

SIXTH EDITION

Policies, Procedures, and Competencies
for Neonatal Nursing Care

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**National
Association of
Neonatal
Nurses**

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for Neonatal Nursing Care

Editors

Sandra Sundquist Beaman and Susan Bowles



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Preface

Health care continues to evolve at an incredible pace, and never has there been a time when such tremendous emphasis has been placed on improving patient outcomes. There is no setting where this is more evident than the neonatal intensive care unit. Thus, the release of this 6th edition of NANN's *Policies, Procedures, and Competencies for Neonatal Nursing Care* is both extremely timely and relevant.

Quite simply stated, evidence-based practice facilitates best outcomes for patients. However, translation of research into practice can often be a daunting task for bedside care providers. As “the professional voice that shapes neonatal nursing care,” NANN strives to provide the support you need to advance your practice and bring the best outcomes to your vulnerable patients and their families. *Policies, Procedures, and Competencies for Neonatal Nursing Care*, 6th edition, brings forth the most current evidence and best practice recommendations in an easy-to-use format. New content includes cutting-edge guidelines for use of human donor milk, aEEG monitoring, managing neonatal abstinence syndrome, providing peritoneal dialysis, and screening for congenital cardiac defects.

Many thanks to editors Sandy Beaman and Susan Bowles, and their team, for sharing their time and expertise. Tremendous effort has gone into creating this invaluable resource. The policies, procedures, and competencies included in this book were developed through a rigorous process of reviewing and synthesizing the best available evidence and are meant to be paired with clinical decision making, institutional policy, and regulatory requirements to meet individual unit needs. This manual, in a sense, is a “call to action” to take forth this body of evidence and transform your practice at the bedside!

Lori Brittingham, MSN RN CNS ACCNS-N
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Editors' Note

As front-line healthcare providers, neonatal nurses are acutely aware of the vulnerability of their patients. While they are incredibly resilient in many ways, they also are very sensitive and fragile. This increases our responsibility to be aware of and implement appropriately the best research and evidence-based practice (EBP).

We have learned some difficult lessons in applying animal or adult research outcomes to neonates or implementing practices that are not well researched. While neonatal-specific research and quality improvement–based evidence has blossomed over the past several years, many challenges remain. Those challenges include finding the time to review all available literature to find new evidence and research as well as funding and available enrollment for research.

This book's editors and contributors synthesized current neonatal nursing practice knowledge available at the time of this printing. Practices included in this book are based on the most recent literature available to the authors and contributors. Many basic care procedures that are important to include have never been based on research, or the research or evidence has existed for so many years that it would be unethical to do additional investigation in this area. While older references exist for some documents, every attempt was made to find new evidence. We believe that the references that are recorded in this book are the most current information available. We also included as references some well-respected neonatal textbooks with a recent publication date. We found that these texts serve as a review and summarization of current available evidence.

NANN's clinical practice products are a standardized set of recommendations developed through a formal process of review and evidence presentation. Evidence levels are included in these documents to help end users evaluate the strength of the evidence. These products differ from standards in that they are not rigidly applied and followed. In the spirit of EBP, individual (patient/family) preferences and clinical judgment are considered when applying these guideline recommendations. This content has been interspersed throughout the policies, procedures, and competencies within this book. Developmental care and pain assessment and management influence almost every aspect of patient care in the neonatal unit; these topics are woven into the content of each policy and exist separately as guidelines available from NANN. To learn more about NANN's Clinical Practice Products, visit <http://nann.org/education/educational-products/clinical-practice-products>.

Evidence Level Hierarchy

NANN has adopted the following rating system for the hierarchy of evidence¹:

- Level I:** Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs) or evidence-based clinical practice guidelines based on systematic reviews of RCTs
- Level II:** Evidence obtained from at least one well-designed RCT
- Level III:** Evidence obtained from well-designed controlled trials without randomization
- Level IV:** Evidence from well-designed case control and cohort studies
- Level V:** Evidence from systematic reviews of descriptive and qualitative studies
- Level VI:** Evidence from a single descriptive or qualitative study
- Level VII:** Evidence from the opinion of authorities or reports of expert committees

Definitions

Policies are statements that describe a deliberate plan of action to guide decisions and actions to achieve intended outcomes. Policies are instituted to ensure that actions are within the practice of nursing or designed to be achieved according to state practice acts or in alignment with standards of practice. They also may include actions recommended to meet legal requirements, avoid negative effects, or seek benefits.

Procedures are developed to describe technical tasks or processes. Procedures may vary based on specific products or equipment used. Manufacturer recommendations must be incorporated into individual procedures.

Competencies are tools that aid in the validation of necessary skills for clinicians. Competencies break a technical skill or process into critical steps to ensure elements are individually validated. They may be used for orientation or validation of specific new skills or periodic revalidation of high-risk, problem-prone skills.

We hope you find this book useful while developing or renewing your unit's policies, procedures, and competencies. We would like to thank all those who took the time to contribute to the development of this text. Without their knowledge and dedication, the book would not have been possible.

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Additional Web-Based Resources

Agency for Healthcare Research and Quality

www.ahrq.gov

BMJ Best Practice

<https://bestpractice.bmj.com/info/us>

Centre for Evidence-Based Medicine

www.cebm.net

Centre for Health Evidence

www.cche.net

CINAHL Complete

www.ebscohost.com/nursing/products/cinahl-databases/cinahl-complete

A research tool for nursing and allied health professionals

Cochrane Library

www.cochranelibrary.com

Evidence-Based Nursing

www.ebn.bmjournals.com

Essential Evidence Plus

www.essentialevidenceplus.com/index.cfm

A system of filtered, synopsised, evidence-based information with an integrated search engine that enables simultaneous keyword search in multiple databases

Joanna Briggs Institute

<http://joannabriggs.org>

A repository for publications and information for policy makers and health professionals

Johns Hopkins Medicine Center for Evidence-Based Practice

www.hopkinsmedicine.org/evidence-based-practice/ebp_resources.html

National Guideline Clearinghouse

www.ahrq.gov/gam/index.html

Free resource providing latest clinical practice guidelines based on scientific evidence

National Institute for Health and Care Excellence

www.nice.org.uk

Natural Medicines

<https://naturalmedicines.therapeuticresearch.com>

Provides clinical, evidence-based information on dietary supplements; natural medicines; and complementary, alternative, and integrative therapies

PubMed for Nurses

www.nlm.nih.gov/bsd/disted/nurses/cover.html

Provides free access to MEDLINE, the U.S. National Library of Medicine database of indexed citations and abstracts

University of Toronto Libraries: Evidence-Based Practice

<https://guides.library.utoronto.ca/evidencebasedmedicine/EBMResources>

UpToDate

www.uptodate.com/contents/table-of-contents

A point-of-care clinical medicine database, providing coverage of more than 8,500 topics in 17 medical specialties

U.S. National Library of Medicine

www.nlm.nih.gov

VCU Libraries Research Guides

<https://guides.library.vcu.edu/ebpsteps>

Virginia Henderson Global Nursing e-Repository

www.nursingrepository.org

A resource of the Honor Society of Nursing, Sigma Theta Tau International

All websites confirmed active on December 19, 2018

Policies and Procedures

Policy: Admission, Transfer, and Discharge Level I, II, III, and IV Nurseries

I. Purpose: To provide guidelines to facilitate the admission, transfer, and discharge of infants and to define the levels of care according to the functional capability of facilities to provide increasing complexity of care to infants as appropriate to their degree of risk and illness

II. Considerations^{1(Level III)}

A. Level I, basic care

1. Well-newborn nurseries have the staff and equipment to:
 - a. Perform neonatal resuscitation
 - b. Evaluate and provide care for healthy infants
 - c. Stabilize and provide care for infants of 35–37 weeks gestational age
 - d. Stabilize infants who are less than 35 weeks gestational age or who are ill until their transfer to the appropriate level of care

B. Level II, specialty care

1. Special care nurseries have the staff and equipment to:
 - a. Manage infants born at 32 weeks gestational age or later and weighing 1,500 g or more
 - b. Manage convalescing infants after intensive care
 - c. Manage infants with moderate illness with problems that are expected to resolve quickly and are not expected to urgently require a higher level of care
 - d. Manage infants needing mechanical ventilation for less than 24 hours or continuous positive pressure ventilation
 - e. Stabilize and transfer infants born at less than 32 weeks gestational age and less than 1,500 g

C. Level III, subspecialty care

1. Neonatal intensive care units (NICUs) have the staff and equipment to provide continuous life support and comprehensive care for extremely high-risk infants and those with complex and life-threatening illnesses.
 - a. Capable of comprehensive care for infants born at less than 32 weeks' gestational age and weighing less than 1,500 g
 - b. Staffed by readily available pediatric medical subspecialist, pediatric surgical specialist, pediatric anesthesiologist, and pediatric ophthalmologist
 - c. Capable of advanced respiratory support including conventional or high-frequency ventilation and inhaled nitric oxide
 - d. Capable of advanced imaging providing urgent interpretation for computed

tomography, magnetic resonance imaging, and echocardiography

D. Level IV, subspecialty

1. Regional NICUs have the same capabilities as a Level III, with additional capabilities and experience in the care of the most complex and critically ill infants, with the capacity for surgical repair of complex conditions
 - a. Incorporated within an institution capable of surgical intervention for congenital cardiac malformations that necessitate cardiopulmonary bypass with or without extracorporeal membrane oxygenation
 - b. Has pediatric medical subspecialist, pediatric surgical specialist, pediatric anesthesiologist, and pediatric ophthalmologist on site
 - c. Provides transport services and outreach education

E. Whenever possible, delivery of a high-risk neonate will be planned to occur in a facility capable of Level III care. If delivery in a facility with Level I or Level II care cannot be avoided, the infant should be stabilized and transferred to a NICU with the appropriate capabilities.

F. Neonatal resuscitation should be performed according to the guidelines of the American Heart Association and American Academy of Pediatrics Neonatal Resuscitation Program.^{2(Level VII)}

III. Nursing knowledge

- A. Nursing staff should be competent to provide care for the infants who will be cared for in a Level I, II, III, or IV nursery, as appropriate, including stabilization and preparation for transport of the intensive care infant to a higher level of care as needed.
- B. At a minimum, competencies in these areas are required:
 1. Population-specific pain assessment using a multi-dimensional pain assessment tool
 2. Developmentally appropriate supportive care
 3. Prevention of the spread of nosocomial infection
 4. Discharge of the late-preterm and high-risk neonate
 5. Resuscitation in the delivery room

IV. Process^{2(Level VII)}

A. Identification (ID)

1. The infant ID process should begin in the delivery room (DR) with matching bands for the infant, mother, and father (or support person).
2. These identical bands should indicate:

- a. The mother's name and admission number
 - b. The infant's sex
 - c. The date and time of birth
 - d. Other information as specified in hospital policy
3. The birth records and ID bands should be checked and verified for accuracy before the infant leaves the DR.
 4. Both the nurse accompanying the infant and the admitting nurse should check and verify the ID bands and birth record.
 5. ID bands should be verified each time the infant is taken to the mother, if this is done, and at discharge.
 6. If the infant's condition does not allow placement of ID bands, the ID bands should accompany the infant and should be placed on the incubator or warmer to be attached to the infant as soon as possible.
 7. With multiple births, each of the infants should be identified according to birth order (A, B, C) or as identified prenatally.
 8. Infants admitted with the same last name should be designated as "1," "2," "3," etc., or by first name. Other indicators may also be appropriate such as "HIGH ALERT" or "NAME ALERT."
- B. Communication^{2(Level III),3,4(Level VII)}
1. Care of the infant is improved by effective communication of information about the mother and infant to the physician and other healthcare providers.
 2. The physician should document the following information, which also should be available on the medical record that accompanies the infant during any transfer:
 - a. Mother's name; medical record number; blood type; serology result; and rubella, hepatitis B, and HIV status
 - b. History of substance use or high-risk circumstances, such as:
 - 1) Unstable housing
 - 2) Adolescent mother
 - 3) Maternal psychiatric disease
 - 4) History of domestic violence
 - 5) History of previous child abuse
 - c. Maternal illness potentially affecting the pregnancy
 - 1) Chorioamnionitis
 - 2) Maternal medications
 - d. Complications of pregnancy
 - 1) Abnormal fetal growth
 - 2) Fetal anomalies
 - 3) Abnormal results from test of fetal well-being
 - e. Information regarding the delivery
 - 1) Duration of labor
 - 2) Mode of delivery
 - 3) Complications of labor
 - 4) Duration of rupture of amniotic membranes
 - 5) Presence or absence of meconium
 - 6) Need for resuscitation
 - f. Situations in which lactation may be compromised
 - 1) History of breast surgery, trauma, or lactation failure
 - 2) Contraindications due to specific infections or drug use
- C. Admission and observation of the transitioning newborn
1. The infant should be carefully observed during the transition period (the first 4–8 hr after birth).^{1(Level VII)}
 2. If the infant is stable, contact with the mother should be allowed during the transition period.
 3. Within 2 hr of birth, the infant's health status should be evaluated and the infant assessed for risks that may complicate transition to extrauterine life.^{4(Level VII)}
 4. The following should be monitored and documented at least every 30–45 min until the infant's condition has remained stable for 2 to 4 hr:
 - a. Temperature
 - b. Heart and respiratory rate
 - c. Skin color
 - d. Peripheral circulation
 - e. Respiratory effort
 - f. Level of consciousness
 - g. Tone and activity
 5. The infant should be observed for any signs of illness or variations from normal behavior. The healthcare provider should be informed to determine whether the clinical event warrants immediate medical attention. These include infants who demonstrate^{2(Level I)}:
 - a. Temperature instability, persistently (after 2 to 3 hr of age) less than 36.5°C
 - b. Persistent tachypnea, flaring, grunting, and retractions
 - c. Persistent cyanosis or unusual skin color; persistent oxygen saturation less than 90% in room air
 - d. Prolonged need for supplemental oxygen (after 2 or 3 hr of age)
 - e. Episodes of prolonged apnea (more than 20 seconds) and bradycardia (less than 80 beats/min)

- or abnormal cardiac or respiratory rate and rhythm
 - f. Poor capillary refill (more than 3 s) and blood pressure instability
 - g. Unusual neurologic behavior (lethargy, decreased activity with marked and persistent hypotonia, irritability, excessive tremors, jitteriness, or other abnormal movements)
 - h. Excessive oral secretions, drooling, and choking or coughing spells
 - i. Change in activity, including refusal of feedings
 - j. Abdominal distension or bilious vomiting
 - k. Delayed or abnormal stools (more than 24 hr)
 - l. Delayed voiding (more than 12 hr)
 - m. Weight change that is greater than anticipated
- D. Proper procedures regarding admission notes and assessment forms should be followed.^{3,4(Level VII)}
1. Upon admission, the admitting nurse should check the infant's ID bands to ensure that they are properly applied and that the information matches the number on the birth record.
 2. An admission note and admission assessment form should be completed for an infant admitted to any nursery.
 3. An initial assessment should be completed within 30 min and documented within 2 hr of admission.
 4. Vital signs (VS) should be documented at least every 2 hr until they are stable.
 5. Frequency of VS should occur more often with any change in condition or as deemed appropriate according to the infant's status.
 6. Reassessment of VS is an ongoing function of the nurse caring for the infant.
 7. Initial pain assessment should occur on admission and be carried out according to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition.
 8. A plan of care for the infant should be initiated upon admission and completed within 24 hr of admission.
 9. Infant care guidelines are dynamic and should be individualized and updated as the infant's status changes.
- E. Transfer of infant to another level of care^{2(Level VII)}
1. Before transfer, verify that the following requirements are met to ensure the transfer is appropriate:
 - a. A physician or allied health professional (AHP) has accepted the transfer.
 - b. The receiving nursery or hospital has the space and staff to care for the infant.
 - c. The transfer is executed with qualified staff and transport equipment.
 - d. All medical records related to the infant's condition must be sent to the receiving nursery or hospital. These records include:
 - 1) History records related to the infant's medical condition and diagnosis and the results of any diagnostic studies and tests
 - 2) Written consent for transfer to another facility
 - 3) Other records not yet available, which must be sent as soon as possible.
 - e. The nurse should:
 - 1) Prepare the infant for transport
 - 2) Provide a report to the admitting or transporting nurse
 - 3) Confirm the infant's identity from the ID bands with the admitting or transporting nurse
- F. Discharge^{5(Level VI),6,7(Level IV),8(Level III),9,10(Level VII)}
1. The infant is considered ready for discharge if the following have been achieved:
 - a. Sustained pattern of weight gain
 - b. Maintenance of normal body temperature when the infant is fully clothed in an open crib
 - c. Competent feeding by breast or bottle without cardiorespiratory compromise (or assessment of nutritional risks and initiation of dietary modification)
 - d. Sufficiently mature respiratory control
 - e. Administration of immunizations as indicated
 - f. Performance of metabolic screening
 - g. Assessment of hematologic status and initiation of appropriate therapy
 - h. Completion of hearing screening and initiation of appropriate referrals if applicable
 - i. Completion of eye examinations and initiation of appropriate referrals if applicable
 - j. Assessment of neurodevelopment and neurobehavioral status and initiation of appropriate referrals if applicable
 - k. Car seat evaluation if applicable
 - l. Initiation of plans for follow-up monitoring and treatment
 - m. Development of an individualized home care plan
 2. Family and home environment readiness has been established through:
 - a. Identification of primary caregivers and assessment of their ability, availability, and commitment
 - b. Psychosocial assessment for parenting strengths and risks
 - c. Home environmental assessment

- d. Review of available financial resources and financial support
 - e. Demonstration by parents and caregivers of the necessary capabilities to provide all components of care, including:
 - 1) Feeding, including formula preparation if applicable
 - 2) Basic infant care
 - a) Bathing
 - b) Skin, umbilical cord, and genital care
 - c) Temperature measurement
 - d) Dressing
 - e) Comforting
 - 3) Infant cardiopulmonary resuscitation, as indicated
 - 4) Understanding of early signs and symptoms of illness
 - 5) Infant safety precautions
 - a) Safe sleep practices
 - b) Proper use of car seat or car bed
 - 6) Specific safety precautions, if applicable
 - a) Artificial airway
 - b) Feeding tube
 - c) Intestinal stoma
 - d) Infusion pump
 - e) Mechanical or prosthetic devices
 - 7) Administration of medications and understanding of side effects
 - 8) Appropriate technique for special care procedures required, if applicable, for:
 - a) Infusion site or device
 - b) Intestinal stoma
 - c) Healing wounds
 - d) Maintenance of artificial airway
 - e) Suctioning
 - f) Physical therapy
3. Community and healthcare system resources have been identified.
 - a. Identification of pediatrician
 - b. Identification of surgical specialty or pediatric medical subspecialty follow-up and initiation of referrals
 - c. Identification of neurodevelopment follow-up and initiation of referrals
 - d. Identification of subspecialty follow-up and initiation of referrals for infants who have:
 - 1) Bronchopulmonary dysplasia or chronic lung disease or who are on oxygen or medications at home
 - 2) Chromosomal or birth defects
 - 3) Cerebral palsy or identified risk of developmental delay
 - 4) Other conditions necessitating special follow-up
 - e. Arrangements for home nursing visits and parent support as necessary
 - f. Provision of information on breastfeeding support and availability of lactation counselors.
4. The physician or allied health professional completes the discharge order sheet and discharge summary. A written discharge plan, which includes information on diet, medications, and equipment; hearing screening results; vision exam results; and all follow-up appointment recommendations, including identification of a primary care physician or pediatrician with name and phone number, is given to parents or caregivers upon discharge.^{4(Level VII)}
 5. The nurse notifies the parents of discharge if they have not been notified by the physician or AHP. One or both parents should be present or should have signed and witnessed a permit allowing a relative to receive the infant.
 6. The infant's ID bands are cross-checked with the parent or support person. ID (such as a driver's license) is required.
 7. Documentation of discharge should include:
 - a. The name of the person to whom the infant was discharged
 - b. The instructions that were provided
 - c. Confirmation that the instructions were comprehended

Related Documents

Policy: Deliveries, Attendance at

Procedure: Late-Preterm and Early Term Infants, Caring for

Policy: Thermoneutral Environment

Policy: Transport

Competency: Admission to the NICU

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition.

