section - Administration Sets 0.5.11 Set-up 2.)
4. Attach the administration set sterilely and run the fluid as ordered
5. Document accordingly:
    a. Type of catheter
    b. Catheter size
    c. Distance catheter threaded
    d. Patient tolerance
    e. Site: (color, temperature, presence of drainage, bleeding, edema, erythema)
    f. Patency
    g. Dressing
    h. Complications
    i. Infusion rate and site assessment
    j. Document 'Time Out' (See *Universal Protocol: for Surgical and Non-Surgical Invasive Procedures* Policy on PolicyStat)

C. PAL:

1. Flush catheter every 5 minutes until infusion is started
2. Prepare fluid administration set (see section - Administration Sets 0.5.11 Set-up 2.)
3. Attach the administration set sterilely and run the fluid as ordered
4. Document accordingly:
    a. Type of catheter
    b. Catheter size
    c. Patient tolerance
    d. Site: (color, temperature, presence of drainage, bleeding, edema, erythema)
    e. Patency
    f. Dressing
    g. Complications
    h. Infusion rate and site assessment
    i. Document 'Time Out' (See the Universal Protocol: for Surgical and Non-Surgical Invasive Procedures policy)

Administration Sets

A. ****A new fluid bag and administration set are REQUIRED to be hung when a new central line is placed. You cannot change over the line from the previous central line to the new central line (Ex. from UVC to PICC)****

Set-up

A. UAC/PAL: ***DO NOT place End Caps on UAC/PAL***

1. Gather the following supplies:
    a. Buretrol administration set
    b. Transducer kit
    c. Heparinized fluid
    d. Sterile gown, gloves (2), cap, surgical mask
    e. Sterile gauze
    f. Add-on devices as needed
    g. Provide a surface for sterile field; clean with hospital approved wipes and allow to dry as indicated on the container prior to opening supplies.
2. Perform hand hygiene
3. Don cap, surgical mask, sterile gown
4. Open sterile glove pack on cleaned surface
5. Open administration supplies and carefully drop on to glove sterile field

6. Don sterile gloves
7. Assemble the administration set sterilely
8. Attach the assembled set to the fluid source(s) - utilize another person to help attach the administration set to the fluid bags in-order to keep both hands sterile. If unable to keep both hands sterile follow the steps outlined below:
    a. One hand will now be your CLEAN hand, and the other hand will remain your STERILE hand
    b. Hang the fluid bag from the IV pole using your CLEAN hand in order to prime the tubing
9. Prime the fluid(s) through the administration set
    a. Use your STERILE hand to adjust the roller clamp on the tubing to prime the fluid from the IV bag through
    b. Use your CLEAN hand to push the plungers of syringes to prime the tubing
10. Once the tubing has been primed completely
    a. Stop the old infusion and clamp the tubing
    b. Load your new tubing into the pump keeping the end on the sterile field
    c. Turn on the air shield and put down the isolette wall (if in an isolette)
11. Remove your contaminated sterile gloves
12. Don new sterile gloves
13. Hold Hub in your CLEAN hand
14. Use sterile gauze to disconnect old IV tubing from Hub
15. Using your STERILE hand clean Hub with CHG wipe for 5 seconds with a 5 second dry time (see section - Administration Sets: 0.5.12. Maintenance 1. f.)
16. Using your STERILE hand connect new IV tubing to Hub
17. Begin infusion of new IV fluids as ordered
18. Zero transducer (see section - Administration Sets: 0.5.12. Maintenance 1. b.)
    a. If using a new transducer set-up be sure to change out the open-yellow port cap with one of the three closed-white port caps that come in the kit when you zero it after connecting it to the patient

B. UVC/PICC:
    1. Gather the following supplies:
        a. Buretrol administration set
        b. Heparinized fluid
        c. End Cap
        d. Sterile gown, gloves (2), cap, surgical mask
        e. Sterile gauze

f. Add-on devices as needed

g. Provide a surface for sterile field; clean with Purple top wipes and allow to dry for 2 minutes prior to opening supplies.