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Procedure: Amplitude-Integrated Electroencephalography Monitoring Level II, III, and IV Nurseries

I. Purpose: To ensure the correct use of bedside amplitude-integrated electroencephalography (aEEG) monitors in the neonatal intensive care unit (NICU) and to outline the appropriate selection of infants for whom this monitoring is used

II. Considerations

A. aEEG (or cerebral function monitoring), a method of electrocortical monitoring in which a time-compressed waveform representing an overall trend in brain activity is generated from raw electroencephalogram (EEG) waveforms,^{1(Level III)} can be used for infants of any age.^{1,2(Level III)}

B. aEEG is particularly valuable when other neuromonitoring is not feasible because of a lack of resources or available personnel at off-peak times of the day. It can be used as a standalone continuous bedside monitor or as an interim assessment tool while waiting for consultations with specialists or as part of other traditional neurodiagnostic examinations.^{1,3(Level III)}

C. aEEG has been demonstrated to correlate well with standard EEG.^{4(Level IV),5(Level III),6(Level IV)} As with standard EEG, the main features that can be identified from aEEG waveforms are^{1,7,8(Level III)}

1. Background: the level of continuous electrical activity of the brain
2. Sleep-wake cycling: the presence, absence, or maturity of cyclic variations in the background that may represent periods of sleep and wakefulness
3. Seizures: the presence and frequency of electrographic seizures
4. Symmetry of electrical voltage between cerebral hemispheres (possible to assess when more than one channel of aEEG is recorded).^{3,7,9(Level III),10(Level IV)}

D. Normative voltage values and descriptions of normal and abnormal aEEG patterns have been well described in the literature for both full-term^{1,2,5,8(Level III)} and preterm infants.^{7,11,12(Level III),13(Level IV)}

E. Clinical use

1. aEEG can be used for infants of any age, with conditions other than hypoxic ischemic encephalopathy, who may present with encephalopathy and suspected seizure activity.^{2,3(Level III),14(Level IV)} aEEG use should not be restricted to full-term infants with neonatal encephalopathy related to events that occurred at or near the time of birth.^{3(Level III)}
2. Conditions for which aEEG may be considered include:
 - a. Meningoencephalitis^{3,14(Level IV),15(Level III)}
 - b. Inborn errors of metabolism^{8,15(Level III)}

c. Electrolyte and glucose disturbances (e.g., hypocalcemia, hypoglycemia)^{15(Level III)}

d. Neonatal abstinence syndrome^{16(Level VI)}

e. Congenital brain malformations or lesions^{15(Level III)}

f. Extracorporeal membrane oxygenation^{17(Level IV)}

g. Severe apnea, especially if repeated^{9(Level III)}

h. After cardiac arrest or open heart surgery^{3,8(Level III)}

III. Equipment

A. Digital aEEG monitor with the following minimum features: one channel of EEG, one channel of aEEG, and impedance tracking

B. Scalp electrodes

C. Skin preparation supplies

D. Head wrap to cover and stabilize the electrodes (optional)

E. Printer (optional)

IV. Nursing knowledge

A. aEEG differs from traditional EEG in the following ways^{1(Level III)}:

1. Electrodes

a. Although aEEG monitors can use traditional EEG electrodes such as reusable metal cups and disks that adhere to the skin with pastes or glues, aEEG monitors typically use disposable electrodes that can be applied quickly by NICU staff.

b. aEEG uses a limited montage of electrodes (three to five electrodes) to record EEG activity from specific regions of the brain.

2. Length of study: aEEG is used to trend brain activity over long periods of time (hours and days). The longer duration of aEEG recordings outweighs the limitations of fewer electrodes.^{3(Level III)}

3. Assessment of the aEEG tracing^{7,18(Level III)}

a. The aEEG waveform is a trend of brain activity.

b. The long-term compressed trend of aEEG is assessed instead of the beat-to-beat activity seen on the standard EEG.

c. aEEG is plotted on a semilogarithmic scale rather than a linear scale, making it more sensitive for assessing changes in the neonate's low-voltage brain activity.

4. Size and portability: Unlike standard EEG, aEEG monitors are small and portable and are designed to reside for long periods at the bedside.

B. To identify changes in the overall trend and pattern of aEEG, a protocol for regular assessment of the aEEG trend should be established.

C. Analysis and recording

1. Recommended frequency is every 3 hr.
2. Assess the upper and lower margins of the aEEG waveform, looking for significant changes such as^{7,12(Level III)}:
 - a. Increases in the upper and lower band margins or narrowing of the bandwidth (can indicate ictal discharges or seizures)
 - b. Gradual drifts to the baseline (can indicate the influence of artifacts)
 - c. Bandwidth narrowing and widening in a cyclic pattern every 20–40 min (may indicate sleep cycles)
 - d. Drastic decrease in both the upper and lower bandwidth margins (may indicate electrodes touching or severe depression of brain activity)

D. Specific clinical uses

1. Hypoxic ischemic encephalopathy (HIE)
 - a. aEEG can be used to determine the severity of brain injury in full-term infants at risk for HIE who present with^{9,20(Level I),21(Level III)}:
 - 1) A history of severe intrapartum distress
 - 2) Clinical evidence of perinatal depression or asphyxia as evidenced by marked acidosis at birth (pH <7.0 or base deficit ≥16) or 5-min Apgar score of 5 or lower
 - b. aEEG has been shown to be predictive of long-term outcome for newborns with HIE and correlates well with Sarnat assessment scores,^{22(Level IV)} standard multichannel EEG studies,^{4(Level III)} and severity of magnetic resonance imaging changes.^{14(Level IV)}
 - c. aEEG tracings recorded within the first 72 hr after birth have been shown to strongly predict long-term neurological outcomes in infants with HIE.^{20(Level I),23,24(Level III),25,26(Level IV)}
2. Therapeutic hypothermia: aEEG may be used continuously to monitor full-term infants with HIE before, during, and after therapeutic hypothermia.
 - a. In the research protocol investigating the efficacy of selective head cooling (SHC) in infants with HIE,^{27(Level II)} a moderately or severely abnormal aEEG recording of at least 20 min was required before SHC was initiated. In clinical practice, this may not be required.
 - b. aEEG is not required before implementing whole-body cooling.^{28(Level II)}
 - c. aEEG can be valuable in trending background brain activity and the recovery of sleep–wake cycling during and after hypothermia and is predictive of long-term neurodevelopmental outcomes in this population.^{3(Level III)}
3. Encephalopathy or other etiology: Encephalopathy may have any number of underlying etiologies during the neonatal period, and aEEG has been

shown to be a useful tool in evaluating infants regardless of etiology.^{5,9,22(Level III)}

4. Seizures

- a. Clinical diagnosis of neonatal seizures is challenging at best. aEEG can be used to confirm the presence of electrographic seizures when infants exhibit abnormal movements that are suspected to be clinical seizure activity.^{8,9,29(Level IV),30(Level III)}
- b. aEEG can be used when clinical evaluation of seizure activity is difficult or impossible because an infant has been chemically paralyzed or deeply sedated or has been given a muscle relaxant.^{8,9,31(Level III)}
- c. aEEG can be used to evaluate the effectiveness of antiepileptic medications in controlling or abolishing electrographic evidence of seizures.^{29,33,32(Level III)}

E. Scalp electrodes^{18(Level III)}

1. The application of scalp electrodes for the purposes of aEEG can be done by any NICU staff member trained in the procedure. It is recommended that this skill be validated annually through a performance-based competency.
2. aEEG electrodes should be applied using the method recommended by the manufacturer.
3. Location of EEG and aEEG electrodes is based on the International 10-20 system for EEG.
 - a. aEEG electrodes can be applied anywhere on the scalp, but the common locations for neonatal monitoring are parietal, central, and frontal.^{1(Level III)}
 - b. If a physician order is required, the order should include the desired location of the electrodes.
4. When the electrodes have been applied to the scalp, the bedside nurse is responsible for ensuring that adequate attachment to the skin is maintained so a high-quality recording is produced.
5. Invasive and noninvasive options and disposable and reusable options for electrodes exist.^{2,9,19(Level III)}
 - a. Single-use options
 - 1) Hydrogel electrodes
 - 2) Subdermal, low-impedance needle electrodes
 - b. Reusable options
 - 1) Metal disks
 - 2) Metal cups
6. Skin preparation supplies
 - a. For hydrogel electrodes
 - 1) Gauze: 2 × 2 or 4 × 4
 - 2) Cotton-tipped applicators
 - 3) Abrasive cream for skin exfoliation
 - 4) Water for cleaning the hair and skin

- 5) Comb or brush
- b. For subdermal needle electrodes
 - 1) Comb or brush
 - 2) Skin antiseptic (preferably use the same products and techniques approved for placing peripheral or scalp intravenous catheters in the NICU)
 - 3) Tape
 - 4) Clear occlusive dressing
- c. For reusable metal cups and disk electrodes
 - 1) Abrasive cream for skin exfoliation
 - 2) Conductive paste
 - 3) Adhesive or glue
 - 4) Tape

V. Process

A. Procedure to implement an aEEG

1. Obtain an order for aEEG monitoring or implementation through a specific protocol.
2. Obtain necessary equipment.
3. Plug the monitor into an alternating current plug with emergency backup power and turn on the aEEG monitor.
4. Follow the monitor's onscreen prompts to start a new assessment and enter patient information if necessary.
5. Assess the infant's scalp for presence of trauma, breakdown, or lesions.
 - a. Avoid these areas if possible by adjusting the electrode location.
 - b. Note that electrode location and spacing can influence the aEEG pattern.
6. Provide an adequate level of anticipatory support to the infant during skin preparation and electrode application. This process can be time consuming and requires additional handling of the infant. These interventions may minimize both pain and stress:
 - a. Swaddling throughout the procedure
 - b. Offer of a pacifier before and during the procedure
 - c. Use of sucrose solutions (if no contraindication exists)
 - d. Administration of pain medication or sedation before the procedure to improve tolerance of the procedure (if medication orders exist)
7. Place or assist in the placement of electrodes in an appropriate location using these steps:
 - a. Determine the location of each electrode on the scalp. It is recommended to use the electrode-siting tools provided by the monitor's manufacturer.

- b. Part the infant's hair at each electrode location to increase scalp exposure and improve skin preparation and electrode attachment.
 - 1) It is recommended that one electrode location be prepared at a time.
 - 2) Shaving the hair is not necessary but can make electrode application much easier.
- c. Prepare the infant's skin for electrode placement.

- 1) For hydrogel electrodes and reusable cup or disk electrodes

- a) Gently exfoliate the infant's skin using your finger, toothbrush, comb, or cotton applicator.
 - i. To achieve an acceptable impedance value, an abrasive cream may be needed.
 - ii. The vigorousness used to prepare the skin should be adjusted according to the infant's age (gestational and chronological), the cleanliness of the scalp and hair, and the infant's overall systemic condition. Note that the younger and less mature the infant and skin, the less exfoliation is needed.
 - iii. Do not use alcohol to prep the skin because it will impair impedance.

- b) Cleanse the hair and scalp well to remove all traces of the abrasive cream before applying the electrodes. The abrasive cream is not conductive and will interfere with sensor attachment.
- c) Re-create the part in the hair if it was disrupted during preparation.

- 2) For subdermal needle:

- a) Cleanse each electrode site with an approved skin antiseptic and if necessary wait the prescribed time before insertion.
 - i. Reverify the desired electrode location.
 - ii. Apply or insert the electrodes.
 - iii. Confirm that the electrodes are well attached to the skin.

8. Connect the electrodes to the monitor.
9. Start recording the assessment when impedance levels are in an acceptable range.
10. Use a head wrap to stabilize the electrodes if necessary.
11. It is recommended to create a safety loop with the electrode wires and secure them to the bed or head wrap to prevent accidental dislodgement or removal of the electrodes during routine care.

- B. During a recording, the NICU nurse is responsible for^{19,34(Level III)}:

1. Assessing the impedance level throughout the recording
 - a. Hourly assessment of the level of impedance will ensure that problems with poor signal are resolved in a timely manner.
 - b. Impedance values should be documented per hospital protocol.
2. Managing and troubleshooting problems with electrodes: If an electrode becomes dislodged or displaced:
 - a. Assess the skin for any evidence of breakdown or trauma.
 - b. Reapply or reinsert the electrodes or notify someone trained in the application technique as soon as possible to minimize any interruption to the recording.
3. Reviewing and reporting changes in the aEEG trend
 - a. The medical team should regularly review the aEEG pattern and voltage trend, typically every 2–3 hr.
 - b. The medical team is responsible for interpreting the aEEG tracing and initiating any medical interventions indicated.
 - c. This review should be documented in the medical record.
- C. Obtain an order to discontinue use of the aEEG monitor.
- D. Gently remove electrodes from the infant's head and discard them if they are not reusable.
- E. Document the infant's skin condition and disposition after aEEG has been discontinued.

VI. Documentation

- A. Use the built-in event-marking function on the aEEG monitor whenever possible to:
 1. Document times of routine care and procedures
 2. Document times of medications given, especially anticonvulsants and sedatives
 3. Record clinical signs of seizures

VII. Family education

- A. The bedside aEEG monitor is not a diagnostic tool but is used in combination with many other assessments and exam results.
- B. aEEG may be used to guide clinical interventions, including administration of medications or requests for additional testing.
- C. aEEG monitoring tracks brain activity over long periods of time and does not require constant attention or review as do other continuous physiologic monitors.
- D. Most aEEG monitors do not have alarms.
- E. Some aEEG monitors are equipped with screensaver applications that can be turned on while parents are at the bedside to minimize distress and attention to the monitor screen.

Related Documents

Procedure: Hypothermia, Induced

Competency: Amplitude Integrated Electroencephalography Monitoring (aEEG)

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Procedure: Arterial Puncture and Cannulation, Peripheral: Use and Care of Peripheral Arterial Line (PAL) Level II, III, and IV Nurseries

I. Purpose: To ensure that proper technique is used during insertion, blood sampling, continuous blood pressure monitoring, and removal of a peripheral arterial line (PAL)

II. Considerations

- A. An order is required to perform an arterial puncture or cannulation.
- B. A PAL may be inserted by the physician, the allied health professional (AHP), or a registered nurse (RN) who has completed competency training per state nursing practice act.
- C. Attempts to obtain an arterial puncture or radial artery line should be limited to *no more than two attempts per practitioner*.^{1(Level VII)}
- D. Arteries preferred for puncture or cannulation are the radial and posterior tibial arteries.^{2(Level VII)}
- E. A minimum of a cap, mask, sterile gloves, and small sterile fenestrated drape should be used during peripheral arterial catheter insertion.^{3(Level II)}
- F. No medications, blood products, or hypotonic or hypertonic solutions should be infused through a PAL. A heparinized saline solution, as ordered, should be infused at 0.5–1 ml/hr to maintain patency.^{4(Level V),5(Level II)}
- G. PALs must be attached to a pressure transducer and maintained at the heart level. The transducer should be calibrated during every shift and as needed.^{6(Level VII)}
- H. The PAL site must be assessed every hour.
 - I. Cuff blood pressure should be checked and documented at least once during every shift.^{6(Level VII)} Cuff pressures should not be measured on the limb with the PAL because it may compromise the PAL.
 - J. The PAL administration set, pressure transducer, and flush solution should be changed every 96 hours.^{1,3(Level VII)}
- K. A closed-flush system should be used to maintain patency.^{3(Level VII),7(Level VI)}
- L. The PAL should be removed at the first indication of clot formation or circulatory compromise.^{3,4(Level VII)} Signs of clot formation or circulatory compromise may include but are not limited to:
 1. A dampened waveform on the blood pressure plethysmograph
 2. Pale or blue color in the extremity distal to the catheter
 3. Inability to withdraw a blood sample from the catheter

III. Equipment needed

Insertion:

- A. Appropriate syringe (no larger than a 3-ml syringe) for blood collection
- B. 25-gauge safety-engineered butterfly with 5/8-inch needle (for arterial puncture) or 22- to 26-gauge intravenous (IV) catheter and T-connector (for cannulation)
- C. Sterile gloves, cap, mask, and a small sterile fenestrated drape^{3(Level VII)}
- D. Skin disinfectant
- E. Sterile saline wipes
- F. Sterile 2 × 2 gauze
- G. 24% sucrose or breast milk
- H. Heparinized fluid for infusion in PAL as ordered
- I. Tape (½ inch and 1 inch) and transparent, semipermeable dressing
- J. Armboard
- K. High-intensity fiberoptic light for transillumination and a sterile cover (optional)
- L. Pressure transducer system

Arterial catheter blood sampling:

- A. Appropriate specimen containers and labels
- B. Needleless connector with Luer lock, if using a stopcock
- C. A closed, needle-free in-line blood sampling system may be considered.

IV. Nursing knowledge

- A. The use of aseptic and sterile techniques, standard precautions, and product sterility practices must be maintained for all invasive procedures, dressing changes, and administration set changes.^{1(Level VII)}
- B. Disinfectants should be evaluated for risks and benefits relative to efficacy, potential for toxicity, and skin irritation.
- C. A neonatal intensive care unit or special care nursery RN who has completed competency training may perform radial or tibial arterial punctures and PAL insertions.

V. Process

- A. Follow standard precautions while performing all steps of the puncture or cannulation unless directed to use sterile precautions.
- B. Verify patient identification before performing procedure.

- C. Provide pain management. Refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition.
- D. Hold the infant's wrist in extension, neither flexed nor hyperextended.
- E. Use the index finger and palpate the infant's wrist for the radial pulse at the distal crease of the wrist or use a transilluminator to locate the artery.
- F. If accessing the tibial artery, hold the foot in a flexed position to palpate the artery or transilluminate to locate the vessel.
- G. Perform an Allen test for the radial artery or modified Allen test for the dorsalis pedis artery, to assess collateral circulation.^{7(Level VII)}
1. Elevate the infant's hand or foot.
 2. Occlude both radial and ulnar arteries at the wrist. Occlude the dorsalis pedis and posterior tibial arteries at the ankle.
 3. Occlude arteries until the hand or foot is blanched.
 4. Release occlusion of the ulnar artery or dorsalis pedis only.
 5. Observe for return of color in less than 10 s, indicating adequate collateral supply.
 6. Do not puncture the radial or tibial artery if color return takes more than 15 s.
- H. Don gloves.
- I. Clean the infant's wrist with disinfectant per manufacturer's recommendation. Allow to dry, then remove the disinfectant with a sterile saline wipe.
- J. Perform arterial puncture.^{2(Level VII)}
1. Grasp both wings of the butterfly needle, penetrate the skin, and then puncture the artery to minimize trauma to the vessel. Inserting at a 15- to 45-degree angle with the tip of the needle bevel up and entering the skin at the first wrist crease is recommended.
 2. Advance the needle slowly to puncture the artery.
 - a. If no blood is obtained before encountering resistance, withdraw the needle cautiously until blood returns. It may be necessary to change the angle of insertion.
 - b. If complete withdrawal from the skin is necessary, the site should be cleansed and a new needle used for the puncture.
 3. When blood return is obtained, collect the specimen.
 4. Quickly withdraw the needle and firmly apply a sterile 2 × 2 gauze pad against the infant's wrist. Hold the gauze in place for 1–3 min.^{7(Level VII)}
 5. Cleanse the site thoroughly with saline or sterile water wipes to remove any remaining disinfectant from the skin.
6. Verify satisfactory peripheral blood flow, checking arterial pulse, capillary refill time, color, and temperature.
 7. Document the infant's response to the procedure and describe the site in nurses' notes. Document any bruising of the extremity at or distal to the selected puncture or insertion site.
- K. Perform the arterial cannulation.^{8(Level VII)}
1. For PAL placement, don cap, mask, and sterile gloves.
 2. Prepare insertion area with a small sterile fenestrated drape.^{5(Level II)}
 3. Using a needle stylet and cannula, puncture the artery at a 10- to 15-degree angle. Once blood return is obtained, advance the cannula while removing the needle stylet.
 4. Firmly attach the cannula to the T-connector. A Luer-lock T-connector is preferred but may cause the cannula to kink, resulting in occlusion of the device. In this case, the T-connector may be a slip-tip connector but should be taped securely to prevent accidental disconnection and blood loss.
 5. Flush the cannula with a small amount of flush solution to ensure proper placement in the artery. Observe for blanching at the site.
 6. Secure the cannula with transparent dressing to allow direct visualization of the site.
 7. Connect to tubing to include the transducer.
 8. Secure the T-connector with tape, cotton balls, and armboard as indicated at the appropriate angle to ensure optimal waveform on the blood pressure transducer.
 9. Ensure digits are available for direct visualization once secured.
 10. Assess the site hourly for appearance, particularly any leakage of blood at the site, blood in the tubing, and color of the extremity distal to the insertion site. Any change in color (pale or blue) should be reported promptly to the physician or AHP. Observe waveform for dampening. If the waveform is dampened, reposition extremity first to restore waveform. Any flushing of the catheter should be done with caution because rapid flushing can lead to arterial spasm.^{8(Level VII)}
- L. Infuse through a PAL.
1. A heparinized solution should be ordered by the physician or AHP to be infused at a keep-open rate (0.5–1 ml/hr).
 2. When the arterial line has been placed and the T-connector has been clamped to prevent back-flow, perform these steps:
 - a. Prepare the solution for infusion using aseptic technique. Flush it through the tubing and stopcock (all ports) to rid the system of air bubbles. All connections must be Luer locks.

- b. Connect the primed stopcock and tubing to the T-connector.
 - c. Ensure that all air has been removed from the system.
 - d. Set the pump to infuse at the prescribed rate.
 - e. Open the stopcock to the infant to allow the infusion to proceed.
 - f. Attach a needleless connector with a Luer lock to the stopcock to maintain a closed system.
3. Observe the T-connector for backflow of blood or presence of air bubbles. Use the sampling port to cautiously flush the connector as necessary.
 4. Closely observe the infant's fingers or toes distal to the PAL during any manipulation of the line.
- M. Monitor arterial pressure.
1. Calibrate the transducer.
 2. Set the alarm limits on the monitor 5–10 mm Hg higher and 5–10 mm Hg lower than the infant's blood pressure.
 3. Observe the waveform and record the measurements.
- N. Troubleshoot arterial lines.
1. 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:
 - a. Air bubbles within the tubing or at the transducer
 - b. A kink in the tubing
 2. Hypotension: Check blood pressure values to help determine whether this is a mechanical or physiological reflection by conducting the following assessment:
 - a. Perform manual cuff measurement (cuff or peripheral blood pressure is generally expected to be lower than the central blood pressure but can be greatly affected by the fit of the cuff).
 - b. Assess the infant's clinical condition, looking at:
 - 1) Color
 - 2) Capillary refill
 - 3) Pulses
 - 4) Temperature of extremities
 - c. Report all findings to the physician or AHP.
- O. Blood sampling technique
1. Closed blood draw system
 - a. A commercially available closed, needle-free in-line blood sampling system may be used with the PAL. Follow manufacturer's instructions for blood sampling.
 2. Three-drop method
 - a. Perform hand hygiene per policy and don gloves.
 - b. Verify the infant using two patient identifiers.
- c. Disinfect the diaphragm of the T-connector for 10–15 s with friction and allow to dry.
 - d. Clamp the T-connector tubing close to the hub.
 - e. Place gauze underneath the T-connector's hub.
 - f. Introduce a 25-gauge needle through the diaphragm and allow three or four drops of solution or blood to drip onto gauze.
 - g. Attach the syringe to the needle and allow the specimen to be pulled into the syringe or allow the specimen to drip into the specimen container.
 - h. Remove the needle from the diaphragm of the T-connector, activate the safety mechanism, and discard in the sharps disposal container.
 - i. Unclamp the T-connector and allow residual pump pressure to flush the catheter.
 - j. Label and process the blood sample as necessary.
3. Stopcock method
 - a. Perform hand hygiene per hospital policy and don gloves.
 - b. Verify the infant using two patient identifiers.
 - c. Disinfect the needleless connector to be accessed on the stopcock with approved antiseptic and allow it to dry completely.
 - d. Attach the syringe to be used for the blood draw to the port closest to the needleless connector.
 - e. Close the stopcock off toward the infusion pump.
 - f. Gently aspirate approximately 1 ml of solution or blood to clear the line.
 - g. Using a second syringe, gently withdraw the sample. Remove the syringe. Place blood into appropriate tubes for testing.
 - h. Slowly infuse 0.5 ml of flush solution over 30–60 s to clear the T-connector and catheter. Flush only the volume needed to clear blood from the tubing using a pulsatile flush.
 - i. When the flushing is complete, open the stopcock to allow the infusion to proceed.
 - j. Label and process the blood samples as necessary.
- P. Removal of PAL
1. Obtain an order from a physician or AHP.
 2. Assemble the equipment to include sterile gauze (2 × 2), sterile gloves, and suture removal set if sutures are in place.
 3. Verify correct infant using two patient identifiers.
 4. Remove any dressing over the site and sutures, if used.
 5. Pull the catheter completely out.
 6. Apply pressure with sterile gauze for 5–10 min.
 7. Observe for bleeding or oozing.

8. If bleeding or oozing occurs, continue to apply pressure and notify the physician or AHP.

VI. Documentation

- A. Hourly infusion of solution to maintain patency
- B. The appearance of the site, ease of blood aspiration, waveform, and pulse
- C. Notification of the primary care provider of any color or temperature change in the extremity distal to the infusion site or patency issues
- D. Date and time of insertion of the PAL and by whom
- E. Time and type of specimen obtained
- F. Time of removal, assessment of the site, amount of time the pressure was applied, and condition of the extremity upon removal

Related Documents

Procedure: Intravenous Infiltration, Treatment of
Policy: Skin Care

Competency: Admission to the NICU

Competency: Arterial Puncture

Competency: Hemodynamic Monitoring, Invasive

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Original Date: _____

Approvals: _____

Procedure: Blood Sampling Level I, II, III, and IV Nurseries

- I. Purpose: To choose an optimal blood sampling method (venipuncture or heel stick) for use with neonates
- II. Considerations
- A. Each infant should be assessed individually to choose the optimal blood sampling method.
 - B. Venous blood sampling has been shown to be less painful than heel stick sampling, even with the use of sucrose.^{1(Level I)}
 - C. It is recommended that volumes greater than 1 ml be drawn via venipuncture.^{2(Level VII)}
 - D. Venipuncture should be performed in the most distal sites first to preserve venous access.^{3(Level VII)}
 - E. Fingertips, toes, or earlobes of infants should not be used as blood sampling sites.^{4(Level VII)}
 - F. Nonpharmacologic comfort measures should be provided to neonates undergoing painful procedures. Refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition.
 - G. Contraindications to performing heel sticks are bruising or hematoma on the feet; feet that are edematous, are injured, have poor perfusion, or are infected; and feet with anomalies on which pressure should be avoided.^{4(Level VII)}
 - H. 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.^{5(Level VI),6(Level VII)}
 - I. The recommended heel lancing device is an automated lancing incision device.^{4,6 (Level VII)}
 - J. 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.^{7,8(Level II)}
- III. Equipment
- A. Venipuncture
 - 1. Nonsterile gloves
 - 2. Hospital-approved skin disinfectant
 - 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
 - 8. Pacifier
 - 9. Blanket for swaddling
 - 10. Specimen labels
 - 11. 2 × 2 Sterile gauze
- B. Capillary heel stick sampling
 - 1. Nonsterile gloves
 - 2. Hospital-approved skin disinfectant
 - 3. Automated heel lancing device (appropriate size for infant)
 - 4. Cloth or pad to protect bed linens
 - 5. Sucrose
 - 6. Pacifier
 - 7. Blanket for swaddling
 - 8. Specimen collectors as appropriate
 - 9. Specimen labels
 - 10. Sterile gauze
- IV. Nursing knowledge
- A. Nurses should be trained in venipuncture and capillary heel stick blood sampling of neonates.
 - B. Nurses should be trained in neonatal pain assessment and intervention.
 - C. Nurses should provide comfort measures to neonates undergoing painful procedures such as venipuncture or capillary heel stick blood sampling.
- V. Process
- A. Follow standard precautions while performing all steps of the procedure unless directed to use sterile precautions.
 - B. Ensure proper identification of the infant.
 - C. Provide pain management. Refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition.
 - 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.
 - D. 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. Label specimens following hospital protocol.
- E. 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 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 hospital protocol.

VI. Documentation

- A. Document the sample collection site and labs submitted for evaluation.

Related Documents

Policy: Skin Care

Competency: Admission to the NICU

Competency: Blood Sampling

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Approvals: _____

Procedure: Car Seat Observational Monitoring

Level I, II, III, and IV Nurseries

- I. Purpose: To ensure the safe transportation of infants at hospital discharge
- II. Considerations
- A. A car seat observation currently is recommended before hospital discharge for all infants younger than 37 weeks' gestation at birth.^{1(Level VII)}
1. The following parameters may characterize an event during a car seat observation or as determined by the primary healthcare provider:^{2(Level VII)}
 - a. Apnea: defined as cessation of breathing for more than 20 s
 - b. Bradycardia: defined as heart rate less than 80 beats per min
 - c. Oxygen desaturation below 90% for more than 10 s^{3(Level VII)}
 2. If an infant's documented events during the observation period are deemed significant by the provider, interventions to reduce the frequency of desaturation and episodes of apnea and bradycardia are recommended.^{1(Level VII)} Examples include:
 - a. Use of a car bed
 - b. Providing supplemental oxygen
 - c. Continued hospitalization or further medical assessment
- B. Car safety seats should be used directly from the manufacturer's box (without modification). The use of after-market positioning devices should be avoided because the devices have not been crash tested with the accompanying car safety seat.
- C. The usage period for car safety seats typically ends 6 years after the date of manufacture (or sooner per manufacturer instructions). If a car safety seat is more than 6 years old, parents should be advised to replace it.
- D. A car bed should be considered if the patient is unable to tolerate a car safety seat. If it is determined that a car bed should be used, the safety observation should be repeated with the infant positioned in the car bed.^{1(Level VII)}
- III. Equipment
- A. Infant's own car safety seat
 - B. Cardiorespiratory monitor and electrodes
 - C. Pulse oximeter and pulse oximeter probe
 - D. Blanket (to place on the floor to keep the car safety seat area clean)
 - E. Additional cotton blanket or cotton diapers as rolls (if necessary to assist with positioning)
 - F. Car bed (if indicated)
- IV. Nursing knowledge
- A. Nursing staff should receive instruction in positioning infants for the car safety seat observation.
 - B. Nursing staff should receive training in detecting apnea, bradycardia, and oxygen desaturation in neonates.
 - C. Nursing staff should demonstrate competency in car seat safety and observational monitoring.
- V. Process
- A. Car safety seat observation
1. Follow standard precautions while performing all steps of the procedure unless directed to use sterile precautions.
 2. Check for proper patient identification.
 3. Verify that the patient meets criteria for car safety seat observation.
 4. Verify that the patient's last feeding was at least 30 min earlier.
 5. Place the car safety seat on a clean blanket on the floor or other firm, level surface to ensure stability.
 6. Ensure the car seat is in the correct recline angle position as directed by the manufacturer's instructions.
 7. Connect the patient to the cardiorespiratory monitor and pulse oximeter.
 8. Obtain baseline vital signs (VS) before the observation period.
 9. Position and secure the infant in the car safety seat with parent involvement, if they are present.
 - a. Ensure that the buttocks and back are flat against the back of the car seat.
 - b. Do not place blankets under or behind the infant in the seat.
 - c. Secure harness straps snugly at or below shoulder level.
 - d. Position chest clips at midpoint of the infant's chest (at armpit level). Avoid the abdomen and front of the neck.
 10. Observe the patient for 90–120 min or the duration of travel, whichever is longer.^{1(Level VII)}
 11. Monitor VS (heart rate, respiratory rate, oxygen saturation) every 30 min.
 12. If the infant experiences events necessitating intervention during the observation period, consider the following interventions or corrections:
 - a. Remove the existing head support (if applicable) that is original to the car safety seat.

- b. If needed, add or place a small blanket roll between the infant and crotch strap to reduce slouching.
 - c. Place blanket rolls, if necessary, on both sides of the infant's trunk to provide lateral support of the head and neck.
 - d. Restart timing of testing at the time of position adjustments.
 - e. Document events observed and corrective actions taken.
13. If the infant is unable to be positioned to maintain defined oxygen saturation or has apnea or bradycardia during the observation period, stop the observation, respond to the event, notify the healthcare provider, and document the event.
 14. At the completion of the observation, remove the infant from the car seat and place the infant in a crib, modeling infant safe sleep practices.

B. Car bed safety observation

1. Verify that the patient is to be observed in the car bed.
2. Check for proper patient identification using two hospital identifiers.
3. Verify that the patient's last feeding was at least 30 min earlier.
4. Place the car bed on a clean blanket on the floor to ensure stability.
5. Connect the patient to the cardiorespiratory monitor and pulse oximeter.
6. Obtain baseline VS before the observation period.
7. Position the infant in the car bed, securing per manufacturer's recommendation.
8. Observe the patient for 90–120 min or the duration of travel, whichever is longer.
9. Monitor VS (heart rate, respiratory rate, oxygen saturation) every 30 min.
10. If the infant is unable to be positioned to maintain defined oxygen saturation or has apnea or bradycardia during the observation period, stop the observation, respond to the event, notify the healthcare provider, and document the event.

11. At the completion of the observation, remove the infant from the car bed and place the infant in a crib, modeling infant safe sleep practices unless otherwise ordered for the patient.

C. Family education

1. Instruct families on correct positioning of their infant in the car safety seat based on results of the car safety observation.
2. Ensure that families participate in the positioning of their infant in the car bed.
3. Advise families that car seats should be used only for travel and that an infant should never be left unattended in a car seat or bed inside or outside of the car.
4. Instruct parents that the back seat of a vehicle is the safest place for children to travel.
5. Advise parents that they should arrange for an adult to be seated in the rear seat adjacent to the infant whenever possible during travel for close observation of the infant.

VI. Documentation

- A. Document VS (heart rate, respiratory rate, oxygen saturation) before placing the infant in the car safety seat or car bed.
- B. Document VS every 30 min throughout the observation. Include heart rate, respiratory rate, oxygen saturation, and supplemental oxygen if in use.
- C. Document any events that occur. Include nursing interventions and actions performed, whether the observation was terminated or restarted, and notification of healthcare providers.
- D. Document completion of testing results.

Related Documents

Competency: Car Seat Screening

Related Web-Based Resources

National Highway Traffic Safety Administration:
www.nhtsa.dot.gov

Safe Kids USA: www.safekids.org

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Approvals: _____

Policy: Case Management and Family-Centered Care Level I, II, III, and IV Nurseries

- I. Purpose: To provide structure for communication among the healthcare team, leading to improved continuity of care and discharge planning
- II. Considerations
- A. Family-centered care is defined as a model of care that “assures the health and well-being of children and their families through a respectful family-professional partnership. It honors the strengths, cultures, traditions and expertise that everyone brings to this relationship.”^{1(Level VII)}
 - B. Both infants and families are “patients” in the neonatal intensive care unit (NICU). This experience should be recognized as high-stress for families, and it is important to recognize and address psychosocial and psychological issues that may affect the infant and family.^{2(Level V)}
 - C. Case management includes discharge planning, which begins with admission to the NICU and is based on expected infant outcomes and family abilities, resources, and expectations.
 - D. Family members are defined by the biological or surrogate parents or legal guardians:
“Families are big, small, extended, nuclear, multigenerational, with one parent, two parents and grandparents. We live under one roof or many. A family can be as temporary as a few weeks, as permanent as forever. We become part of a family by birth, adoption, marriage, or from a desire for mutual support” (New Mexico’s Memorial Task Force on Children and Families and the Coalition for Children, 1990).^{3(Level I)}
 - E. Multidisciplinary conferences should be held regularly to review each infant’s condition and the family’s desires, needs, and progress in learning and providing care and bonding, as well as any indicated post-discharge care and referrals. Families will be included in the decision-making process regarding plans for care and discharge.
 - F. The multidisciplinary conference may include a neonatologist or neonatal nurse practitioner; case manager; respiratory therapist; registered nurse knowledgeable in the care of the patient (preferably the primary nurse); disciplines involved in the care of the patient, such as a clinical nurse specialist, occupational therapist, and social worker; a nutritionist; and other healthcare providers as indicated.
 - G. Additional parent conferences are scheduled as necessary or requested by families to update parents on the infant’s condition and status. Appropriate disciplines are involved, including a nurse and physician or allied health professional.
 - H. The ongoing plan of care is discussed with input from families and all disciplines involved.
- I. Follow-up appointments with the primary care provider and any necessary subspecialists should be made or appropriate information given to families to make appointments. The provider ensures that all pre-discharge screening has been completed and that results are obtained when available. It is recommended that a copy of the discharge summary be made available to parents and follow-up healthcare personnel upon discharge.
- III. Nursing knowledge
- A. Communication from any staff member (e.g., nurse, physician, allied health professional, therapists) needs to be consistent, provided in a manner that the family can understand and personalized for each family or infant.^{2(Level V)}
 - B. Nurses spend more time with a specific infant than any other discipline. Consistency of care provides for improved communication between the healthcare team and families.
- IV. Process
- A. Recognizing that the family is the constant in an infant’s life, parents or primary caregivers will be supported in participating in an infant’s care and care-related decision making.^{1(Level VII)}
 - B. Support the family in learning about the NICU environment and their infant’s care and condition. Evaluate families for readiness to learn and learning needs on an ongoing basis in preparation for discharge.
 - C. Honor cultural diversity and family traditions as parents care for their infant. Past experiences of the family should be taken into account. Build on family strengths.^{1(Level VII)}
 - D. Parents will be taught routine and specialized care for their infant and will demonstrate their ability to provide care before infant discharge.
 - E. Parents will be encouraged and allowed to be present for bedside and multidisciplinary rounds during the discussion of their infant’s ongoing care and planning for discharge.^{3(Level I)}
 - F. Make referrals to community-based services as appropriate.
 - G. Encourage family-to-family and peer support during the NICU stay. If these are not offered by the specific hospital, they may be offered in the community and should be accessed. Various support groups exist online as well and may be helpful to the family.
 - H. As the infant reaches various milestones, celebrate successes with the family.^{1(Level VII)} The NICU

experience can be isolating because it is so unusual to those who have not experienced it. Therefore, the NICU staff often are the only support system to families during some of the most stressful times.

Related Document

Policy: Guidelines for Nursing Care

Related Web-Based Resource

Institute for Patient- and Family-Centered Care:
<http://www.ipfc.org>

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Procedure: Chest Tube Management: Placement, Needle Aspiration, and Maintenance Level I, II, III, and IV Nurseries

- I. Purpose: To describe proper care of the infant with pneumothorax, hemothorax or pleural effusion, or chylothorax. Infants with air leak syndrome may need needle aspiration as an immediate intervention before thoracostomy tube placement.^{1(Level VII)} A chest tube will allow decompression of the pneumothorax or evacuation of large amounts of pleural fluids and subsequently re-expand the affected lung.
- II. Considerations^{2(Level II)}
- A. Inserting a chest tube is an invasive procedure requiring sterile technique. Each person assisting must wear a gown, sterile gloves, mask, and cap.
 - B. Chest tube insertion and removal may be performed by a physician or an appropriately trained allied health professional (AHP).
 - C. Milking or stripping of the chest tube is generally unnecessary.
 1. Presence of clots or other debris may require gentle kneading of the chest tube and should be performed only with a written order.
 - D. 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 reaccumulation of pneumothorax.
- III. Equipment^{1,3(Level VII)}
- A. Needle aspiration
 1. 23- or 25-gauge butterfly or 18- or 20-gauge angiocatheter
 2. Intravenous (IV) extension tubing (T-connector)
 3. Three-way stopcock
 4. 10- to 20-ml syringe
 5. Approved disinfectant
 6. Sterile saline wipes
 7. Sterile gloves
 - B. Chest tube insertion
 1. Appropriate-size chest tube
 2. Cutdown or chest tube tray
 3. No. 15 blade
 4. Sterile drapes
 5. Approved disinfectant
 6. Sterile saline wipes
 7. Rubber-tipped clamps or C-clamp
 8. Sterile gloves
 9. Thoracic or regular suction gauge
 10. Chest drainage system
 11. Sterile water
 12. Tape
 13. Suture, as requested
 14. Polysporin ointment or Vaseline gauze
 15. Sterile 2 × 2 gauze
 16. Semipermeable transparent dressing
 17. 0.5% lidocaine
 18. Analgesia (such as morphine or fentanyl)
 19. Sedative (such as midazolam)
- IV. Nursing knowledge^{1(Level VII)}
- A. Neonatal intensive care unit (NICU) nurses should be trained to recognize infants with a pneumothorax. Symptoms include an abrupt change in respiratory status marked by increased work of breathing; increased respiratory rate; restlessness, irritability, or lethargy; cyanosis; decreased breath sounds; and asymmetrical chest rise.^{4(Level II)}
 - B. A NICU or special care nursery (SCN) registered nurse (RN) should be trained in the appropriate use of a transilluminator, including recognition of a pneumothorax and limitations of transillumination in identifying a pneumothorax.
 - C. A NICU or SCN RN should receive specialized competency training with annual skill validation to perform needle thoracentesis.
 - D. A NICU or SCN RN should be trained in the setup of the hospital's drainage system. Some drainage systems require water to be added to obtain a seal; others are dry systems. Suction levels are set differently in various devices. Manufacturer's instructions should be followed.
- V. Process^{1,3(Level VII)}
- A. Follow standard precautions while performing all procedure steps unless directed to use sterile precautions.
 - B. Check for proper patient identification and observe preprocedural timeout.
 - C. Provide pain management (refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition).
 - D. Diagnostic tools may include transillumination to confirm presence of a pneumothorax or anterior-posterior and lateral chest X rays if time and condition allow.
 - E. Needle thoracentesis or an initial treatment for a tension pneumothorax may be preferable to chest tube placement.^{5(Level I)} Some of the following steps may be performed by an RN after specific training, or the RN may be assisting with this procedure.

1. Cleanse skin with an approved disinfectant at the second to third intercostal space in the midclavicular line on the side indicated by transillumination, chest X ray, or assessment.
 2. An assistant should attach the stopcock to IV extension tubing (T-connector) and the syringe to the stopcock.
 3. The person performing needle thoracentesis should wear sterile gloves.
 4. Insert the angiocatheter or butterfly needle at a 45-degree angle in the second intercostal space just above the top of the lower rib in the midclavicular line.^{1(Level VII)}
 5. If using an angiocatheter, remove the needle and slide the cannula into the pleural space.
 6. Attach IV extension tubing (T-connector) to the angiocatheter cannula or butterfly extension, open the stopcock, and evacuate air with 10- or 20-ml syringe.
 7. Continue evacuation until no additional air is obtained or until the infant's condition improves.
- F. When needle aspiration is completed, the physician or AHP will decide whether a chest tube is indicated. If so, repeat steps A through D as indicated, then continue with steps G through I.
- G. 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.
- H. Prepare the drainage system and set up for the procedure.
1. Using sterile technique, open the instrument tray and add necessary supplies to the tray.
 2. Open and set up the drainage system following manufacturer's instructions. Maintain sterility of the connection to the chest tube.
 3. Set the suction at the level ordered by the physician or AHP. This is usually between -5 and -20 mm Hg. Connect to the suction regulator with suction tubing.
 4. Securely tape all connections, particularly between the infant and water seal device.
 5. When the drainage system is connected to the infant, turn on wall suction to a level adequate to achieve bubbling in the suction chamber of the drainage device.
 6. 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 preprocedure breath sounds.
- I. Secure chest tube setup
1. Ensure that all connections are tight and junctions taped.
2. Place the drainage system in an upright position to ensure system is below the level of the chest. Ensure system is secured in such a way that it cannot be accidentally knocked over.
 3. Place a safety tab on tubing near the junction of the chest tube and tubing; using a clamp, 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.
- J. Nursing care of the infant with a chest tube
1. Initial assessment for the shift
 - a. General respiratory assessment
 - b. Chest tube site
 - 1) Check for signs of infection or drainage from the site and security of the dressing.
 - 2) 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
 - e. Amount of drainage in the collection chamber, if any
 2. 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 physician or AHP orders
 3. 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.
 4. To promote air evacuation, maintain elevation of the head of the bed at a 30- to 45-degree angle, as appropriate.
 5. 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 physician or AHP 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 physician or AHP should be notified immediately.^{1(Level VII)}

K. Removal of the chest tube

- 1. The chest tube may be clamped for a period of time before planned removal. This is done according to physician or AHP order.
- 2. When the chest tube is removed, an occlusive pressure dressing is placed at the site.^{4(Level VII)}

VI. Documentation

- A. All patient assessments, placement of the chest tube, and tolerance in the medical record

- B. A site assessment at least every 12 hr and any necessary dressing changes in the medical record
- C. The presence or absence of bubbling, the suction level, and the security of the dressing during every shift
- D. 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.)