2. Perform hand hygiene
3. Don cap, surgical mask, sterile gown
4. Open sterile glove pack on cleaned surface
5. Open administration supplies and carefully drop on to glove sterile field
6. Don sterile gloves
7. Assemble the administration set sterilely
8. Attach the assembled set to the fluid source(s) - utilize another person to help attach the administration set to the fluid bags in order to keep both hands sterile. If unable to keep both hands sterile follow the steps outlined below:
    a. One hand will now be your CLEAN hand, and the other hand will remain your STERILE hand
    b. Hang the fluid bag from the IV pole using your CLEAN hand in order to prime the tubing
9. Prime the fluid(s) through the administration set
    a. Use your STERILE hand to adjust the roller clamp on the tubing to prime the fluid from the IV bag through
    b. Use your CLEAN hand to push the plungers of syringes to prime the tubing
10. Once the tubing has been primed completely
    a. Stop the old infusion and clamp the tubing
    b. Load your new tubing into the pump keeping the end on the sterile field
    c. Turn on the air shield and put down the isolette wall (if in an isolette)
11. Remove your contaminated sterile gloves
12. Don new sterile gloves
13. Hold End Cap or Hub in your CLEAN hand
14. Use sterile gauze to disconnect old IV tubing from End Cap or Hub (if a Monday)
15. Using your STERILE hand clean End Cap with CHG wipe for 5 seconds with a 5 second dry time (see section - Administration Sets: 0.5.12. Maintenance 1. h.)
16. Using your STERILE hand connect new IV tubing to End Cap or Hub
17. Begin infusion of new IV fluids as ordered

Maintenance

A. UAC/PAL:

1. Parents are **NOT ALLOWED** to hold patient while a UAC/PAL line is in place.

2. Umbilical tape may be left on for up to 24 hours to control bleeding.
    a. Unless there is a lot of oozing, the tape can be loosened once initial coagulation occurs if it needed to be tied snug.
    b. Carefully assess the color and perfusion of the skin around the umbilicus while the tape is in place
    c. Document when the umbilical tape is in place, and when it is removed in the electronic health record (EHR)
3. Zero the arterial line transducer in the monitor after initial insertion, at the start of every shift (every 12 hours), and as needed (PRN) by following these steps:
    a. Turn transducer stopcock OFF to BABY
    b. Remove transducer cap from port completely
    c. Press "zero" on monitor (lower right hand corner)
    d. Wait for Systolic, Diastolic and mean arterial pressure (MAP) to read 0
    e. Secure cap back on port
    f. Return stopcock position as "off" to port
    g. Verify that ABP has a good waveform and reads appropriately
4. Correlate UAC/PAL BP with a Cuff BP once every shift and document accordingly
5. New fluid and administration sets are required as follows:
    a. **Every 96 hours –** Replace administration set
        i. If expiration date of fluid is less than 96 hours change the bag by the time of expiration but the lines may remain following the Blood Transfusion Therapy & Transfusion Reaction policy.
    b. Immediately upon suspected contamination
    c. When the integrity of the product/system has been compromised
    d. When a new central line has been placed
    e. **Every 72 hours -** Replace the disposable transducer and the administration set
    f. **Every 4 hours –** Blood product transfusion administration sets (**requires Provider order to be administered via the UAC**)
6. When changing the administration set
    a. Do NOT clamp silicone UAC directly without any padding between the catheter and the clamp
    b. Fold the UAC in your fingers prior to disconnecting the old tubing to avoid flash back of blood OR place gauze around the catheter and clamp with a Kelly clamp over the gauze
7. Label administration sets with the date it needs to be changed (refer to the Blood Transfusion Therapy & Transfusion Reaction policy).