Related Documents

Competency: Chest Tube Management

Competency: Respiratory Management

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Approvals: _____

Policy: Circumcision, Preparation and Care Level I, II, III, and IV Nurseries

- I. Purpose: To provide guidelines for the care of newborns undergoing circumcision
- II. Considerations
- A. Circumcision should be performed after 6 hr of life, preferably after 24 hr of age.^{1(Level VII)}
 - B. Before circumcision, a nurse should complete an initial assessment and history.
 - C. A physician's patient history and physical should also be completed and recorded in the medical record.
 - D. Informed parental consent should be obtained and signed before the procedure.
 - E. The clinician performing the circumcision should notify the assisting nurse of the pending circumcision before the procedure to facilitate analgesic administration.
 - F. Any physician or allied health professional with appropriate credentials may perform the circumcision.
 - G. 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.
 - H. It is particularly important to report and document the following conditions, which may contraindicate the procedure:
 1. Obvious congenital or other related anomalies of the genitourinary tract
 2. Bleeding disorder or family history of bleeding diathesis (or if infant did not receive vitamin K)^{2(Level VII)}
 3. Signs or symptoms of infection
 4. Respiratory distress
 5. Hypothermia
 - I. The infant should weigh a minimum of 1,600 g and have achieved cardiovascular and respiratory stability.
 - J. Ideally, the infant should have nothing by mouth for 1 hr before the procedure.
 - K. An order is required for the circumcision unless it is performed by the attending physician, which ensures the infant's physiologic stability required for the procedure.
- III. Equipment^{1(Level VII)}
- A. Sterile circumcision tray
 - B. Sterile circumcision instrument as ordered (Gomco, Plastibell, Mogen clamp)
 - C. Vaseline gauze
 - D. Sterile gloves
 - E. Scalpel blade and holder
 - F. Povidone-iodine
 - G. Sterile water (to wipe off povidone-iodine)
 - H. Positioning device
 - I. Pads
 - J. Light source
 - K. Items needed for pain management (refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition)
- IV. Nursing knowledge^{2(Level VII)}
- A. Nurses should be aware of the latest recommendations and policy statement from the American Academy of Pediatrics on newborn circumcision.
 - B. Parents should be informed and allowed to make decisions on whether to have the infant circumcised based on available information. The decision is often based on their ethical, cultural, and religious practices.
 1. There may be some medical benefit to circumcision, but there is insufficient medical evidence to recommend routine circumcision for all male newborns.
 2. Benefits include prevention of urinary tract infections, penile cancer, and transmission of some sexually transmitted diseases.
 - C. Nurses should be able to identify postprocedure complications, including bleeding, infection, injury, adhesions, necrosis, and lack of voiding.
- V. Process
- A. Perform preprocedural timeout verification.
 - B. Assemble supplies.
 - C. Protectively contain the infant on the chosen positioning device.
 - D. Assist with the procedure as requested.
 - E. Provide care after the circumcision.
 1. Maintain Vaseline gauze or antibiotic ointment on the tip of the penis for the first 3 days if a Gomco or Mogen device was used. This is contraindicated with use of the Plastibell.
 2. Check the circumcision for bleeding every 30 min for 1 hr, then hourly for 2 hr, and then with diaper changes until discharge.
 3. The infant should not be discharged sooner than 2 hr after circumcision or before the first void.
 - F. If bleeding or oozing occurs^{1(Level VII)}
 1. Apply pressure for 5–10 min.

2. If bleeding cannot be stopped, apply topical thrombin on absorbable sponge (Gelfoam) or oxidized cellulose (Surgicel or Oxycel).
 3. If bleeding does not stop after this, notify the physician.
- G. If active bleeding or hemorrhage occurs, notify the physician immediately.
- H. Conduct parent teaching.
1. Explain to parents the proper care (specific to the type of device used for the procedure) of the circumcision.

2. Demonstrate and ensure that parents return demonstrate.
3. Document in the medical record.

Related Documents

Policy: Skin Care

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Policy: Code Blue

Level I, II, III, and IV Nurseries; Labor and Delivery; Maternity Units

- I. Purpose
 - A. To provide for efficient and effective management of neonatal resuscitation
 - B. To clearly define the roles of each discipline during a neonatal Code Blue
 - C. To identify the process for assessing and managing neonatal Code Blue
- II. Considerations
 - A. Every healthcare provider who delivers care to neonates should possess sufficient knowledge to provide assessment and intervention to carry out resuscitation.
 - B. Everyone with hands-on involvement in a neonatal Code Blue must have completed the Neonatal Resuscitation Program (NRP).
 - C. Steps for resuscitation should follow the most current recommendations of the NRP.^{1(Level VII)}
- III. Equipment^{1(Level VII)}
 - A. Resuscitation box contents
 - 1. Endotracheal tube: sizes 2.5, 3.0, and 3.5 mm internal diameter
 - 2. Laryngoscope blade: No. 0 and No. 1 (No. 00 optional for very preterm newborn)
 - 3. Laryngoscope handle with extra batteries and bulbs
 - 4. Materials to secure endotracheal tube and laryngeal mask
 - 5. Laryngeal mask: size 1
 - 6. Stylet (optional)
 - 7. Colorimetric CO₂ detector
 - 8. Syringes: 1 ml, 3–6 ml, and 30–60 ml
 - 9. Prefilled saline flush syringes
 - 10. Single-lumen umbilical catheters: 3.5 and 5.0 Fr
 - 11. Insertion tray, instruments, and sterile gloves to insert the umbilical line
 - 12. Umbilical tape
 - 13. Bulb syringe
 - B. Medication code box for neonatal resuscitation
 - 1. Epinephrine (0.1 mg/ml)
 - 2. Volume expander: normal saline
 - C. Other equipment
 - 1. Radiant warmer or other heat source with firm and padded surface
 - 2. Oxygen source, compressed air source, and oxygen blender with flowmeter and tubing
 - 3. Pulse oximeter and sensor
 - 4. Electrocardiogram monitor and leads
 - 5. Self-inflating or flow-inflating bag or T-piece resuscitator with appropriately sized mask
 - 6. Stethoscope
 - 7. Mechanical suction with appropriate tubing
 - 8. Suction catheters
 - 9. Nonsterile gloves and applicable personal protective equipment
- IV. Nursing knowledge: successful completion of basic life support training and NRP and maintenance of current updates
- V. Process
 - A. Follow the steps outlined in the NRP algorithms for neonatal resuscitation for newly born infants and neonates during initial hospitalization necessitating resuscitation during the first weeks after birth.^{2(Level VII)}
 - B. Identify who will respond to a neonatal Code Blue and how they will be contacted. Ensure there is an identified team leader.
 - C. Perform a preresuscitation team briefing before deliveries.
 - D. Participants assuming a role during a code should remain in that role until the end of the code unless they are relieved by another competent healthcare provider.
 - E. Roles of the initial responders:
 - 1. The first responder establishes an airway.
 - 2. The second responder calls for assistance and begins compressions, if indicated.
 - 3. The third responder brings the crash cart and begins documentation.
 - F. When sufficient personnel have arrived, the respiratory therapist, allied health professional (AHP), or physician assumes airway management; the physician or AHP (or registered nurse [RN] in their absence) manages the resuscitation; the respiratory therapist or RN performs compressions; and the pharmacist or RN prepares medications. Additional personnel are needed to document the code. The charge nurse or designee:
 - 1. Ensures all roles are appropriately filled
 - 2. Directs extra personnel away from the area
 - 3. Assigns a nurse not involved in the code to attend to the family if present
 - 4. Conveys a request from the physician to the unit clerk if additional personnel or tests are needed
 - G. If more than one physician is present, it must be clearly delineated who is in charge.
 - H. Perform a post-resuscitation team debriefing.

Related Documents

Policy: Deliveries, Attendance at

Policy: Thermoneutral Environment

Competency: Golden Hour

References

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Approvals: _____

Procedure: Critical Congenital Heart Defects (CCHDs), Screening for Level I, II, III, and IV Nurseries

I. Purpose: Timely identification of infants with critical congenital heart defects (CCHDs) before discharge from the birth hospitalization

II. Considerations

A. Congenital heart defects are the most common congenital disorder in newborns.^{1(Level VI)}

B. Screening for CCHD should be performed after 24 hr of life or as late as possible if early discharge is planned.^{2,3(Level VI)}

1. Any one of the following parameters is considered a positive screen^{4(Level II)} (**Figure 1**):

- a. Oxygen saturation (SpO₂) measurement less than 90% in either extremity
- b. SpO₂ measurement 90%–94% in both upper and lower extremities on three measurements, each separated by 1 hr
- c. SpO₂ difference more than 3% between the upper and lower extremities on three measurements, each separated by 1 hr

2. Any infant with a positive screen needs evaluation for causes of hypoxemia through a diagnostic echocardiogram evaluated by a pediatric cardiologist.

III. Equipment

- A. Pulse oximeter
- B. Two pulse oximeter probes to measure SpO₂ in the right hand (preductal) and either foot (postductal)

IV. Nursing knowledge

- A. Nursing staff should receive information on common congenital cardiac defects.
- B. Nursing staff should receive training in use of pulse oximetry and detection of targeted oxygen saturations used in screening for congenital cardiac defects.

V. Process

- A. Newborn screening for critical congenital heart disease using pulse oximetry
 1. Provide parents with education related to the pulse oximeter screening and CCHD.
 2. Identify infants older than 24 hr of age or shortly before discharge if younger than 24 hr of age.
 3. A quiet environment is ideal. Parents may be present. It is preferred that the infant is awake and alert but quiet during the test. Do not test an actively crying or cold-stressed infant.
 4. Bright lights and phototherapy lights should be turned off for screening.
 5. Place pulse oximetry probes, one on the right hand (preductal) and one on a lower extremity (postductal).
 6. Obtain pulse oximetry readings from both extremities when infant is quiet and not crying.
 7. Notify healthcare provider of positive screen and need for further evaluation.

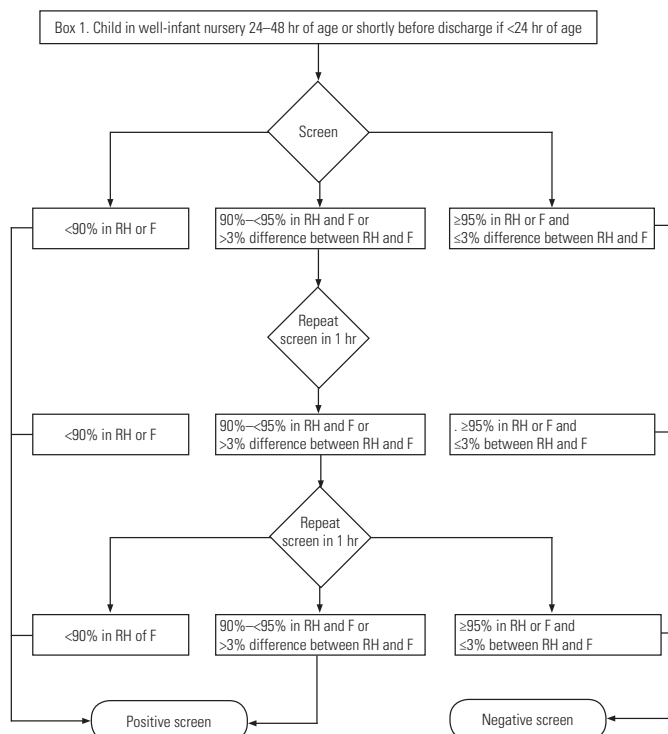
B. Special settings

1. High altitude: False positives are higher in centers at high altitude.
2. Neonatal intensive care unit (NICU): There are no clear guidelines for screening in the NICU. Despite the presence of pulse oximetry as a routine in the NICU, it may be reasonable to perform a formal screening with preductal and postductal pulse oximetry placement in infants who do not receive a cardiac echocardiogram for another reason.

VI. Family teaching

- A. Describe screening process to parents and explain the importance of early detection of congenital heart defects.
- B. Inform parents that the screening will be performed at 24 hr of age or shortly before discharge if sooner.

Figure 1. Pulse-Oximetry Monitoring Protocol



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VII. Documentation

- A. Document oxygen saturation of both preductal and postductal pulse oximetry sites.
- B. Document parents' understanding of screening process.

Related Document

Competency: Congenital Cardiac Defects

References

1. Tennant PW, Pearce MS, Bythell M, Rankin J. 20-year survival of children born with congenital anomalies: a population-based study. *Lancet*. 2010;375 (9715):649.
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Policy: Cue-Based Feeding Level I, II, III, and IV Nurseries

I. Purpose: 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

II. Considerations

A. Implementation of nipple oral feedings begins in healthy infants at a postconceptual age as early as 28–34 weeks. Infants are able to successfully breastfeed at an earlier gestational age than bottle feeding.^{1(Level VI)}

1. Infants demonstrate a range of behavioral states as gestational age increases.
 - a. Awake states and quiet alert states increase in duration as gestational age increases.
 - b. Awake states and quiet alert states support behavioral and physiological ability to nipple feed.
2. 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.^{2(Level VII)}

B. Feeding tools and scales have been demonstrated to help guide and identify readiness to feed.^{3(Level IV),4(Level VI),5(Level VI),6 (Level II)} A tool to assist in feeding readiness assessment identifies concrete, consistent measurements for each infant. Additionally, the use of non-nutritive sucking has been demonstrated to increase proficiency at oral feeding.^{7(Level V),8(Level V),9(Level VI)}

C. Unit-based guidelines to define the transition from timed-interval feeding to semi-on-demand feeding to full on-demand or ad-lib feeding should be established.^{10(Level VI)} These guidelines may be based on the feeding tool or scale of choice to achieve consistency.

1. Interval feedings are based on time sequence and volume delivered.
2. Semi-on-demand feedings are used during the transition to on-demand feeding.
 - a. Feedings may still be time cycled (e.g., every 3 hr).
 - b. Nonnutritive sucking should be provided during all gavage feedings, even when exclusive breastfeeding is planned.^{11(Level VII)} Nonnutritive sucking may also be beneficial before bottle feeding or breastfeeding.
 - c. Feeding readiness cues are used to initiate, continue, or stop an oral feeding at breast or bottle.^{12(Level VII)}

d. The remainder of the feeding may be gavage fed if the predetermined volume is not taken by nipple.

3. On-demand feedings are infant driven and are controlled according to the volume of intake and timing of the feeding.

D. Parent involvement and education are needed during the feeding process so parents can gain competence in feeding their infant.^{5(Level VI)}

1. Parents should be educated on infant cues for both readiness and distress before, during, and after feedings.
2. Parents should be educated on skills the infant needs to accomplish the task of feeding.
3. Involvement of the parent is critical, whether or not breastfeeding is the goal.
4. The transition to breastfeeding may take place at any time during the cue-based feeding process.

III. Equipment (B, C, and D are not necessary for breastfeeding)

- A. Feeding scale or tool (recommended)
- B. Warmed feeding
- C. Bottle
- D. Artificial nipple
- E. Gavage equipment if the infant is unable to finish feeding via nipping

IV. Nursing knowledge

- A. Nurses should be competent in identifying infant feeding readiness cues and distress signals.
 1. Behavioral cues: crying, rustling, sucking interest, rooting, ability to maintain alert or quiet state, restlessness, flexed state, body oriented toward nipple
 2. Physiological cues: ability to maintain oxygen saturation, respiratory rate, heart rate, color, and ability to coordinate sucking, swallowing, and breathing
 3. Distress signals related to motor system, state, or autonomic system: bradycardia, apnea, poor tone, finger splaying, irritability, gagging, staring, yawning, loss of fluid from mouth, disorganization, poor latching
- B. Nurses should be able to feed the infant by oral or gavage method.
- C. Nurses should be able to facilitate breastfeeding.

V. Process

- A. Identify infants of appropriate gestational age and abilities.

- B. Initiate a cue-based feeding protocol (may be initiated by order of physician or allied health professional or according to protocol, depending on hospital policy).
- C. Assess infants before each feeding using a preferred, consistent scale or behavioral and physiological cues.
- D. Facilitate a breast or nipple feeding based on observation or scoring tool assessment.
- E. Allow infants to breast or nipple feed for an amount of time according to the infant's choice.
- F. Stop feeding at signs of stress or lack of interest from the infant.
- G. Complete feeding via gavage as needed with expressed breast milk or formula according to orders.

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Approvals: _____

Policy: Deliveries, Attendance at Level I, II, III, and IV Nurseries; Labor and Delivery

- I. Purpose: To identify the members of resuscitation team and circumstances under which the team will be called to attend to the needs of the high-risk infant in labor and delivery (L&D)
- II. Considerations
- A. By evaluating perinatal risk factors, most newborns who need resuscitation may be identified before delivery.
- B. The resuscitation team with a designated leader should consist of two or three people skilled in newborn resuscitation.
1. Team members may consist of a physician or allied health professional (AHP), a registered nurse (RN), and a respiratory therapist. Roles are defined by institutional policies and scope of practice determinations.
 2. For all deliveries, there must be a provider skilled in intubation immediately available.
 3. In the case of multiples, separate teams for each infant should be present.
 4. To promote family-centered care, a team member should be designated to support and communicate with the family.^{1(Level VII)}
- C. When the infant's viability is questionable, the obstetrician should discuss and document the discussion with the neonatologist and the family before the delivery and should request resuscitation team attendance if the decision is made to attempt resuscitation. If the neonatal team attends the delivery and a live infant is born, the infant's subsequent course and documentation are the team's responsibility. If no resuscitation is chosen, the team is not usually called to attend, and documentation is the obstetrician's responsibility.
- III. Nursing knowledge
- A. Any healthcare professional attending a delivery should receive training and be competent in the most current guidelines of the Neonatal Resuscitation Program (NRP).^{2(Level I)}
- B. Hospitals may differentiate high-risk criteria and criteria for attendance for deliveries. At least two qualified team members should be present, strictly to manage the infant when perinatal risk factors are present.^{2(Level VII)} Risks may include the following:
1. Maternal age less than 16 years or greater than 35 years
 2. Insufficient prenatal care or maternal substance abuse
 3. Maternal conditions such as diabetes, hypertension, abruption, placenta previa, anemia, infection, or hematologic incompatibilities
 4. Drug therapies such as magnesium sulfate, adrenergic blocking agents, and sedation
 5. Polyhydramnios, oligohydramnios, premature rupture of the membranes, preterm premature rupture of the membranes
 6. Preterm, postterm, and multiple gestation, fetal malformations
 7. Nonreassuring fetal heart rate, umbilical cord prolapse
 8. Cesarean delivery, abnormal fetal positioning, macrosomia
 9. Prolonged labor, precipitous delivery, instrument-assisted delivery
 10. Meconium-stained amniotic fluid^{1(Level VII)}
- C. Briefing sessions among team members improve the resuscitative effort.
1. The prebrief, a discussion before delivery attendance, encompasses a review of clinical information, role assignment, identifying available equipment, and discussion of intended plan.
 2. The postbrief provides a platform where team members may address positive and negative considerations. This discussion has been shown to improve future resuscitative measures.^{3(Level VII),4(Level V)}
- D. Family presence during the resuscitation is not believed to have an adverse effect on the newborn and may be helpful for the family. Support for the family during the resuscitation should also be provided.^{5(Level V)}
- IV. Process
- A. The resuscitation team should be identified at the beginning of each shift and pending high-risk deliveries as soon as possible before each delivery.
1. Deliveries determined to be high risk should be attended by a physician or AHP, a neonatal nurse, and a respiratory therapist.
 2. In some cases, additional personnel may be needed. In these cases, the nearest transport team should be notified as soon as possible if the neonatal team is not in the hospital where the birth occurs.
- B. Resuscitation supplies should be available at each delivery, and the person responsible for this task should be designated in advance.
- C. One team member must be designated to care for only the infant at every delivery, ideally assigned during the prebrief.^{2(Level VII)}

- D. L&D personnel should communicate the following information to the team attending the delivery and providing care for the infant:
1. The reason the team's attendance was requested
 2. Any resuscitation measures that have already been implemented
 3. Use of any instrumentation in the delivery (e.g., forceps, vacuum extraction)
 4. Status of prenatal care
 5. Any indications of maternal infection, including timing of membrane rupture
 6. Maternal diabetes
 7. Preeclampsia and hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome
 8. Suspected recent maternal substance abuse
 9. Amniotic fluid abnormalities (e.g., oligohydramnios, polyhydramnios)
 10. Maternal seizure disorder or maternal use of anti-seizure medications

- E. In an emergency, the L&D nurse should tell the team
1. Whether the infant has been delivered
 2. The reason for requesting the team's attendance
 3. Location of the delivery

V. Documentation

- A. Apgar scores are given and documented by the resuscitation team. Apgar scores are assigned at 1 min and 5 min. If the 5-min Apgar score is lower than 7, scores are repeated every 5 min until 20 min or until the score is 7 or higher.^{2(Level VII)}
- B. All care in the delivery room should be documented in the infant's medical record.

Related Documents

Policy: Admission, Transfer, and Discharge

Policy: Code Blue

Policy: Golden Hour

Competency: Golden Hour

References

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Author: _____

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Approvals: _____

Policy: Donor Human Milk Use Level I, II, III, and IV Nurseries

- I. Purpose: To provide guidelines for the safe use of donor human milk (DHM) products
- II. Considerations^{1(Level VII)}
- A. Human milk is the preferred feeding for all infants. Each hospital should establish criteria by which an infant qualifies for use of DHM.
 - B. The Baby-Friendly Hospital Initiative advocates exclusive breastfeeding.^{2(Level VII)}
 - C. Banked DHM is considered the “first alternative” when maternal milk is unavailable or undesirable.
 - D. Informed parental consent is recommended before administration.
 - E. 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.^{3(Level VII)}
 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.^{1(Level VII)}
- III. Equipment
- A. Refrigerator and freezer space dedicated to the storage of human milk with thermometers for temperature monitoring
 - B. Tissue banking or other license as required by state and local regulations
- IV. Nursing knowledge^{4(Level VII)}
- A. 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
 - B. HMBANA has established guidelines for milk banking and sets standards for screening and testing donors. Milk banks collect and process milk, label it, and dispense it to institutions. Screening guidelines are recommended by HMBANA and can be obtained from any milk bank. Potential donors must meet specific health requirements and consent to or arrange for and present evidence of screening for various viral conditions such as HIV and hepatitis.
- C. All donor milk from HMBANA-certified milk banks is pasteurized with Holder pasteurization.^{4(Level I)} This pasteurization process inactivates many viral contaminants, such as HIV, human T-cell lymphotropic virus type 1, and cytomegalovirus.
1. After pasteurization, donor milk retains most of its bioactive properties, which help protect infants from infection and promote digestion and nutrient absorption.
 2. Pooled, pasteurized milk is tested for bacteria and distributed only if negative.
- D. Parental consent is to be obtained before administration, in accordance with hospital or unit policy.
- V. Process^{4(Level I)}
- A. 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. Each individual bottle should be assigned to a specific infant.
 6. Use a designated area for milk preparation and clean the area before preparing each feeding.
 - B. Thawing DHM^{4(Level I)}
 1. 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.
 2. Milk also may be slowly thawed at room temperature and refrigerated before it is completely thawed, while ice crystals are still present.

3. DHM is labeled to indicate its expiration 24 hr after it is completely thawed; follow current recommended practice standards from the HMBANA.
 - a. Label each DHM container, once thawed, with two unique patient identifiers of the designated infant and the date and time thawed, warmed, or fortified as applicable.
 4. The container of milk must be completely thawed and gently agitated in order to ensure uniform distribution of the nutrients.
- C. Warming DHM^{4(Level I)}
1. 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. Alternatively, a bottle or milk warmer may be used according to manufacturer's instructions.
 3. A microwave oven should never be used to warm milk.
 4. Unused portions of human milk should not be refrigerated.
- D. 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 a double-check, bar coding of milk, or other means. Meticulous attention is necessary to ensure that the correct milk is given to the infant.
 2. Feedings should not be prepared more than 24 hr in advance.^{4(Level II)}
3. Human milk should be provided in a manner that ensures that nutrients, particularly fat, are delivered to the infant.^{1(Level I)}
 - 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.
- E. 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.
- F. Lactation consultants and unit-based registered dietitians should be available and used as resources.
- VI. Documentation^{4(Level VII)}
- A. Informed parental consent must be documented in the infant's medical record.
 - B. Maintain DHM logs in a designated location, which may be electronic.
 - C. Document administration of DHM in the infant's medical record, including the lot number of the DHM.

Related Document

Policy: Human Milk: Pumping, Use, and Storage

References

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Enteral Tube, Insertion and Management of Level I, II, and III Nurseries

I. Purpose

- A. To supply nourishment to infants who are unable to nipple feed or breastfeed or who have anomalies of the gastrointestinal tract, impaired swallowing capabilities, severe debilitation, or respiratory distress
- B. To provide for gastric decompression

II. Considerations

- A. A nasal or orogastric tube may be placed for purposes of decompression without order by a physician or an allied health professional (AHP).
- B. A short-term (polyvinyl chloride) feeding tube should be changed every 24–72 hr, per manufacturer's recommendation, and long-term (silicone) feeding tubes should be changed every 30 days, per manufacturer's recommendation.^{1,2(Level IV),3(Level V)} Special caution should be taken to prevent contamination of the tubing.
- C. A physician or AHP order is required to begin feedings. Feeding changes may be made according to an established protocol.
- D. Nasogastric versus orogastric placement
 1. Nasogastric tube 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.^{4(Level V)}
 2. When a gastric tube is placed nasally, it should be moved from one nare to the other when changed.
- E. 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 and should be abandoned.^{5(Level V)}
 2. Check aspiration of stomach contents and evaluate the color of aspirate, although color is unreliable when determining placement.
 3. Check the aspirate for pH to confirm aspiration of stomach contents. If in the stomach, pH should be less than 5.0.^{6(Level VI)}
 4. Evaluate placement whenever an X ray is taken to confirm proper location of the tip of the tube.^{4(Level V)}
 5. 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.
- F. All tubing used for feeding should fit only other oral devices (e.g., feeding tubes, syringes) and be ISO compliant.^{7(Level VII)}

III. Equipment

- A. Appropriately sized feeding tube
- B. Syringe
- C. Water-soluble lubricant or sterile water
- D. Items for pH testing

IV. Nursing knowledge

- A. Nurses must have knowledge of developmental support during enteral tube insertion.
- B. Nurses also should be aware of signs of distress and be knowledgeable about appropriate response during enteral tube passage.

V. Process

- A. Feeding solution and tubing should be changed according to the following schedule^{8(Level VII)}:
 1. Formula or breast milk: Change every 4 hr for continuous feedings and at every feeding for intermittent feedings.
 2. Syringe: Change every 4 hr for continuous feedings and at every feeding for intermittent feedings.
 3. Extension tubing: Change every 4 hr.
 4. Gastric tube (short term): Change every 24–72 hr, per manufacturer's recommendation.
 5. Gastric tube (long term): Change every 30 days, per manufacturer's recommendation.
- B. Explain the feeding method to parents and discuss the need for gavage feedings.
- C. Place the infant supine or on right side with the head slightly elevated. Provide support for the infant and place in a flexed position. Offer a pacifier during tube insertion.
- D. Open the gavage tube and prepare for insertion, taking care to prevent contamination.
- E. Measure the tube from the tip of the nose to the ear to the distance halfway between the xiphoid process and umbilicus.^{4(Level V)} Make note of the centimeter marking at this point.
- F. Lubricate the tube with sterile water or water-soluble lubricant. For an oral tube, place the tip of the feeding tube on the anterior surface of the tongue and advance the tube past the oropharynx. For nasogastric tubes, pass through the nare. Alternate nares should be used when passing the tube to minimize irritation. Watch angulation of the tube to avoid trauma. Continue to advance the tube until the measurement mark is reached.
- G. Observe the infant for gagging, coughing, apnea, bradycardia, or color change during tube placement. If the infant does not stabilize immediately, remove and try again after stabilization.

H. Check tube placement as described above.

I. Tape the tube securely in place before beginning the feeding. Refer to the Skin Care Policy for methods to protect skin under tape used to secure tubes. If the tube is to be left in place, note the lip or nare line for future reference.

J. For intermittent feedings, the gavage tube may be left in place and secured for up to 72 hr, per manufacturer's recommendation, or may be removed after each feeding.

K. Prepare the feeding solution according to specific facility practice. This may include use of milk technicians, a specific designated area to be used for food prep, or other measures including warming of the feeding.

L. Intermittent feedings may be given by gravity, with the nurse holding the syringe barrel containing the formula or breast milk or placing the tube on a syringe or feeding pump. If the feeding is placed on a pump, the tube must be secured in place. Consideration of nutrient loss in the tubing should be made when giving feedings over time. Methods such as shorter feeding time, shorter tubing, and angulation of the syringe may all be helpful in avoiding nutrient loss.^{9,10,11(Level VI)}

M. When administering feedings by gravity, connect the syringe barrel or manufactured device to the feeding tube. Pour the feeding solution into the barrel. Insert the plunger into the barrel to start fluid flow. Adjust the height of the barrel to control flow speed. Do not push fluid in, but allow it to flow by gravity over an amount of time that may be expected for a feeding.

N. Offer a pacifier with feedings so the infant will associate sucking with a full stomach.^{12(Level V),13 (Level VII)}

O. After an intermittent feeding, clear the feeding tube with approximately 2 ml of water or air. Clearing the feeding tube of residual fluid may decrease growth of bacteria in the tubing.^{1,2(Level IV)}

P. Continuous feeding

1. Fill the syringe with human milk or formula. Connect the extension tubing to the syringe. Purge milk through the tubing.

2. Load the syringe and set the rate of infusion.

3. Check gavage tube placement as described above.

4. Attach the extension tube to the gavage tube and start the system to begin feeding.

5. Check the tube position by noting the mark at the lip line and the amount of fluid infused every hour.

6. Checking for residuals is controversial and alone may not indicate feeding intolerance. Increasing or changing residuals accompanied by abdominal distension, emesis, change in bowel sounds, change in activity level, or other signs of distress often are more informative.^{14(Level V)}

7. Notify the physician about any signs of feeding intolerance.

8. Provide developmental support for the infant and periodically offer opportunities for nonnutritive sucking.

VI. Documentation

A. Intermittent feeding

1. Document amount and type of residuals and tolerance of feedings.

2. Document what was fed, the amount, and the time.

B. Continuous feeding

1. Label the syringe and tubing with the date and time when changed. Also document in the medical record.

2. Document intake and output hourly or as appropriate based on the infant's acuity.

Related Document

Procedure: Perioperative Care

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Approvals: _____

Procedure: Exchange Transfusion: Double Volume and Partial Volume Level III and IV Nurseries

I. Purpose: To guide nurses when assisting in the process of exchange transfusion

II. Considerations

- A. Double-volume exchange transfusions are performed for alloimmune hemolytic disease of newborns, disseminated intravascular coagulation, congenital leukemia, metabolic toxin removal, removal of antibodies and abnormal proteins, and correction of severe hyperbilirubinemia that might lead to neurological sequelae.
- B. Partial-volume exchange transfusions are performed to decrease the hematocrit and whole-blood viscosity in polycythemic neonates with hyperviscosity or to correct severe anemia from acute blood loss.^{1(Level VII)}
- C. Blood used in double-volume exchange transfusions should be as fresh as possible, preferably less than 7 days old.^{1(Level VII),2(Level IV)}
- D. Use of blood irradiated less than 24 hr before the exchange is recommended to decrease the amount of potassium in the blood.^{1(Level VII)}
- E. Infants with a venous hematocrit higher than 65% may need a partial exchange to reduce the hematocrit. Treatment usually depends on the presence of signs and symptoms.^{3(Level VII)} An infant with a high hematocrit should be assessed for the following:
 1. Lethargy and irritability
 2. Hypotonia
 3. Tremors
 4. Poor sucking ability
 5. Tachypnea, tachycardia, respiratory distress
 6. Abdominal distension, decreased bowel sounds, poor feeding
- F. Fresh frozen plasma, Plasmanate, 5% albumin, and isotonic saline have been used as replacement fluids for whole blood withdrawn. However, it has been shown that crystalloid solution is just as effective in decreasing the hematocrit of neonates with polycythemia.^{4(Level II)}
- G. The volume of donor blood needed for the total procedure is equal to twice the calculated blood volume (80 ml/kg for full-term and up to 120 ml/kg for preterm infants) plus the volume for tubing dead space, including the blood warmer.^{1(Level VII)}

Volume for a partial exchange is calculated as follows^{1(Level VII)}:

For the purpose of correcting anemia:

$$\text{Volume (ml)} = \frac{\text{Infant's blood volume} \times (\text{desired Hgb} - \text{initial Hgb})}{\text{Hgb of PRBC} - \text{initial Hgb}}$$

For the purpose of correcting polycythemia:

$$\text{Volume (ml)} = \frac{\text{Infant's blood volume} \times \text{desired HCT change}}{\text{Initial HCT}}$$

H. A physician or an allied health professional (AHP) may perform an exchange transfusion.

I. To minimize blood pressure changes, blood should be withdrawn and reinfused in 5-ml aliquots every 3 min.^{5(Level V)} A double-volume exchange should take a minimum of 60 min once started.^{2(Level IV)}

J. Once initiated, the exchange transfusion should be completed without interruption, except for emergencies.

III. Equipment

- A. Emergency resuscitation cart and medications
- B. Sterile disposable exchange transfusion tray, including:
 1. Two 5-ml Luer-tipped syringes, one with a 23-gauge needle
 2. Two 20-ml Luer-tipped syringes
 3. Four-way stopcock
 4. Extension tubing (usually 33 in. long) with male-male ends
 5. 5-Fr and 8-Fr umbilical catheters, one each
 6. Blood administration setup or tubing with filter
 7. Fluid collection bag
 8. 15-cm ruler
 9. 4 × 4 gauze pads (usually three)
 10. Sterile wrap or drape
- C. Radiant warmer bed
- D. Soft restraints
- E. One (extra) extension tubing (if needed to reach the infant from the blood warmer unit)
- F. Hospital-approved skin disinfectant
- G. Sterile water or normal saline (to remove disinfectant)
- H. Suction equipment
 - I. Resuscitation equipment and oxygen source
 - J. Cutdown tray or umbilical line tray
- K. Sterile drapes
- L. Sterile, appropriately sized powder-free gloves, gown, and mask
- M. Cardiorespiratory monitor and pulse oximeter with cables and attachments
- N. Blood warmer and designated tubing
- O. Ordered blood product and blood bank documentation
 - P. Exchange transfusion record form per hospital documentation system
- Q. Point-of-care glucose meter and supplies

- R. Lab tubes and Microtainers
- S. Informed consent form
- T. Assisting registered nurse (RN)
- U. Chair with adjustable height (optional)

IV. Nursing knowledge

A. Special notes for any exchange transfusion

1. Keep the bedside flowsheet easy to read, with transfusion labs before and after the exchange.
2. Do not feed the infant before the exchange transfusion. If feeding has occurred recently, remove gastric contents by passing a gastric tube and aspirating stomach contents.^{2(Level IV)}
3. Monitor the infant for signs and symptoms of feeding intolerance or gastrointestinal bleeding after the exchange transfusion to reduce the risk of necrotizing enterocolitis.

B. Nursing knowledge

1. The nurse should be knowledgeable and competent in the care of infants who may be candidates for partial or double-volume exchange transfusions.
2. The nurse should be knowledgeable and competent in the setup and use of specific blood-warming equipment to be used.
3. The nurse should ensure a blood type and cross-match has been performed or is available before ordering blood for exchange transfusions.
4. The nurse should ensure the blood that is ordered and delivered is the freshest blood available for a double-volume exchange transfusion.^{1(Level VII)}
5. Despite the mention of the use of stopcocks in this procedure, the ongoing use of stopcocks in intravenous catheters should be avoided whenever possible because they have been linked to increased risk of infection.^{6(Level IV)}

V. Process

- A. Follow standard precautions while performing all steps of the procedure unless directed to use sterile precautions.
- B. Verify patient identification.
- C. Follow sterile procedure for insertion of the umbilical catheters, if used.
- D. Follow a universal protocol or timeout procedure before beginning the procedure.
- E. Ensure that informed consent has been obtained, as required, from a parent or legal guardian.
- F. Preprocedure preparations:
 1. Assign a dedicated RN and physician or AHP to the infant for the exchange procedure.
 2. Place the infant under a radiant warmer and keep a temperature probe in place throughout the procedure.

3. Attach the infant to a cardiorespiratory monitor and pulse oximeter for continuous monitoring during the exchange procedure.
 4. Place a blood pressure cuff on the infant's upper extremity and connect to the monitor for repeated blood pressure assessments at set time intervals (e.g., every 5 min).
 5. Restrain and monitor the infant's extremities with soft restraint devices.
 6. The physician or AHP will select the method of exchange transfusion (e.g., via arterial and venous umbilical catheters, a single umbilical line with stopcocks, or isovolumetric exchange with a peripheral venous catheter and peripheral arterial catheter).
 7. Provide additional infusion access if needed, to maintain hydration during and after the procedure. It is necessary to have intravenous dextrose available for medication infusion during this procedure.
 8. Ensure that blood components are checked according to hospital protocol.
 9. The volume for the partial-volume exchange transfusion should be divided into 3 or 4 equal aliquots of 5–10 ml/kg, not to exceed 20 ml.^{2(Level IV)}
 10. Place an oral or nasal gastric tube and aspirate the infant's gastric contents as indicated. The infant should be given nothing by mouth (NPO) throughout the exchange and for at least 4 hr afterward with a double-volume exchange.^{2(Level IV)}
 11. Labs will usually be collected either before the exchange transfusion begins or on the sample obtained from the first draw of the exchange. Additional labs may be ordered according to the infant's condition.
 - a. Complete blood count with platelets (central source)
 - b. Electrolytes, calcium, glucose
 - c. Blood gas
 - d. Bilirubin
 - e. Coagulation panel
 12. At a minimum, obtain the glucose level before, during, and right after the procedure because hypoglycemia and hyperglycemia are complications of a double-volume exchange.^{1(Level VII)}
- G. Perform the procedure.
1. Set up all necessary equipment using sterile technique.
 2. The assisting RN should attach the blood filter in the exchange transfusion tray to the bag of blood product and prime tubing for the blood warmer according to manufacturer instructions. The RN must ensure that the temperature on the blood warmer is set to the appropriate level per manufacturer's instructions.

3. The assisting RN should remain at the bedside continuously and observe the infant.
4. The RN should agitate the blood bag periodically to prevent red cells from settling.
5. Collect and process blood specimens during the procedure following hospital protocol.

H. Provide postprocedure care.

1. Continue NPO status for at least 4 hr after the procedure.^{6(Level VII)}
2. Continue to closely monitor vital signs for at least 2 hr after the procedure.^{4(Level VII)}
3. Send any necessary specimens to the lab 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.
4. Place infant under phototherapy as indicated.
5. All orders written before the procedure should be rewritten or renewed after the procedure as indicated.
6. Calcium gluconate 100 mg/kg may be given per a physician or AHP 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 decrease.

VI. Documentation

- A. Procedure performed and the full name of the physician, other practitioner, or advanced practice nurse who performed the procedure
- B. Date and time the procedure began and ended
- C. Results noted and steps taken during the procedure:
 1. Vital signs from the monitors at least every 15 min during the procedure
 2. Glucose checks hourly during and at the end of the procedure
 3. The infant's activity and any adverse reactions
 4. The amount of blood in and blood out with each cycle
 5. Lab specimens sent
 6. Medications administered

Related Documents

Policy: Hyperbilirubinemia

Policy: Skin Care

Procedure: Umbilical Arterial Catheters, Placement and Care of

Procedure: Umbilical Venous Catheters, Placement and Care of

Competency: Exchange Transfusion, Double Volume and Partial Volume

Competency: Hyperbilirubinemia, Care of the Infant with

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Procedure: Gastric Decompression

Level II, III, and IV Nurseries

- I. Purpose: To guide nurses when providing gastric decompression, thus minimizing vomiting and aspiration
- II. Considerations
- A. Gastric decompression may be accomplished by use of an 8-Fr or larger single-lumen gastric tube or a double-lumen tube available in a 6-, 8-, or 10-Fr size.^{1(Level VI)} Advantages of a double-lumen tube include the capacity for greater drainage and less risk of obstruction by the stomach wall.
 - B. Gastric tube insertion and maintenance may be used to treat various gastrointestinal and multisystem disorders with gastrointestinal involvement.^{2(Level VII)}
 - 1. Abdominal wall defects (e.g., omphalocele, gastroschisis)
 - 2. Obstruction (e.g., esophageal atresia, tracheoesophageal fistula, hypertrophic pyloric stenosis, malrotation, meconium ileus or plug, Hirschsprung disease, necrotizing enterocolitis, imperforate anus)
 - 3. Congenital diaphragmatic hernia
 - 4. Prune-belly syndrome (Eagle-Barrett syndrome)
 - C. Recommendations for gastric tube insertion and maintenance^{1(Level VI),3(Level VII)}
 - 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
 - 2. A double-lumen gastric tube should be drained with continuous suction at 40–60 mm Hg. If a single-lumen gastric tube is used, intermittent suction at 40–60 mm Hg is appropriate. Either may be used for gravity drainage.
 - 3. 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.
 - 4. Decreasing the risk of emesis and the potential for aspiration is integral to preventing further complications.
 - 5. Measuring the drainage accurately is necessary to maintain fluid balance.
- III. Equipment
- A. Tape
 - B. Drainage trap
 - C. Appropriate-sized gastric tube
- IV. Nursing knowledge
- A. Nurses should be competent in the use and troubleshooting of tubes used for gastric decompression.
 - B. Nurses should be competent and knowledgeable in presenting findings of common gastrointestinal conditions, including:
 - 1. Abdominal distention (ileus, intestinal obstruction, enlarged organ)
 - 2. Bowel movement irregularities (necrotizing enterocolitis, intestinal obstruction, imperforate anus)
 - 3. Bowel exposure (abdominal wall defect)
 - 4. Bilious vomiting (intestinal obstruction)
 - 5. Coughing, choking, drooling (tracheoesophageal atresia or fistula)
 - 6. Cyanosis with feeding (tracheoesophageal atresia or fistula).
- V. Process^{4(Level VII)}
- A. With the infant's head turned to the side, measure from the tip of the nose to the earlobe and then from the earlobe to midway between the xiphoid process and the umbilicus^{5(Level V)} and note the centimeter marking for placement. In the absence of preplaced markings on the tube, mark this length on the catheter to be inserted (tape may be used).
 - B. Moisten the end of the catheter with sterile water or a water-based lubricant.
 - C. Slowly and gently pass the catheter through the nare or mouth to the premeasured length. If resistance is met, consult the physician or an allied health professional (AHP). Do not force. Monitor the infant for bradycardia during insertion. If bradycardia occurs, stop insertion and remove tube to allow for recovery.
 - D. Tape the catheter securely and comfortably.
 - E. Connect the trap to suction as ordered. Measure and record drainage collected in the specimen trap every shift or as ordered. Record the color and character of the aspirate.
 - F. Notify the physician or AHP of any change in drainage color or quantity.
 - G. X rays are not routinely ordered but may be needed to check position in infants for whom proper positioning is in doubt.
 - H. After proper positioning is confirmed (refer to Enteral Tube, Insertion and Management of Procedure), note the centimeter mark at the nare or mouth and record it in the medical record or via a nurse-to-nurse communication tool. Note: Measure the tubing

only, not the hub or adapter. This mark should be checked every shift to assess for tube migration.