8. Label administration sets used for medications that are administered via specialized access devices to indicate the correct administration route and device
    a. Place the label near the connection to the device
9. "Scrub the Hub" prior to each time you open the central line by doing the following:
    a. Obtain a Chlorhexidine Gluconate (3.15%) and Isopropyl Alcohol (70%) wipe
    b. Do not unfold wipe
    c. Apply wipe to the hub by holding the wipe between thumb and index finger
    d. Scrub using repeated back-and-forth strokes for 5 seconds
    e. Allow to air dry for 5 seconds (do not blot or wipe dry)
    f. Attach device to hub
10. Utilize the Central Line Maintenance Checklist during each shift that the line is in place (attached as a document to the policy)
11. Trace all catheters/administration sets/add-on devices between the patient and the solution container before connecting or reconnecting any infusion/device, as part of the hand-off process, and at each care transition to a new setting or service.
12. **Troubleshooting PAL**:
    a. A dampened waveform can be recognized by the disappearance of the dicrotic notch (point of closure of the aortic valve). A damped tracing may be caused by:
        i. Air bubbles within the tubing or at the transducer
        ii. A kink in the tubing
    b. Hypotension: Check BP values to help determine whether this is a mechanical or physiological reflection by conducting the following assessment:
        i. Perform manual cuff measurement (cuff or peripheral BP is generally expected to be lower than the central BP but can be greatly affected by the fit of the cuff).
        ii. Assess the infant's clinical condition, looking at:
            a. Color
            b. Capillary refill
            c. Pulses
            d. Temperature of extremities
        iii. Report all findings to the Provider

B. UVC/PICC:

1. Umbilical tape may be left on for up to 24 hours to control bleeding.
    a. Unless there is a lot of oozing, the tape can be loosened once initial

coagulation occurs if it needed to be tied snug.

b. Carefully assess the color and perfusion of the skin around the umbilicus while the tape is in place

c. Document when the umbilical tape is in place, and when it is removed in the EHR

2. End Caps should be on the end of the catheter at all times, and should only be changed for the following reasons:
    a. Every MONDAY, with administration set change
    b. When used for blood draws (requires conversation with Provider)
    c. If blood is visible in the body of the cap
3. When changing the End Cap
    a. Do NOT clamp silicone catheters directly without any padding between the catheter and the clamp
    b. Fold the catheter in your fingers prior to disconnecting the old tubing to avoid flash back of blood OR place gauze around the catheter and clamp with a Kelly clamp over the gauze
4. New administration sets are required as follows:
    a. **Every 4 hours –** Blood product transfusion administration sets
    b. **Every 24 hours -** Starter TPN; TPN/IL
    c. **Every 96 hours –** Replace the administration set
        i. If expiration date of fluid is less than 96 hrs change the bag by the time of expiration but the lines may remain following the Blood Transfusion Therapy & Transfusion Reaction policy.
5. Label administration sets with the date it needs to be changed
6. Label administration sets used for medications to indicate the correct administration route and device
    a. Place the label near the connection to the device
7. "Scrub the Hub" prior to each time you open or access the central line by doing the following:
    a. Obtain a Chlorhexidine Gluconate (3.15%) and Isopropyl Alcohol (70%) wipe
    b. Do not unfold wipe
    c. Apply wipe to the end cap by holding the wipe between thumb and index finger
    d. Scrub using repeated back-and-forth strokes for 5 seconds
    e. Allow to air dry for 5 seconds (do not blot or wipe dry)
    f. Attach device to end cap

8. Utilize the *Central Line Maintenance Checklist* during each shift that the line is in place (attached as a document to the policy)
9. **Do NOT** measure BP or perform venipuncture on the extremity containing the PICC
10. Trace all catheters/administration sets/add-on devices between the patient and the solution container before connecting or reconnecting any infusion/device, as part of the hand-off process, and at each care transition to a new setting or service
11. For PICC lines:
    a. Use larger-bore syringes (greater than or equal to 5 mL) whenever possible
        i. ***Exception**: medications received **from Pharmacy** in a less than 5 mL syringe CAN be administered through the PICC line.
            a. The medication should NOT be transfered into a larger syringe
    b. Dressing changes are only performed as needed by a Provider when the dressing is:
        i. Loose
        ii. Soiled
        iii. Wet