- I. Tubes should be changed every 72 hr or according to the manufacturer's recommendations. Note tubing changes on a sticker on the tube and in the medical record and via a nurse-to-nurse communication tool, if used.
- J. If secretions are very thick or drainage has stopped, the tube may be irrigated to prevent or correct plugging. 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. 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.

K. When calculating intake and output, subtract the amount of normal saline used as irrigant from the total output.

L. Do not block both nares unless the infant's airway is maintained because infants are obligatory nose breathers.

VI. Documentation

A. Initial documentation should include

- 1. The size of the gastric tube and the date and time inserted
- 2. Infant's tolerance of insertion

B. Ongoing documentation

- 1. Amount of drainage
- 2. Any replacement given and the specific interval

Related Document

Procedure: Perioperative Care

References

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Gastrostomy Tube Care Level II, III, and IV Nurseries

- I. Purpose: To provide guidance for postoperative and ongoing care of the gastrostomy tube
- II. Considerations
- A. When the gastrostomy tube is placed, the following information should be readily available:
 - 1. Type and size of tube or device used
 - 2. Tube length (measured in centimeters) from the insertion site to the distal end of the tube
 - 3. Balloon volume (if a balloon-tip catheter is used)
 - B. The initial dressing change after gastrostomy tube placement is usually performed 3–5 days after placement.
 - C. After the initial dressing change, site care should be performed every 24 hr and as needed if drainage is present.^{1(Level VII)}
 - D. Topical medication may be prescribed by the physician or allied health professional (AHP) for the prevention or care of skin breakdown and should be used only if ordered.
 - E. Site care will be done with normal saline only, then mild soap and water once the site has healed unless ordered otherwise.^{1(Level VII)}
 - F. Drainage, redness, or leakage around the site should be reported to the physician or AHP.
 - G. If a percutaneous enterogastric tube (PEG) is placed, the tube will need to be vented to allow gastric decompression. The stomach is inflated in order to perform the procedure.^{2(Level VII)}
- III. Equipment
- A. For dressing change
 - 1. Gloves
 - 2. Several 2 × 2 pads
 - 3. Normal saline
 - 4. Cotton-tipped swabs
 - 5. Soap
 - 6. Appropriate securement device
 - 7. Topical medication (as ordered)
 - B. For feeding
 - 1. Appropriately sized catheter tip syringe or adapter
 - 2. Feeding solution, as ordered
 - 3. Supplies for feeding pump or syringe pump, if applicable
- IV. Nursing knowledge
- A. After healing, various methods may be used to fix the gastrostomy tube: a catheter bridge, gauze bolster dressing, commercially available securement device, or modified, soft feeding nipple.^{2(Level VII)}
 - B. The following principles apply during maintenance and care of the gastrostomy tube^{2(Level VII)}:
 - 1. Make certain the tube is pulled up snugly against the skin but not so tight as to cause skin breakdown.^{3(Level VII)}
 - 2. Secure the tube to prevent inadvertent dislodgement.
 - 3. Fix the tube in a perpendicular position to prevent movement that could lead to a larger stoma, development of granulation tissue, and leakage around the tube.^{3(Level VII)}
 - 4. Regularly measure and document the external length of the gastrostomy tube to assess for tube migration.^{1,2(Level VII)}
- V. Process
- A. Specific hand hygiene and infection control measures as appropriate (refer to the Infection Prevention Policy)
 - B. Site care and dressing change^{1,2(Level VII)}
 - 1. Remove old dressing.
 - 2. Measure the gastrostomy tube length from the insertion site to the end of the tube.
 - 3. Using a cotton-tipped swab and normal saline, cleanse around the base of the insertion site until the site has healed.
 - 4. Once the site has healed, use 2 × 2 pads, soap, and water, to clean skin around the gastrostomy tube. If the infant has a skin-level device or button, clean around the appliance and the actual appliance. If a PEG is in place, rotate the tube with each cleaning. For a surgically placed gastrostomy tube, rotation cannot be done until the sutures are removed.
 - 5. Allow the skin to dry completely. Apply any topical treatment that has been prescribed.
 - 6. Use a single layer of a 2 × 2 gauze folded in half on either side of the wound or a foam dressing surrounding the base of the tube. Make certain the tube is pulled up snugly against the skin but not too tightly. Secure the tube to prevent inadvertent dislodgement. If the infant has a skin-level device or button, no further securing is needed. No dressing is needed on a PEG.
 - 7. When the area has healed (after approximately 2 weeks), leave the site open to air (with no dressing) unless there is drainage.
 - 8. Granulation tissue may develop around the stoma as a result of excessive movement of the tube or if the site is covered with a dressing. The following measures may prevent the formation of granulation tissue^{3(Level VII)}:

- a. Ensure tube is adequately secured as outlined above.
 - b. Do not leave dressing in place over stoma, allowing better stabilization of the tube.
 - c. If granulation tissue develops, notify primary provider because treatment may be necessary to remove this tissue.
9. Leakage may result from an enlarged stoma. This may occur as a result of excessive movement of the tube or the development of granulation tissue.^{3(Level VII)}
- a. Secure the tube adequately to prevent enlargement of the stoma.
 - b. If leakage occurs, protect skin from exposure to acidic gastric secretions in order to protect from breakdown. If signs of breakdown or infection are present, notify primary provider.

C. Feedings^{3(Level VII)}

- 1. Attach a syringe to the gastrostomy tube.
- 2. Assess for residual by aspirating the gastrostomy tube if intermittent feedings are ordered.
- 3. Allow the prescribed tube feeding to flow in by gravity. Feedings should take 15–20 min (or the length of time needed for nipple). The feeding should not be injected under pressure. For feedings to be given over a specified amount of time or continuously, use an infusion (syringe or feeding) pump.
- 4. Allow the infant to suck on a pacifier during feeding to fulfill normal sucking desire and to help with relaxation.
- 5. Follow the feeding and any medication administration with a small amount of sterile water (1–5 ml) to rinse the tube and prevent occlusion.
- 6. Disconnect and reclamp the gastrostomy tube. If the infant also has had a Nissen fundoplication, the tube should be vented or left open to air for 15–20 minutes or as ordered after the feeding. To vent the tube, suspend it with the barrel of a catheter-tip syringe attached.

D. Gastrostomy tube replacement^{1,2,4(Level VII)}

- 1. A Foley catheter the same size as the gastrostomy tube should be available for any infant with a gastrostomy tube in place. (This is not necessary if a button is in place because the button will not fall out.)

- 2. If the gastrostomy tube becomes displaced, it may be replaced with the Foley catheter to avoid stoma closure.
- 3. Lubricate the tip of the catheter with water-based lubricant and pass it into the opening. If any resistance is met, notify the physician or AHP. Note: Healing of the site generally occurs in 4–6 weeks. The tube should not be changed before this. If the tube inadvertently falls out before healing is complete, the tube will be more difficult to replace.^{1(Level VII)}
- 4. Once the Foley is passed into the opening, inflate the balloon with an appropriate amount of water to secure it in place (the catheter will be labeled with the balloon size).
- 5. Notify the physician or AHP that the gastrostomy tube has been replaced because additional measures may be necessary to confirm proper placement.

E. Parent teaching

- 1. Parents or primary caretakers should be included in the routine care of the gastrostomy tube, beginning in the immediate postoperative period, according to their desire and comfort level.
- 2. Teaching should include assessment and care for the site, bathing, feeding via gastrostomy tube, and troubleshooting problems with the tube.
- 3. Home care supplies should be obtained before discharge if the infant is to be discharged with a gastrostomy tube, including supplies necessary to replace the gastrostomy tube in case the tube falls out.
- 4. Written material regarding care of the gastrostomy tube should be provided for the family.

VI. Documentation

- A. Condition of the site and the amount of drainage from the site
- B. Appearance of skin integrity
- C. Infant's tolerance of feeding, dressing change, or gastrostomy replacement as appropriate
- D. Measurement of the gastrostomy tube after a dressing change or site care
- E. Any physician notification

Related Document

Procedure: Perioperative Care

Competency: Gastrostomy Tube Care

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Author: _____

Original Date: _____

Approvals: _____

Policy: Glucose Homeostasis Level I, II, III, and IV Nurseries

- I. Purpose: To guide nurses when monitoring for blood glucose changes and treatment of hypoglycemia or hyperglycemia
- II. Considerations
- A. The guidelines in this document apply to infants admitted to the neonatal intensive care unit (NICU) and not to otherwise healthy, full-term, or near-full-term newborns. These infants often tolerate lower glucose levels and, when hypoglycemic, can be adequately treated with oral feedings.^{1,2(Level I)} Screening for glucose homeostasis should be based on risk. Term, nonsick infants who are at an appropriate size for gestational age and are not infants of diabetic mothers (IDMs) often tolerate lower glucose levels and, once feedings are initiated, rebound quickly.^{1,2(Level VII)} The following categories of infants should be screened^{3(Level VII)}:
1. Small for gestational age
 2. Stressed or sick
 3. Large for gestational age or IDMs
 4. Born at less than 37 weeks
 5. With delayed feeding for any reason
- B. All infants admitted to the NICU should have an initial blood glucose screening completed within 30 min to 1 hr of birth or upon admission if already at or past this age.^{2,3(Level VII)} This is necessary because of the high risk of hypoglycemia in infants experiencing physiological stress or prematurity.^{3(Level VII)} Hyperglycemia is a risk in all critically ill infants. Low-birth-weight infants have a relative glucose intolerance and may be more likely to have hyperglycemia in the first few days or weeks of life.^{4(Level VII)}
- C. An infant's blood glucose level is often lower during the first 24 hr of life but should stabilize between 72 and 96 hr of age to levels similar to adult levels.^{4(Level VII)}
- D. Hypoglycemia and hyperglycemia are usually asymptomatic in neonates and are most often diagnosed in routine screening.^{5(Level VII)}
- III. Equipment
- A. Bedside blood glucose monitor
 - B. Lancet
 - C. Hospital-approved skin disinfectant
 - D. 2 × 2 gauze pad
- IV. Nursing knowledge
- A. Contrast whole-blood glucose with serum glucose results.^{3(Level VII)}
1. Bedside monitoring measures whole-blood glucose, which is considered an estimate of the blood glucose level. Whole-blood glucose may be 15% lower than serum glucose.
 2. Clinical laboratories measure serum glucose, which is considered the gold standard for glucose monitoring.
- B. Nurses should be knowledgeable and competent in blood sampling via indwelling catheter, heel stick, and venipuncture.
- C. When a blood glucose sample is obtained from an indwelling catheter infusing a glucose solution, the reliability of the value is uncertain.
- D. The definition of hypoglycemia is extremely difficult to establish. No consensus exists about the exact level at which treatment should be initiated.^{6(Level VII)} Consequently, alternative levels may be ordered by the physician or allied health professional (AHP) based on individual infant factors.
- V. Process
- A. Perform bedside blood glucose monitoring within 30 min to 1 hr of admission to the NICU.^{2,3(Level VII)}
- B. Screening should also occur in the following situations:
1. A significant change in dextrose solution delivered intravenously
 2. After intravenous (IV) fluids are initiated or changed
 3. In infants who have been receiving nothing by mouth for more than 6 hr without IV fluids
 4. Preoperatively and postoperatively
 5. In infants who are maintained on IV fluids, but access has been lost for a period exceeding 30 min
 6. In infants who show signs of low blood glucose at any time.^{2(Level VII)} Signs may include jitteriness, irritability, seizures, temperature instability, lethargy, poor feeding, emesis, apnea, pallor, cyanosis, and weak or high-pitched cry.^{3(Level VII)}
- C. When a bedside blood glucose level lower than 50 mg/dl is obtained, a sample should be sent to the laboratory for confirmation, but treatment should not be delayed.^{3(Level VII)}
- D. Blood glucose levels lower than 45 mg/dl or higher than 150 mg/dl should be reported to the physician or AHP unless ordered otherwise.^{2,3,5(Level VII),6(Level VI)}
- E. Treatment
1. Treatment is considered on an individual basis and is ordered by the attending physician or AHP.
 2. Treatment may include oral feedings, dextrose/glucose gel, IV glucose infusion, or a combination of these methods.
 3. For oral feedings, a feeding of at least 15 ml should be given. These feedings should be formula or

breast milk, which provides continued support to maintain a higher blood sugar.^{1(Level VII)}

4. Dextrose gel may be used in the following circumstances.^{7(Level II),8(Level VI)} This will provide treatment of hypoglycemia while supporting continued breastfeeding and prevention of IV therapy or admission to the NICU, if possible.
 - a. In infants who are unable to take adequate enteral feedings
 - b. As an alternative to feeding formula in order to support breastfeeding
 - c. When the infant does not have an IV line for other purposes^{8(Level VI)}
5. Administer 40% dextrose gel at 0.5 ml/kg into the buccal mucosa. Administer in four aliquots in alternating cheeks. Massage the infant's cheek gently to promote absorption.^{7(Level II)}
6. Indications for IV glucose infusion include the following^{6(Level VII),7(Level II)}:
 - a. Hypoglycemia is persistent and symptomatic despite other treatment.
 - b. The infant is unable to take enteral feedings, or enteral feedings are contraindicated.

- c. Oral feedings and dextrose gel do not maintain normal glucose levels.

- d. The initial glucose screening level is lower than 30 mg/dl.^{1(Level VII)}

7. IV glucose infusion treatment consists of a minibolus of 2 ml/kg of dextrose 10% followed by a continuous infusion of dextrose 10% in water at a rate of at least 80 ml/kg.^{2,3(Level VII)}

- F. Screening should be repeated every 15–30 min until the level is higher than 45 mg/dl on at least two consecutive tests.^{2,3(Level VII)} NOTE: Screening should reflect treatment of IV therapy within 15 min. If oral therapy is given, the effect should be seen within 30 min.

VI. Documentation

- A. Blood glucose value, communication with the physician or AHP, actions taken, and orders received
- B. The infant's symptoms, if any
- C. Response to treatment, as appropriate

Related Document

Competency: Admission to the NICU

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Author: _____

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Approvals: _____

Policy: Golden Hour: Initial Management of the Very-Low-Birth-Weight Infant Level I, II, III, and IV Nurseries; Labor and Delivery

I. Purpose: To deliver care during the first hour of life, also known as the “golden hour,” with emphasis on minimizing complications and improving outcomes in very-low-birth-weight (VLBW) infants. These complications may begin in the first hour of life but continue well beyond that time frame.^{1,2(Level I)}

II. Considerations

- A. This policy applies to the care of infants younger than 28 completed weeks’ gestation or weighing less than 1,500 g.^{1(Level VI)}
- B. Complications in these VLBW infants include hypothermia, chronic lung disease, hypoglycemia, intraventricular hemorrhage, sepsis, and retinopathy of prematurity.^{3(Level V),4(Level VI)}
- C. A skilled resuscitation team and the necessary equipment should be available at every delivery.^{5(Level VII)}
- D. If the delivery is imminent at a Level I or II neonatal intensive care unit (NICU) and maternal transport is not possible, the team should consider requesting a transport team from a Level III or IV NICU to attend the delivery, provide ongoing care, and ultimately transport the infant to an appropriate-level institution.

III. Nursing knowledge

- A. Registered nurses (RNs) attending deliveries of VLBW infants should be competent in the care of these infants and principles of neonatal resuscitation specific to this population.
 1. Simulation-based learning is beneficial to prepare for delivery of VLBW infants.
 2. RNs also should be knowledgeable about limits of viability concepts for VLBW infants and competent in parental support in situations in which resuscitation may not be provided.
- B. The golden hour concept strives to use evidence-based interventions to decrease the risk of complications in the VLBW infant. The interventions are in the following arenas:
 1. Delayed cord clamping
 2. Thermoregulation
 3. Respiratory support
 4. Cardiovascular support, specifically maintaining perfusion
 5. Optimal early nutrition, specifically preventing hypoglycemia
 6. Decreasing risk of infection
 7. Integration of the family in the care of the infant

IV. Process

- A. Delayed cord clamping and cord milking

1. Relative exclusion criteria may include mono-chorionic multiples, placenta previa, concern for abruption, Rh sensitization, hydrops, congenital malformations, or need for immediate resuscitation.^{6(Level VII)}
2. In cases of immediate need for resuscitation, there may be some benefit to cord milking.^{7(Level I)} The exact process for cord milking should be established and agreed upon (e.g., length of cord to be milked and number of times).
 - a. Although there is limited research available to compare cord milking with delayed cord clamping, studies are ongoing to compare these methods. Additional evidence may be available soon.
3. Optimal timing of delayed cord clamping should be established, and at least 30 seconds is recommended.^{8,9(Level VII)}

B. Normothermia

1. Normothermia is defined as a body temperature between 36.5 °C and 37.5 °C or 97.7 °F and 99.5 °F.^{10(Level V)}
2. Early or persistent hypothermia may lead to increased neonatal mortality, hypoglycemia, worsened respiratory distress, late-onset sepsis, and intraventricular hemorrhage.^{11(Level I)}
3. Various methods are available for maintaining normothermia in the VLBW infant.^{5(Level I)} These may include:
 - a. Increasing delivery room temperature to 26 °C to 28 °C or 78.8 °F to 82.4 °F
 - b. Use of a prewarmed radiant warmer, OmniBed, or incubator
 - c. Thermal mattress
 - d. Polyethylene wrap
 - e. Infant hat, which may be a plastic (polyethylene) hat or lined with polyethylene
 - f. Providing heated humidified gases during stabilization to improve temperatures^{11(Level I),12(Level IV)}
4. After delivery, without drying the infant, attach the temperature probe, cover with polyethylene wrap, and turn radiant warmer to servo control.
5. When multiple interventions are used simultaneously, care must be taken to avoid iatrogenic hyperthermia.^{13(Level I)}
6. Transport the infant to the NICU in a prewarmed incubator or transporter with the polyethylene wrap, thermal mattress, hat, and warmed positioning aids in place.
7. Humidification (40%–80%) aids in thermoregulation while supporting fluid balance.^{14(Level V)}

C. Respiratory support: The main goals of respiratory support at delivery are to achieve functional residual capacity (FRC) and appropriate tidal volumes (4–6 ml/kg) and decrease work of breathing while avoiding apnea, invasive ventilation, and damage to lung parenchyma.^{3(Level V)}

1. The use of sustained inflation, a positive pressure inflation from 5 to 15 s, has shown a significant reduction in the need for mechanical ventilation but no difference in bronchopulmonary dysplasia or death.^{15(Level II)} Nevertheless, this is a recommended intervention to prevent continuous positive airway pressure (CPAP) failure.^{16(Level VII)}
2. Surfactant facilitates the establishment and maintenance of FRC.
 - a. For infants needing CPAP, the intubation, surfactant, and extubation (INSURE) approach should be completed within the golden hour for infants in whom CPAP failure risk is thought to be high.^{16(Level VII)}
 - b. Infants needing intubation and assisted ventilation in the delivery room should be given surfactant once diagnosed with respiratory distress syndrome.
3. Ensure the availability of blended oxygen for use in the delivery room and for transport to the NICU. If using tanks, ensure they are full and engaged for transport.
4. Set the T-piece resuscitator to blender and adjust oxygen delivery appropriately. Ensure that the pulse oximeter is present and the probe is ready to be placed on the infant.
5. Ensure that intubation equipment is immediately available and prepared as necessary.
6. After delivery occurs, apply the pulse oximeter probe, intubate as indicated, and ventilate with a T-piece resuscitator. To help prevent oxidative stress, use the minimum amount of oxygen needed to maintain pulse oximetry according to the latest recommendations of the American Academy of Pediatrics Neonatal Resuscitation Program.^{5(Level I)}
7. Prepare for and assist with surfactant administration if warranted.

D. Cardiovascular support: Hypotension is poorly defined in the VLBW infant. Furthermore, evidence exists that infants who are treated for what is perceived to be low blood pressure are more likely to have worse short- and long-term outcomes.^{17(Level V)} The following may help support cardiovascular function:

1. Delayed cord clamping or cord milking^{18(Level II)}
2. Timely intravenous access with initiation of maintenance fluids
3. Assess the infant for signs of poor perfusion, a better indicator of need for treatment than blood pressure. Signs may include delayed capillary refill, weak pulses, poor muscle tone, and pallor or mottling.^{11(Level I)} Support perfusion with fluid resuscitation or vasopressors as ordered.

E. Hypoglycemia prevention^{3(Level V)}: Because of the interruption of glucose supply, delayed gluconeogenesis, and concurrent stressors, VLBW infants are at particularly high risk for hypoglycemia.

1. Measure glucose between 30 and 60 min after delivery.^{11(Level I),14(Level V)}
2. Initiate a dextrose infusion, ideally total parenteral nutrition, to maintain a glucose goal of 50–110 mg/dl.^{11(Level I)}

F. Intraventricular hemorrhage prevention

1. Maintain thermoregulation as above.
2. Provide developmental support and nonpharmacologic measures to decrease pain and agitation. Monitor pain scores as per unit standard of care and administer sedation or analgesia as needed.
3. Maintain midline head position for the first 3 days of life as a potentially better practice.^{19(Level V)}
4. Take care to withdraw blood and infuse medications or fluids at a slow rate to prevent rapid swings in blood pressure that may lead to intraventricular hemorrhage.^{20,21(Level V)}

G. Family support^{3(Level V)}

1. Communication with family is an essential aspect of golden hour care.
2. Family members should be updated with infant status and plan of care.
3. Family presence should be allowed as much as possible, with support and education regarding interaction with their infant.

V. Documentation

- A. Document all care and assessments in the infant's medical record.
- B. Document delivery room interventions on the delivery record (a copy should be available in the mother's chart).

Related Document

Policy: Deliveries, Attendance at

Competency: Golden Hour

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Author: _____

Original Date: _____

Approvals: _____

Policy: Guidelines for Nursing Care Level II, III, and IV Nurseries

- I. Purpose: To provide guidelines that describe the basic level of care all infants should receive
- II. Considerations
- A. All nursing care is provided in coordination and collaboration with the multidisciplinary healthcare team and the family to implement an individualized plan of care. Neonatal nurses will assess, determine the diagnosis or issue, plan, identify expected outcomes, implement, coordinate, promote health and a safe environment, evaluate, and document the infant's plan of care to promote optimal outcomes.^{1(Level VII)}
- III. Nursing knowledge
- A. Nursing staff in the neonatal care areas will be knowledgeable about and adhere to all applicable unit and hospital policies.
- B. Nursing staff will be competent in the care of infants to whom they are assigned. Each hospital should define the process through which competency is determined, defined, and documented.
- IV. Process
- A. Patient admission
- The admitting neonatal nurse will:**
1. Recognize and address life-threatening clinical signs.
 2. Perform and document an initial physical assessment within 2 hr, including airway, breathing, circulation, tone, level of consciousness, vital signs, pain, and comfort.^{2(Level VII)}
 3. Perform a comprehensive assessment in the first 12–18 hr.^{3(Level VII)}
 4. Measure and record length, weight, head circumference, and gestational age.
 5. Determine the need for support services and initiate referrals.
 6. Complete an emergency medication reference based on current weight and post it in a designated area. The emergency medication reference is updated weekly or at other defined intervals with the current weight.^{4(Level VII)}
 7. Apply identification bands and complete allergy identification per hospital policy.
 8. Initiate a written or computerized multidisciplinary and individualized plan of care.
 9. Orient parents/families to the unit and inform parents/families regarding handwashing, infant security, and visitation policies. Document parent orientation to unit.
- B. Ongoing infant care
- The neonatal nurse will:**
1. Perform a physical assessment within 2 hr of each shift with appropriate documentation.
 2. Weigh infants daily unless an order indicates otherwise. Document information in the infant's clinical record, including change in weight. Report excessive weight loss or gain to the physician or allied health professional (AHP).
 3. Measure head circumference and length weekly and document.
 4. Document a complete physical assessment at least once per shift. Focused assessments will be completed at appropriate intervals during the shift. Specific assessments to be completed are described below in sections C–G.
 5. Reposition infants every 3 hr and more frequently for at-risk infants. If this is not possible because of an infant's condition or care being provided, pressure-reducing measures should be implemented.
 6. Replace monitor leads and the oxygen saturation probe during baths or when items become loose or soiled. Reposition the pulse oximeter probe at least every shift.
 7. Provide oral care at least every shift and as needed.
 8. Perform and document pain assessment at least every shift or according to local regulations and infant conditions. Elevated pain scores or treatment should be followed with reassessment. Refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition.
 9. Notify the physician, AHP, or charge nurse regarding significant changes in an infant's condition.
 - a. When an infant's condition changes, nursing judgment warrants reassessment.
 - b. Document any notification, including any further assessment or treatment ordered.
 10. Offer an infant care conference to facilitate open communication between the family and caregivers^{5(Level VII)} at the family's request and any time there is a change in the infant's health status or other needs arise.
 11. Collect ongoing data from functional, psychosocial, developmental, emotional, mental, sexual, cultural, age-related, environmental, spiritual or transpersonal, and economic assessments of the infant and family.^{1(Level VII)}
 12. Continually evaluate the plan of care and document updates at least every 24 hr.

C. Neurological assessment

Neonatal nurses assess:

1. The anterior fontanel every shift and as needed.
2. Level of consciousness and behavior with vital signs and as needed unless ordered otherwise
3. Muscle tone, cry, and symmetrical movement each shift
4. Suck reflex present upon admission and suck-swallow coordination with feedings via nipple or breast

D. Cardiovascular assessment

Neonatal nurses:

1. Monitor and assess heart rate, respiratory rate, color, capillary refill time, perfusion, oxygen saturation (as applicable), cerebral/somatic regional saturation (as applicable), murmur, and any changes in heart sounds noted with vital signs and document.
2. Assess blood pressure at least every 12 hr.
 - a. Infants with arterial lines in place will have a transducer in-line. Blood pressure should be documented at least every 2 hr for these infants.
 - b. Document blood pressure every 4 hr or per order for infants on steroids or oral antihypertensives.
 - c. Document blood pressure every hour if the infant is on continuous infusion of vasopressors or antihypertensives.
3. Perform accurate intake and output monitoring on all infants who are receiving intravenous (IV) fluids or diuretics and on other infants according to nurses' judgment or physician or AHP order.
4. Notify the physician or AHP if urine output is less than 1 mL/kg/hr.^{6(Level VII)}
5. Calibrate the blood pressure transducer with change of caregiver, change of IV tubing, and as indicated.
6. Ensure that after cardiovascular surgery all infants with pacer wires have a pacemaker at the bedside.
7. Print or save monitor strips if an arrhythmia occurs.

E. Respiratory assessment

Neonatal nurses:

1. Assess breath sounds at least every 4 hr and as needed.
2. Assess respiratory effort with each infant interaction (at least every 4 hr).
3. Monitor oxygen saturation for every infant receiving oxygen and as ordered. When pulse oximeter in use, values will be documented every 2 hr for infants on oxygen and every 4 hr for infants on room air.
4. Assess episodes of apnea, bradycardia, and/or desaturation, whether on oxygen or room air,

intervene as needed, and document episodes and actions taken for recovery.

5. Check any necessary respiratory support at least every 2 hr. This may be done by the nurse or respiratory therapist.

F. Gastrointestinal assessment

Neonatal nurses:

1. Measure abdominal girth in the same location each shift and as needed to assess changes in abdominal assessment.
2. Inspect and document abdominal discoloration, abnormalities, surgical drains, and stomas.
3. Auscultate all abdominal quadrants for presence and character of bowel sounds every shift and as needed if feeding intolerance, increased abdominal girth, or change in frequency or characteristics of stool occurs.

G. Genitourinary assessment

Neonatal nurses:

1. Check diapers as needed and weigh if keeping accurate intake and output. If the infant does not qualify for accurate intake and output, diaper counts may be recorded.
2. Assess for diaper rash or fungal-like infection. If diaper rash occurs, refer to the Skin Care Policy.

H. Family-focused care

Neonatal nurses:

1. Assess and document the infant's and family's status upon admission, daily, and as indicated.
2. Listen to family concerns in a supportive manner.
3. Encourage parent and family presence and direct participation in care as appropriate.^{1(Level VII)}
4. Give emotional reassurance to families as needed.
5. Identify family support systems upon admission and as needed.
6. Plan care that is individualized to family values, beliefs, spiritual and health practices, preferences, choices, coping style, developmental level, culture, environment, and available technology when feasible.^{1(Level VII)}
7. Enter appropriate consults and referrals as needed.
8. Refer to social work as needed.

I. Family and caregiver education

Neonatal nurses:

1. Include the family or caregiver in care practices to increase their understanding of the infant's needs during hospitalization and upon discharge.
2. Orient parents and families to the unit guidelines and routines upon admission and throughout hospitalization.
3. Explain all procedures and interventions and the plan of care and encourage questions and discussion.

4. Assess learning needs upon admission and regularly thereafter. Document needs.
 5. Provide the family or caregiver with educational materials as needed regarding the ongoing care of the infant and discharge information.
 6. Provide cardiopulmonary resuscitation instruction as needed to families and caregivers of high-risk infants (infants on home monitors or home oxygen, siblings of victims or near-victims of sudden infant death syndrome, infants with heart disease, and any other infant believed to be at risk for an acute life-threatening event).
 7. Document all teaching and response to learning. Use teach-back methods.^{7(Level 1)}
- J. Infant safety
1. The family can expect age-specific interventions to be implemented to prevent injuries while the infant is in the hospital. Medical immobilization devices will be assessed according to policies and protocols.
 2. Environmental checks should be completed whenever a change of caregiver occurs. Environmental checks include ensuring the infant's identification bands are present and that the cardiopulmonary/oxygen saturation monitor is attached to infant. Alarms should be turned on with the appropriate limits set and audible, and the emergency equipment listed in section K below should be present.
 3. All continuous infusions should be clearly labeled with the name of the medication that is infusing as close as possible to the medication infusion site.
 4. Ensure that all infants have allergy bands (as applicable) according to hospital policy.
 5. The nurse or caregiver will be in close proximity at all times. If leaving the room, use remote monitoring, or another nurse is to be responsible for the infant.
 6. Bed wheels will be locked at all times except during transfer.
 7. Side rails on radiant warmers and open cribs should be up at all times unless a caregiver is next to the bedside.
 8. Locks on incubator doors, portholes, and warmer walls will be used at all times.
 9. Safety belts should be used when infants are placed in swings, car seats, vibrating chairs, or strollers per manufacturer instructions.
- K. Emergency equipment
1. A neonatal crash cart will be available on the unit at all times and checked according to hospital policy.
 2. Intubation boxes or kits, if used, will be checked daily to ensure they are stocked and secured and that there are no expired components.
 3. Delivery room supplies are checked at the beginning of each shift.
 4. Emergency equipment present at the bedside should include:
 - a. Mechanical suction with suction catheters
 - b. Blended oxygen
 - c. Resuscitation bag and appropriately sized mask
- L. Transfer of care
- Neonatal nurses:**
1. Provide a report to the oncoming neonatal nurse, including review of the infant's plan of care and outcome goals using a structured approach such as the situation, background, assessment, and recommendation (SBAR) format.
 2. Review all physician or AHP orders placed throughout the shift and verify status.
 3. Review the medication administration record.
 4. Assess the integrity of all vascular access sites, tubes, and drains.

Related Documents

Policy: Case Management and Family-Centered Care

Policy: Skin Care

Procedure: Suctioning: Oral, Nasal, or Pharyngeal

Competency: Admission to the NICU

Competency: Hemodynamic Monitoring, Invasive

Competency: Physical Exam

Developmental Care of Newborns and Infants, 2nd edition

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Hearing Screening Level II, III, and IV Nurseries

- I. Purpose: To guide personnel when performing hearing screening in the neonatal intensive care unit (NICU)
- II. Considerations
- A. In most states, universal hearing screening is required.
 - B. The following recommendations are made by the Joint Committee on Infant Hearing^{1(Level VII)}:
 1. Infants admitted to the NICU for more than 5 days are to have auditory brainstem response (ABR) included as part of their screening.
 2. Infants who do not pass automated ABR testing in the NICU should be referred directly to an audiologist for rescreening and, when indicated, comprehensive evaluation including ABR. For rescreening, a complete screening on both ears is recommended even if only one ear failed the initial screening.
 3. 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.
- III. Equipment
- A. Hearing screening device (ABR)
 - B. Associated equipment as defined by the manufacturer
 - C. Hospital-approved cleaning solution
 - D. Crib
 - E. Quiet location
- IV. Nursing knowledge
- A. Staff performing the hearing screen should receive training in use of the equipment and follow manufacturer's recommendations for the device used.
 - B. Early detection of hearing loss improves language outcomes.^{1(Level VII)}
 - C. Risk factors associated with permanent congenital, delayed-onset, or progressive hearing loss in childhood include the following^{1(Level VII)}:
 1. Family history of permanent childhood hearing loss
 2. NICU care for more than 5 days
 3. Extracorporeal membrane oxygenation
 4. Assisted ventilation
 5. Exposure to ototoxic medications (gentamicin, tobramycin, furosemide)
 6. Hyperbilirubinemia that necessitates exchange transfusion
 7. In utero infections (e.g., cytomegalovirus, rubella, syphilis, herpes, toxoplasmosis)
 8. Craniofacial anomalies involving the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies
 9. Findings associated with a syndrome known to include a sensorineural or permanent conductive hearing loss
 10. Syndromes associated with hearing loss or progressive or late-onset hearing loss (e.g., neurofibromatosis, osteopetrosis, Usher syndrome)
 11. Neurodegenerative disorders or sensory motor neuropathies
 12. Culture positive postnatal infections associated with sensorineural hearing loss
 13. Head trauma, especially basal skull or temporal bone fracture
 14. Chemotherapy
- D. Because some infants with hearing loss have no identifiable risk factors, a more inclusive strategy of surveillance and screening within the medical home is recommended.^{1(Level VII)}
- E. Infants should be quiet, recently fed, and in an open crib before hearing screening is performed.
- V. Process
- A. Obtain clean equipment.
 - B. Identify the infant with two patient identifiers.
 - C. Place electrodes and couplers on the infant per manufacturer's recommendation.
 - D. Follow manufacturer's instructions on performing the hearing screening.
 - E. Record results, including referral information.
 1. Pass: Document and inform primary care provider.
 2. Initial referral on one or both ears: Repeat screening for both ears as directed by state law.
 3. Refer on one or both ears: Notify the provider so a referral to audiology can be initiated.
 - F. Provide family education.
 1. Instruct parents on the importance of newborn hearing screening.
 2. Provide a hearing screening handout on the importance of continuing to observe for signs of hearing loss as the infant grows and develops.
 3. Provide documentation for the family regarding the results of hearing screening and any recommended follow-up.

VI. Documentation

- A. Hearing screening results
- B. Any referrals made
- C. Education provided to parents or family

Related Document

Competency: Hearing Screening

References

1. Joint Committee on Infant Hearing. Year 2007 position statement: principles and guidelines for early hearing detection and intervention programs. *Pediatrics*. 2007;120(4):898-921.

Author: _____

Original Date: _____

Approvals: _____

Policy: Human Milk: Pumping, Use, and Storage

Level I, II, III, and IV Nurseries

- I. Purpose: To provide guidelines for the safe collection, storage, and handling of human milk in the hospital setting
- II. Considerations
- A. Human milk is the feeding of choice for neonates and should be used unless medically contraindicated. Exclusive use of human milk in the first 6 months of life decreases rates of infant morbidity and mortality, maternal morbidity, and healthcare costs and is endorsed by the American Academy of Pediatrics and the Academy of Nutrition and Dietetics.^{1(Level I)}
 - B. The American Academy of Pediatrics and the Academy of Nutrition and Dietetics recommend initiation of pumping within the first 6 hr of life. There is some evidence that initiating milk expression within 1 hr of delivery increases milk volume in mothers of very-low-birth-weight (VLBW) infants.^{2(Level II)}
 - C. Human milk is given according to a feeding protocol or an order by a physician or allied health professional (AHP).
 - D. In general, use the first 2 weeks of human milk in chronologic order of expression.^{3(Level VII)}
 - 1. Freshly expressed milk is ideal, followed by refrigerated and then frozen.
 - 2. Freezing milk may result in degradation of immunological components.^{4(Level V)}
 - E. 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.^{3(Level VII)}
- III. Equipment
- A. Electric hospital-grade breast pump, with the ability to clean pump kit parts after each pumping
 - B. Storage containers
 - C. Labels with two patient identifiers and area for date and time
 - D. Facilities for mothers to wash their hands before and after pumping
 - E. Refrigerator and freezer space dedicated to the storage of human milk with thermometers for temperature monitoring
- IV. Nursing knowledge
- A. Human milk is a body fluid and should be handled with personal protective equipment.
 - B. Human milk should be stored and prepared in a manner that preserves its nutritional and immunologic integrity and minimizes bacterial growth.^{4(Level VII)}
- C. A centralized breast milk handling station and use of bar code scanning (system for proper identification) improves safety while reducing errors.^{5,6(Level VII)}
 - D. Skin creams including paraffin or any other product unsuitable for digestion should be avoided because milk contamination may occur.^{2(Level VII)}
 - E. Unit-based lactation consultants and registered dietitians are knowledgeable resources.
- V. Process^{2(Level VII)}
- A. Follow standard precautions while performing all steps unless directed to use sterile precautions.
 - B. Use a designated area for milk preparation and clean the area before preparing each feeding.
 - C. Label all milk containers with two unique patient identifiers and the date and time collected, thawed, warmed, or fortified as applicable.
 - D. Collection^{2(Level VII)}
 - 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. Pumping is begun within 6 hr of delivery.
 - 4. Mothers are instructed to pump at least eight times in 24 hr at approximately 2- to 3-hr intervals, with at least one pumping at night. Double pumping for approximately 15 min is recommended.
 - 5. 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.
 - 6. Combining milk expressed at different times (layering) for storage is not permitted for hospital use.
 - 7. Milk may be stored as colostrum, mature milk, or hind milk.
 - 8. The mother is provided with infant labels with two infant identifiers for use in labeling pumped milk.
 - 9. 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.
 - 10. 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.
 - 11. Milk pumped at home is transported to the hospital in a cooler tightly packed with frozen gel packs. Regular ice should not be used. For overnight

shipping, small amounts of dry ice (less than 5 lb) may be used.

12. 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.
13. Pump kit parts are cleaned with soap and water after each pumping.^{7(Level VII)}
 - 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.

E. 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^{2(Level I)}:
 - a. At room temperature: Use or refrigerate within 4–6 hr of pumping. With preterm or sick infants, it is safest to refrigerate milk immediately.
 - b. Refrigerated: Human milk may be safely refrigerated 4 days 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.^{2,8(Level VII)} Containers should be filled no more than $\frac{3}{4}$ 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.^{2(Level I)}
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).^{2(Level I)}

F. 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.^{9(Level VI)}

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.^{2(Level VII)}
4. Fortifiers should be added to milk at room temperature.^{2(Level VII)}
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.^{2(Level I)}

G. Thawing human milk^{2(Level VII)}

1. Frozen human milk may be thawed in a warm water bath before being placed in the refrigerator. Ensure that the lid does not contact the water. Thaw for the minimum time necessary, and the container must be removed from the warm water when the milk is liquid but still chilled.
2. Milk also may be slowly thawed at room temperature and refrigerated before it is completely thawed, while ice crystals are still present.
3. Human milk is labeled to indicate its expiration 24 hr after it is completely thawed; follow current recommended practice standards from the Human Milk Banking Association of North America.
4. The container of milk must be completely thawed and gently agitated in order to ensure uniform distribution of the nutrients.

H. Warming human milk^{2(Level VII)}

1. 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. Alternatively, a bottle or milk warmer may be used according to the manufacturer's instructions.
3. A microwave oven should never be used to warm milk.
4. Unused portions of human milk should not be refrigerated.