Documentation

A. UAC/UVC:
    1. Document catheter placement hourly
        a. If the catheter starts to migrate out notify a Provider immediately
        b. **Umbilical lines can NOT be pushed back in due to increased risk of infection**
    2. Document infusion rate of all running fluids, hourly
    3. Umbilical stump assessment with every hands-on care
    4. Assessment of lower extremities during care times, including:
        a. Color
        b. Pulses
        c. Perfusion
        d. Temperature
        e. Edema
        f. Erythema
    5. Notification of the primary care provider of any color or temperature change in the extremity distal to the infusion site or patency issues

B. PICC:

1. Document dressing status hourly
2. Document infusion rate of all running fluids, hourly
3. Document insertion site assessment hourly
4. Document the following with each assessment – extremity:
    a. Color
    b. Pulses
    c. Perfusion
    d. Temperature
    e. Edema
    f. Erythema
5. Document dressing changes
6. Notification of the primary care provider of any color or temperature change in the extremity distal to the infusion site or patency issues

C. PAL:

1. Document catheter placement hourly
    a. If the catheter starts to migrate out notify a Provider immediately
2. Document infusion rate of all running fluids, hourly
3. Document insertion site assessment hourly
4. Assessment of extremity the PAL is in during care times, including:
    a. Color
    b. Pulses
    c. Perfusion
    d. Temperature
    e. Edema
    f. Erythema
5. Notification of the primary care provider of any color or temperature change in the extremity distal to the infusion site or patency issues

Lab Draws

UAC/PAL

A. Gather the following supplies:

1. Syringes of adequate size to contain your sample
2. 2 - Needle-less cannulas
3. Gloves

4. Appropriate specimen containers as ordered
5. Lab labels
6. 2 – bags to send specimen to Lab in tube system
7. Verify patient identification using two patient identifiers before collecting specimen

B. Withdraw specimen for collection:
    1. Prep port with CHG wipe for 5 seconds and allow to air dry for 5 seconds
    2. Draw back blood sample with attached syringe until blood is to the tip of the reservoir syringe, but NOT in the syringe
    3. Close the one-way anti-backflow stopcock
    4. Using the needle-less system and appropriate syringe, draw sample slowly
    5. Open stopcock and slowly flush line with in-line flush solution

C. Ensure proper flow of IV fluid has resumed

D. Transfer blood samples into appropriate lab tubes (See the LAB GEN: Laboratory Specimen Labeling Policy).
    1. Apply patient labels
    2. Document date and time drawn
    3. Amount of oxygen if applicable
    4. Indicate to Lab that this specimen was drawn from a heparinized line (prothrombin time [PT]/partial thromboplastin time [PTT]/international normalized ratio [INR])
    5. Specimen source (blood cultures)

UVC/PICC

A. Gather the following supplies:
    1. Syringes of adequate size to contain your sample
    2. Gloves
    3. Appropriate specimen containers as ordered
    4. Lab labels
    5. 2 – bags to send specimen to Lab in tube system
    6. Verify patient identification using two patient identifiers before collecting specimen

B. Have Provider withdraw specimen for collection

C. Transfer blood samples into appropriate lab tubes (See the LAB GEN: Laboratory Specimen Labeling Policy)
    1. Apply patient labels
    2. Document date and time drawn
    3. Amount of oxygen if applicable

4. Indicate to Lab that this specimen was drawn from a heparinized line (PT/PTT/INR)
5. Specimen source (blood cultures)

Catheter Removal Procedure

UAC

A. Verify the order to remove the catheter
B. Verify placement depth by centimeter markings on catheter before removal
C. Gather the following supplies:
    1. Suture removal kit
    2. Gauze
D. Carefully remove suture
E. Withdraw catheter to 5cm mark
F. Stop infusion and wait 2 minutes – the artery will spasm and close
G. Withdraw catheter at a rate of 1cm/minute
    1. With each pull the artery will continue to spasm
    2. If pulsations are present delay withdrawal until they stop
H. Have gauze ready upon removal of catheter tip
    1. If bleeding occurs apply manual pressure with sterile gauze or use umbilical tape for 3-5 minutes until bleeding stops
I. Check catheter to ensure it has been completely removed intact
J. A small amount of oozing may occur after catheter removal
    1. Monitor until it stops
    2. Notify Provider if oozing continues, consider ordering Surgicel to help stop the bleeding

UVC

A. Verify the order to remove the catheter
B. Verify placement depth by centimeter markings on catheter before removal
C. Gather the following supplies:
    1. Suture removal kit
    2. Gauze
D. Do NOT stop the infusion – that would predispose to thrombus formation
E. Carefully remove suture
F. Remove catheter by slow continuous withdrawal

1. If bleeding occurs apply manual pressure with sterile gauze or use umbilical tape for 3-5 minutes until bleeding stops

G. A small amount of oozing may occur after catheter removal
    1. Monitor until it stops
    2. Notify Provider if oozing continues, consider ordering Surgicel to help stop the bleeding

PICC

A. Verify the order to remove the catheter
B. Gather the following supplies:
    1. Measuring tape
    2. Transparent dressing
    3. Nonsterile gloves
    4. Sterile Gauze
C. Perform hand hygiene and don gloves
D. Remove dressing carefully to avoid skin trauma
    1. You may utilize silicone based adhesive remover
E. Change gloves
F. Cleanse insertion site with povidone-iodine and allow to air dry
G. Slowly and carefully retract catheter 1 cm at a time
    1. Grasp catheter near the insertion site until the catheter has been removed
    2. Do NOT apply pressure over insertion site during catheter removal
    3. **If resistance is met, DO NOT force catheter**; apply warm compress for 20 - 30 minutes and reattempt
H. Apply sterile gauze over insertion site as withdrawal is completed
I. Continue to apply pressure if needed with gauze until hemostasis is obtained
    1. Once hemostasis is confirmed
        a. Remove antiseptic with sterile saline to prevent skin irritation and breakdown
        b. Cover site with gauze and transparent dressing
    2. Dressing should remain in place for at least 24 hours
J. Measure and inspect removed catheter and compare that distance with the recorded insertion depth
    1. If any part of the catheter has broken off during removal, or the length of the catheter differs from the recorded insertion length, place a tourniquet on the affected

extremity above the insertion site to prevent advancement of the catheter piece into the right atrium.

2. Check for pulses
3. If no pulse, or the extremity is dusky loosen the tourniquet
4. Immediately notify a provider as catheter embolization is an emergency and may require removal via cardiac catheterization or surgery.

PAL

A. Obtain an order from a Provider
B. Assemble the equipment to include:
    1. Sterile gauze (2 × 2)
    2. Sterile gloves
    3. Suture removal set (if sutures are in place)
C. Verify correct infant using two patient identifiers
D. Remove any dressing over the site and sutures, if used
E. Pull the catheter completely out
F. Apply pressure with sterile gauze for 5–10 minutes
G. Observe for bleeding or oozing
    1. If bleeding or oozing occurs, continue to apply pressure and notify the Provider

Documentation

UAC/UVC/PICC/PAL

A. Date
B. Time
C. Site location
D. Measurement of catheter removed in comparison to recorded insertion depth (excluding PAL)
E. Amount of time pressure was applied to site if applicable
F. Condition of extremity upon removal
G. Patient's tolerance of procedure
H. Any complications experienced
I. Complete order for device removal

References

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Attachments

Central Line Maintenance Checklist v1.pdf

HOW TO SECURE UVC AND UAC CATHETERS.pdf

Approval Signatures

Step Description	Approver	Date
System Policy Oversight Committee	Terri Fries: Document Mgmt Spec	2/21/2025
VP and CNO Patient Care Services	Tamara Putney: VP and CNO Patient Care Services	2/19/2025
Mgr Nursing Services	Nicole Matters: Dir Nursing Women & Children's & Acute Care	2/17/2025
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Applicability

Munson Medical Center

Standards

No standards are associated with this document

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MUNSON MEDICAL CENTER
MUNSON HEALTHCARE

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Neonatal Abstinence Syndrome Care of Infants

Purpose

To provide a guide to identify infants who are at risk for Neonatal Abstinence Syndrome (NAS) or Neonatal Opioid Withdrawal Syndrome (NOWS), evaluate infants in a standardized function-based manner, minimize symptoms during hospitalization to decrease pharmacological medication management requirements, and ensure enrollment offered for in-home nursing follow-up post-discharge. This work encompasses a collaborative discharge for a safe home environment and should include partnerships with caregivers as a family-centered approach. This protocol applies to infants greater than or equal to 34 weeks gestation and less than 30 days of age.

Roles & Responsibilities

Obstetrics, Neonatology & Pediatrics

Definition

1. **Caregiver**: can include either parent(s), and/or family members serving as recognized "support" persons to include foster parents.

Policy

A. **Identify infants who are at risk for NAS or NOWS.** Many substances used by a mother while her infant is in-utero may produce withdrawal symptoms in the infant following delivery. These include, but are not limited to: Opiates, antidepressants, antipsychotics, tranquilizers, tobacco, sedatives and other prescribed or illicit drugs and medications. Efforts should be made to screen for substance use prenatally in a standardized manner.

B. **Risk Criteria**: Infants at risk for NAS or NOWS are those born to the following who may have:

1. Reported drug use during pregnancy
2. Had a positive drug screen during pregnancy on admission
3. Are on a medication-assisted treatment plan with a prescribing provider
4. Have taken any medicines that can induce withdrawal
5. Have had limited or absent prenatal care (beginning care at 28 weeks gestation, or less than 4 visits)
6. Have suffered placental abruption
7. Any other provider discretion

C. **Evaluate** infant symptoms in a standardized manner:
    1. The Eat Sleep Console (ESC) Scoring Tool will be used to quantify the severity of NAS symptoms. The ESC tool is based on infant function and comfort rather than reducing signs and symptoms of withdrawal. All infants meeting the risk criteria will be scored within 4-6 hours after birth, then every 3-4 hours thereafter and during care times based on institutional guidelines and infant symptoms, and for a minimum of 48 hrs following complete wean for shorter-acting opioids (oxycodone, codeine). Scoring will take place in the patient room with caregiver involvement whenever possible.
    2. Infants are scored according to behavior during the prior 3-4 hours period. Inter-rater reliability scoring is encouraged whenever possible and during nursing orientation. This can be accomplished with 2 qualified staff assessing the same care time and should reach 80-100% agreeability.

D. **Minimize** Symptoms During Hospitalization:
    1. Three domains (Eat, Sleep, and Console) will be considered when assessing the symptoms of the infant through the 3-4 hour time period:
        a. Each domain is 1 point for a "YES" response.
        b. If infant is unable to meet 1 domain of ESC, informal team huddle (caregiver, nurse) is recommended. Review of non-pharmacologic methods already used will occur and may be increased or reinforced (see scoring tool). If next score is still 1 or higher, work to console again within up to 10 minutes and encourage caregivers to *remain* at the bedside.
        c. When to call the provider: If infant is unable to meet 1 domain over 3 scoring cycles or two or more domains over 2 cycles (1 "YES" in 9 hours or 2 "YES" in 6 hours), formal team huddle is held to include physician, caregivers, nursing support, and social work as available. Consideration of loading dose Morphine to be discussed with the inclusion of the caregiver via phone, meeting, or bedside only if non-pharm methods do not meet need. See medication algorithm attached.
        d. Continue to score every 3-4 hours and wean or increase dose according to algorithm if using pharmacological interventions.
        e. Parents or caregivers will be involved in the scoring process and educated to it following or during the first score for added collaboration at bedside.

2. Criteria for "YES" score per domain:
    a. Eating:
        i. Inability to coordinate feeding within 10 minutes of showing hunger AND/OR is unable to sustain feeding for 10 minutes at breast or with 10mL of finger or bottle feeding. Do not indicate YES if infant may have poor eating due to non-NAS related factors (prematurity, transitional sleepiness or spittiness in first 24 hours of life, or inability to latch due to anatomical matters).
    b. Inability to sleep:
        i. Inability to sleep for 1 hour or more, having first been fed before expectation to sleep. Do not indicate YES during first day of life if infant was exposed to nicotine or SSRIs. Do not include for other non-NAS source of pain such as circumcision care.
    c. Consolation:
        i. Inability to be consoled from crying within 10 minutes.
3. Non-pharmacologic measures include:
    a. Consoling Support Intervention's (CSI) bundle will be utilized as adaptable to meet infant's needs.
        i. Talking to infant slowly and softly
        ii. Gently bringing arms and legs to the center of body
        iii. Facilitating hand to mouth movement
        iv. Holding in 'C' position
        v. Patting with cupped hand
        vi. Rooming-In: one or both caregivers will be encouraged to stay for entire hospitalization if setting allows. All efforts will be made to accommodate rooming-in setting.
        vii. Parental presence: periods of time will be noted on Nurse Assessment Scoring Tool in range of 0-4 and assessed during team huddles.
        viii. Skin-to-skin contact: ensure napping of said parent while another caregiver is holding to decrease chance of falling asleep while holding infant. Provide support to address sleeping with infant in arms at bedside.
        ix. Holding by caregiver/cuddler.
        x. Swaddling with arms and legs in central position.
        xi. Optimal feeding: encourage direct breastfeeding as consolation measure when possible.
        xii. Maintain quiet, low light environment.
        xiii. Non-nutritive sucking.

xiv. Limit visitors to 1-2 at a time (to those who will be quiet and supportive).

xv. Clustering care, allowing for uninterrupted periods of sleep.

E. **Ensure** proper follow-up and safe home environment:

1. All infants who are placed on the NAS pathway should have a Social Services/ Child Protective Services (CPS) consult when applicable according to the requirements of mandated reporting. Social Work should be involved in the patient's case to facilitate when able. Reports can be made by any concerned party. CPS and/or Tribal CPS will have access to the infant when involved.
2. Physical therapy may be initiated inside the hospital or post-discharge.
3. Referral to the MHC Development Assessment Clinic at 6-9 months post discharge if deemed appropriate by provider.
4. Duration of stay per ESC recommendations:
    a. For non-medicated infants, duration of stay for observation will be at minimum 72 hours.
    b. For medicated infants, duration of stay will be minimum of 48 hours *following* total discontinuation of medications AND when parents or caregivers are able to demonstrate ability to feed and console infant.
5. Patient discharge education will be provided related to the risk of re-occurrence of symptoms within 5-7 days requiring physician assessment, especially for pharmacologically treated infants. Support caregivers will receive discharge education including function-based ability to feed and console infant.
6. All infants at risk of withdrawal symptoms should be seen by their primary care provider within 24-48 hours after discharge for management of any ongoing symptoms at discharge from the hospital.

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Attachments

MHC NAS Pharmacologic Management PDF.pdf

Approval Signatures

Step Description	Approver	Date
System Policy Oversight Committee	Terri Fries: Document Mgmt Spec	8/11/2025
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Document Owner	Marissa Loud: Resource Clinician	8/7/2025

Applicability

Charlevoix Hospital, Grayling Hospital, Munson Medical Center, Otsego Memorial Hospital

Standards

No standards are associated with this document