I. 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 a double-check, bar coding of milk, or other means. Meticulous attention is needed to ensure the correct milk is given to the infant.
2. Feedings should not be prepared more than 24 hr in advance.^{2(Level II)}
3. Human milk should be provided in a manner that ensures that nutrients, particularly fat, are delivered to the infant.^{5(Level I)}

- 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 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^{2,3,10}(Level VII):
- 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 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.²(Level VII)
 - 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:
 - 1) HIV on the donor mother or infant
 - 2) Human T-lymphotropic virus on the donor mother
 - 3) Hepatitis B on the donor mother
 - 4) Hepatitis C on the donor mother
 - 5) Cytomegalovirus on the donor mother

Related Documents

Policy: Donor Human Milk Use

Competency: Breast Pumping, Educating Mothers

Competency: Breastfeeding Dyad Care

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Author: _____

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Policy: Hyperbilirubinemia Level I, II, III, and IV Nurseries

I. Purpose: To reduce the incidence of severe hyperbilirubinemia and potentially bilirubin encephalopathy while minimizing the risks of unintended harm such as maternal anxiety, decreased breastfeeding, and unnecessary costs or treatment

II. Considerations

A. 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.

B. This policy applies to infants younger than 7 days (144 hr) and born at 35 weeks' gestation or later.

C. No physician or allied health professional (AHP) order is required to perform a transcutaneous bilirubin (TcB). Based on the results of the TcB, initial measures may be implemented and the physician or AHP notified.^{1(Level VII)}

D. 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. Determination for further actions should be made on the basis of the nomogram in **Figure 1**.^{2(Level VII)}

E. Infants seen in the emergency department who are younger than 7 days also may be evaluated with the bilirubin nomogram (Figure 1).^{3(Level VII)}

F. Phototherapy should be delivered at a minimum of 30 mcW/cm² per nanometer.^{4(Level VII)}

G. The physician or AHP should be notified in these circumstances:

1. When a serum bilirubin is performed^{1(Level VII)}
2. Whenever a TcB is in the high-risk zone or high-intermediate-risk zone according to the bilirubin nomogram (Figure 1) for infants born at 35–37 weeks' gestation (late-preterm infants)^{2(Level V)}
3. Whenever a TcB is in the high-risk zone according to the bilirubin nomogram (Figure 1) for infants born at 37 weeks' gestation or later
4. With value of TcB or serum bilirubin before discharge, regardless of bilirubin level

H. Indications for TcB

1. Healthy newborns^{2(Level VII)}
 - a. All infants at discharge
 - b. Any infant who appears jaundiced within the first 24 hr
 - c. Any infant who appears jaundiced at any time before initiation of phototherapy

2. All infants in the neonatal intensive care unit (NICU) with gestational age of at least 35 weeks
 - a. Those who appear jaundiced within the first 24 hr
 - b. Those who appear jaundiced at any time before initiation of phototherapy
 - c. Those discharged from the NICU while younger than 7 days of age if no serum bilirubin has been ordered, in which case the TcB should be done within 4 hr of discharge
3. Infants admitted via the emergency department who are younger than 7 days old and appear jaundiced or are seen for a primary complaint of jaundice

III. Equipment

- A. Transcutaneous bilirubinometer
- B. Phototherapy lights capable of providing at least 30 mcW/cm² per nanometer^{4(Level VII)}
- C. Eye covers
- D. Dosimeter to check irradiance of phototherapy lights when placed over infant^{5(Level VII)}

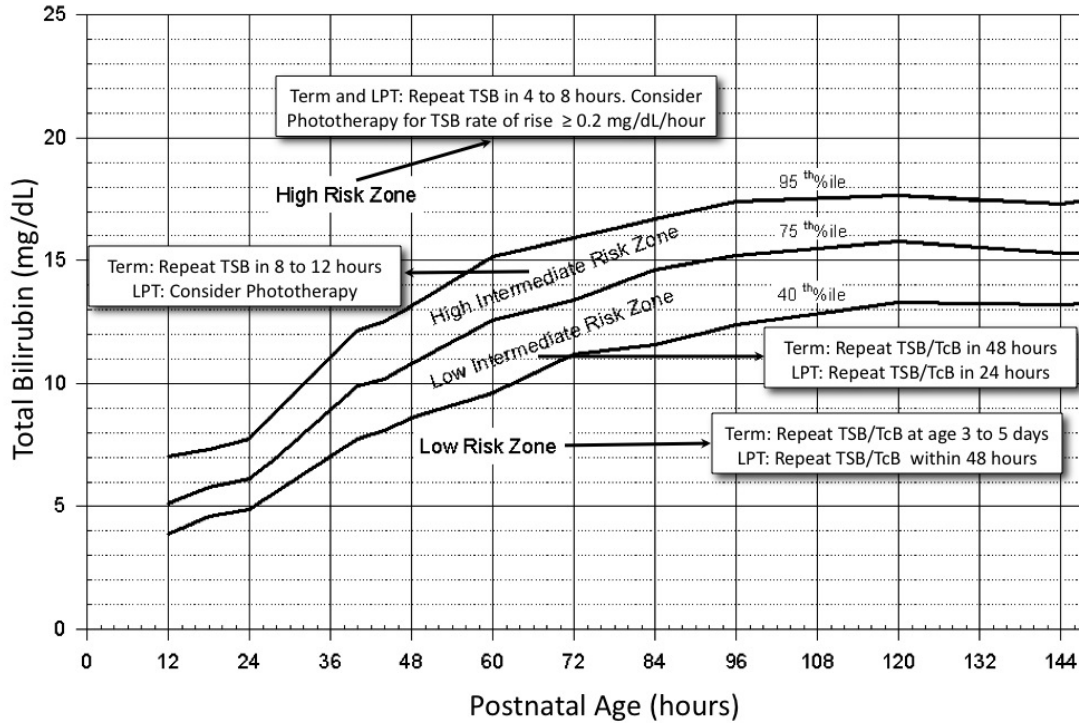
IV. Nursing knowledge

- A. Registered nurses should have knowledge of the effects of hyperbilirubinemia in newborns.
- B. TcB is an accurate method of measuring the infant's bilirubin that does not require obtaining a blood sample.^{6(Level II)} This method may be used but is not required. Alternatively, a serum bilirubin may be obtained.
- C. All personnel caring for infants should receive training in the most current recommendations published by the American Academy of Pediatrics regarding hyperbilirubinemia recognition and care in newborns.

V. Process

- A. If a TcB has been performed and the value is higher than 12 mg/dl (or a level recommended by manufacturer), a total serum bilirubin (TSB) should be drawn immediately and the physician notified according to the risk zone and gestational age.^{7(Level II)}
- B. Regardless of the TcB level, the physician should be notified before discharge. The follow-up plan should be reviewed with the physician based on TcB and risk factors.
- C. Provisions should be made for starting phototherapy if the physician cannot be contacted within a reasonable amount of time.

Figure 1. Management and Follow-Up Guidelines for Repeat Bilirubin Testing Based on Predischarge Screening for Full-Term and Late-Preterm Infants



Note: LPT = late preterm; TcB = transcutaneous bilirubin; TSB = total serum of plasma bilirubin. Original nomogram courtesy of Vinod K. Bhutani, MD FAAP, professor of pediatrics—neonatology, Stanford University School of Medicine, Lucile Packard Children's Hospital, Stanford, CA

- D. Follow-up appointments should be recommended to parents after discussion with the discharging physician or AHP regarding the predischarge TcB or serum bilirubin level and risk factors for severe hyperbilirubinemia.
- E. If the mother is breastfeeding, adequacy of breastfeeding should be evaluated before discharge and provision for follow-up established.
- F. Irradiance should be measured when lights are started and every 12 hr.^{5(Level VII)} Irradiance varies by distance from the infant and center of the light diode and periphery. Therefore, irradiance should be checked regularly while in use.
- G. For infants under phototherapy, TSB levels should be followed per physician or AHP orders. If TcB levels are used, an area of skin must be protected from the phototherapy light.^{8,9(Level IV)}
- H. Lights should be turned off for blood collection for TSB levels.
- I. Infants younger than 7 days of age who are brought to the emergency department with visible jaundice should be treated as follows:

1. The infant should be assessed for gestational age, age in days or hours, and presence of risk factors in addition to TcB level to determine further treatment. Further treatment should be determined by the physician or AHP.
2. Phototherapy, when indicated, should be started immediately while admission and placement of the infant are determined. If admission or placement can occur within 30 min, phototherapy may be delayed until admission.

VI. Documentation

- A. TcB reading
- B. Use of phototherapy and eye covering
- C. Phototherapy dosimeter reading every shift
- D. Parent teaching

Related Documents

Procedure: Exchange Transfusion: Double Volume and Partial Volume

Procedure: Late-Preterm and Early Term Infants, Caring for Competency: Hyperbilirubinemia, Care of the Infant with

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Hypothermia, Induced Level III and IV Nurseries

I. Purpose: To provide guidelines for the safe initiation and knowledgeable nursing management of 72-hr induced therapeutic hypothermia for infants with moderate to severe hypoxic ischemic encephalopathy (HIE)

II. Considerations

A. In cases of perinatal hypoxia-ischemia, induced therapeutic hypothermia (cooling), when initiated before 6 hr of age, has been shown to reduce mortality and not increase major disability in survivors. This therapy has been demonstrated to be safe, and its benefits outweigh the known short-term adverse effects.^{1,2(Level I),3(Level II)}

B. Early identification of HIE is imperative, and nursing care throughout the cooling procedure is critical to its timely and successful implementation. However, a recent trial evaluated the effect of late hypothermia (6–24 hr after birth). Although it was shown to have some benefit, it was not as great as in studies where cooling was started at 6 hr or less.^{4(Level II)}

C. Current evidence and a consensus of professionals supports the use of therapeutic hypothermia for the following infants^{1,2(Level I),3,5,6(Level II)}:

1. Infants who

- a. Were born at 36 0/7 weeks' gestational age or older
- b. Weigh 1,800 g or more
- c. Are less than 6 hr old

2. Other groups who may benefit from therapeutic hypothermia include infants who have moderate to severe HIE but cannot be cooled within 6 hr^{4(Level II)} and infants born at 35 weeks' to 35 6/7 weeks' gestational age.^{1(Level I)}

3. Infants with any one of the following^{7(Level II)}:

- a. Evidence of HIE with seizure activity at less than 6 hr of age
- b. Cord blood or blood gas within the first hour after birth with pH 7.0 or less or base deficit 16 mmol/L or greater
- c. If pH is 7.01–7.15, base deficit is 10–15.9 mmol/L, or no blood gas is available, the following criteria should be met: evidence of an acute perinatal event and either a 10-min Apgar score 5 or less or assisted ventilation initiated at birth and continued for at least 10 min.

4. Infants with evidence of moderate to severe encephalopathy as defined by the Sarnat score, a staging system used to classify the degree of encephalopathy,^{8(Level IV)} or similar clinical manifestations^{4,9(Level II)}

5. Infants who are eligible based on the use of amplitude-integrated electroencephalography (aEEG) or electroencephalography (EEG) for eligibility

- a. Depending on the method of cooling and individual hospital policy, aEEG or EEG may be used to determine eligibility for cooling.
- b. A moderately or severely abnormal aEEG background pattern or seizures with a history of a perinatal event may be applied to determine infant eligibility for cooling in using some cooling methods (e.g., selective head cooling).^{9(Level II)}

D. Exclusion criteria (these are relative, not absolute, criteria for exclusion)^{1(Level I),9(Level I)}:

1. Less than 35 weeks' gestation^{1(Level I)}
2. With a birth weight less than 1,800 g
3. With major congenital abnormalities including:
 - a. Imperforate anus
 - b. Tracheal–esophageal fistulas
 - c. Suspected neuromuscular disorders
 - d. Suspected significant chromosomal abnormalities
 - e. Life-threatening abnormalities of the cardiovascular or respiratory systems
4. So severely affected that there was little hope for normal outcome; that is, moribund or in extremis (e.g., very low blood pressure [BP] or severe acidosis unresponsive to treatment)

E. Both whole-body and selective head cooling are currently acceptable methods to induce therapeutic hypothermia. To date, long-term follow-up of infants enrolled in clinical trials has not shown one particular method to be more effective than another.^{1,2,9(Level I)}

F. Inclusion criteria for the decision to use hypothermia can vary by institution. Recent trials have demonstrated that cooling longer than 72 hr or deeper than 33 °C–34 °C may not confer benefit and may increase the rate of complications.^{10(Level II)} Another recent randomized controlled trial evaluated the effect of cooling after 6 hr of age. Although benefit was shown with later cooling, this should be the practice only if cooling within 6 hr is not possible.^{4(Level II)}

III. Equipment

- A. Regardless of cooling method, access to core temperature monitoring equipment is necessary.
1. Rectal temperature monitored at a depth of 5–6 cm^{11(Level II)}

2. Esophageal temperature also is an acceptable core temperature surrogate during whole-body cooling.^{7(Level II)}

B. Skin temperature monitoring equipment

C. Whole-body cooling: Several methods have been used to deliver whole-body cooling to infants with HIE. Although servo-controlled cooling provided better thermoregulation, outcomes were not different based on cooling method used.^{12(Level III)} Based on the increase in adverse events in the infants cooled to a lower temperature or for a longer time period, care should be taken to avoid overshoots in hypothermia.^{10(Level II)}

D. Selective head cooling combined with mild systemic hypothermia^{5(Level II)}

IV. Nursing knowledge

A. Nurses caring for infants undergoing cooling should understand the pathophysiology of HIE, the clinical signs and symptoms of HIE, and the ways hypothermia works to treat HIE.

B. Induced mild hypothermia (a reduction in core body temperature by 2 °C–4 °C) is a proven treatment for infants with HIE.^{1,9(Level I)}

C. Hypothermia is preferably initiated before 6 hr of age and continues for 72 hr to provide the most benefit.^{4,9(Level I),13(Level II)}

D. Therapeutic hypothermia, regardless of method, causes expected systemic effects that reverse during rewarming.^{13(Level I)}

E. One of the hallmarks of HIE is multisystem organ dysfunction.^{8(Level II)} Some (but not all) of these classic symptoms can be exacerbated by hypothermia.^{11(Level II)}

F. The following physiologic changes occur during hypothermia and are considerations for nursing care:

1. Effects on the cardiovascular system: These are the most pronounced side effects of hypothermia.^{13(Level II)}

a. The most common arrhythmia seen in the hypothermia state is sinus bradycardia.^{5,6(Level II)}

b. A decrease in heart rate of 14 beats per min is expected for every 1 °C of cooling.^{11(Level II)}

c. A normal neonatal heart rate (120–160 beats per min) during the cooling phase should be considered abnormal. Causes of tachycardia such as pain and agitation from being cold, hypovolemia, or anemia should be considered and resolved.^{11(Level II)}

2. BP

a. Monitor the infant's BP frequently and notify the physician or allied health professional (AHP) if it falls outside the normal or prescribed range. Normal values are the same as for normothermic infants. However, noninvasive mean and diastolic BP readings may be underestimated.^{14(Level III)}

b. Infants may need volume replacement and vasopressor support to be initiated, continued, or discontinued during cooling and again during rewarming.^{13(Level II)}

c. Hypertension

1) Some infants may experience an increase in BP due to peripheral vasoconstriction.

2) Mean arterial pressures of 45–65 mm Hg are not uncommon, and vasopressors may need to be discontinued during the entire cooling phase and resumed during rewarming as the vasoconstriction reverses.^{11(Level II)}

d. Hypotension

1) The incidence of hypotension was not increased by cooling.^{3,6,15,16(Level II)}

2) Expected treatment of hypotension is the same as for normothermic infants.^{11,13(Level I)}

a) First, correct hypovolemia.

b) If reduced myocardial contractility is suspected or documented by cardiac echo, dobutamine would be an appropriate treatment choice. Administer according to the physician or AHP order.

c) If the infant is not hypovolemic or having poor myocardial contractility, dopamine would be an appropriate treatment choice. Administer according to the physician or AHP order.

3) Inotropes for hypotension: Dosages are unchanged for the management of hypotension during hypothermia.^{11,16(Level I)}

3. Vascular access

a. Because of peripheral vasoconstriction, it is critical to obtain vascular access before initiating passive or active cooling.

b. A double-lumen umbilical venous catheter is recommended.

c. Arterial access (umbilical arterial catheter or peripheral arterial line)

d. Secure at least one additional peripheral intravenous (IV) line.

1) Avoid scalp IVs because they may interfere with EEG or aEEG electrodes and will have to be removed for head cooling.

4. Fluids, electrolytes, and nutrition

a. Follow physician orders for feeding status.

1) Typically infants will be kept on nothing by mouth status during cooling and rewarming.^{11(Level II),16(Level I)}

b. Administer fluids according to physician or AHP orders.^{13(Level II)}

1) Fluids typically will be started at 60–80 ml/kg/day on the first day of life, the same as for normothermic infants with HIE.

- a) Fluids do not need to be further restricted during cooling unless evidence of renal failure or inappropriate antidiuretic hormone is present.^{17(Level II)}
 - b) Cooled infants may need more fluid administration than normothermic infants with HIE because they tend to shift intravascular volume to the interstitial space, causing an intravascular depletion.
- 2) If there is evidence of hypovolemic hypotension, additional fluid boluses may be indicated as ordered by the physician or AHP.

5. Glucose metabolism^{13(Level I)}

- a. Obtain a baseline blood glucose level before cooling and monitor frequently throughout cooling according to physician orders, hospital policy, or patient indications. Hyperglycemia is common during cooling, but hypoglycemia may also be seen.^{13,16(Level I)}

6. Urine output

- a. Consider placing an indwelling urinary catheter (per physician or AHP order) for careful monitoring and to prevent urinary retention secondary to sedation or paralytics.
- b. Cooling can cause a delay in the typical postinsult increase in creatinine expected in infants with HIE.^{11(Level II)}

7. Coagulation, complete blood count, platelets^{13(Level I)}

- a. Monitor for bleeding and report as appropriate to the physician or AHP. Transfuse as ordered.
- b. Watch for thrombocytopenia, neutropenia, and polycythemia on laboratory results.
- c. Clotting times can be increased with cooling, but not significantly.

8. Ventilation and blood gas values^{11,13(Level I)}

- a. Temperature affects the partial pressure of gases. Confer with the physician or AHP and respiratory therapist to determine whether blood gases will be run at the infant's temperature or uncorrected at 37 °C. Refer to **Table 1** for target values.
- b. The PaO₂ and pH ranges should be the same as for noncooled infants.
- c. Because of the overall decreased metabolic rate, expect carbon dioxide production to be lower during cooling.
- d. Not all infants will need mechanical ventilation during cooling, but hypocapnia and hyperoxemia should be avoided during cooling. Self-ventilating infants may try to compensate for their metabolic acidosis and exacerbate their hypocapnia. In extreme cases, these infants may need intubation and mechanical ventilation.

Table 1. Target Values During Hypothermia

Temperature (rectal)	33.5 °C ± 0.5 °C (preferably less variability than 0.5 °C)
Mean arterial blood pressure	45–65 mm Hg
O ₂ saturation	>93%–98%
PCO ₂	45–58 mm Hg (when analyzed at 37 °C, the true value in the hypothermic state is lower by a factor of 0.83)
PO ₂	60–100 mm Hg
<i>Note. Original material used with permission of Marianne Thoresen, MD PhD, professor of neonatal neuroscience, University of Bristol Department of Child Health, St. Michael's Hospital, Bristol, United Kingdom.</i>	

- e. Do not turn off or decrease the temperature set point on the ventilator circuit heater or humidifier during cooling.
 - f. Secretions are thicker during hypothermia.^{11(Level II)}
 - 1) Monitor frequently for the need for suctioning and perform as indicated. (Refer to the Suctioning the Mechanically Ventilated Infant Procedure.)
 - 2) Reposition the infant frequently to keep secretions mobile.
9. Persistent pulmonary hypertension of the newborn (PPHN)^{13(Level I)}
- a. Place preductal and postductal pulse oximeters on the infant.
 - b. Pulmonary vascular resistance has been shown to increase with hypothermia but also can increase in normothermic infants with HIE.
 - c. If needed, inhaled nitric oxide can be administered in the same manner as for normothermic infants.
 - d. The need for extracorporeal membrane oxygenation to treat PPHN does not preclude an infant from receiving cooling therapy to treat HIE. However, for some infants, rewarming (even slight) may be sufficient to reverse PPHN.^{16(Level I)}
10. Skin care and assessment
- a. Reposition the infant every 2 hr.^{18(Level VII)}
 - b. Monitor skin integrity of all dependent areas at least every 12 hr and be alert for sclerema, bruising, exaggerated acrocyanosis, fat necrosis, erythema, and cyanosis.^{18(Level VII)}
 - c. If the infant is receiving head cooling, the water cap should be removed every 12 hr so a thorough assessment of the scalp can be performed.^{19(Level II)} The heat shield should remain in place to minimize drafts and prevent inadvertent and unnecessary warming of the scalp. The cap should be reapplied as quickly as possible to minimize interruptions in cooling.

11. Medication administration
 - a. No change in drug choice or dosage is currently recommended during hypothermia.^{11(Level II),16(Level I)}
 - b. Drugs excreted by the kidneys are less affected by hypothermia. Gentamicin serum levels are unchanged by cooling.^{19(Level II)}
 - c. Drugs excreted by the liver (e.g., morphine, phenobarbital, and vecuronium) may have higher levels during cooling.^{11(Level II)}

12. Neurologic effects

- a. Seizures
 - 1) Infants undergoing cooling should be observed carefully for any behaviors that may indicate seizure activity. Any observed seizure activity should be reported promptly because traditional treatment regimens can be used during cooling.^{11(Level II)}
- b. EEG and aEEG monitoring^{11(Level II),16(Level I)}
 - 1) A linear relationship exists between temperature and recorded EEG amplitude. Raw EEG amplitude is decreased by 0.6 microvolts for every 1 °C decrease in temperature.
 - 2) Because selective head cooling cools the cortex more than whole-body cooling, one might expect to see changes in EEG or aEEG during rewarming.
 - 3) When available, continuous EEG or aEEG monitoring should be used throughout cooling.
 - a) Continuous monitoring can assist in the identification of subtle or subclinical neonatal seizures.^{11(Level II),16(Level I)}
 - 4) EEG or aEEG monitoring can also assist in the identification and management of seizures throughout the procedure.^{11,20(Level II),16(Level I)}

V. Process

A. Delivery room management and transfer of infants to cooling centers

1. The physician or AHP will determine an infant's eligibility for cooling and confirm that no contraindications or exclusionary criteria exist. It is critical that eligibility for cooling is determined and arrangements for transfer are made as soon as possible after delivery (even during resuscitation) because cooling is more effective the earlier it begins.
2. If cooling is not offered at the birth hospital, the physician or AHP should contact the closest referral center to determine eligibility for cooling and initiate transfer as quickly as possible.
3. Nursing assessment: Infants at risk for HIE because of an acute event at delivery often can appear to recover shortly after birth, which leads to a false sense of security. Consequently, it is

critical for nurses to be aware of the subtle signs of HIE, particularly seizures, and notify the physician or AHP promptly to report changes in the infant's condition.

B. Initiation of passive cooling

1. Passive cooling should be done in a controlled manner and only at the direction of a physician or AHP.
 - a. If an infant is to be transferred, initiate passive cooling only at the direction of the accepting institution. Measures must be taken to prevent hyperthermia or hypothermia^{10(Level II),21(Level IV)} and maintain the infant's temperature using a servo-controlled environment at 36 °C until a transport team arrives.
 - b. If an infant is to be cooled at the birth hospital, initiate passive cooling according to physician or AHP orders while setting up active cooling equipment.
2. Target core temperature during passive cooling is 34 °C–35 °C.
3. Monitor the infant's temperature frequently (no less than every 15 min if continuous monitoring is not available) to prevent overcooling, which can easily occur when external heat sources are removed.^{11(Level II),22 (Level IV)}

C. Active cooling phase

1. Verify parental consent for cooling if required by hospital policy.
2. Care can be provided on a radiant warmer or inside an incubator during the active cooling phase.
3. Follow the manufacturer's manual for proper setup of whole-body cooling or selective head-cooling systems.
4. Induce hypothermia to the desired target temperature and maintain for 72 hr.
 - a. Whole-body cooling target core temperature is 33.5 °C.
 - b. Selective head cooling target core temperature is 34.5 °C. Although the scalp temperature is much lower, the target core temperature goal is 34.5 °C.
5. Monitor core (rectal and esophageal) and skin temperature continuously and document according to hospital protocol throughout the induction and cooling phase. Servo-controlled systems for delivering hypothermia will result in fewer temperature fluctuations compared with manually controlled systems.^{9(Level I),11(Level II)}
6. Prevent increased metabolic demands and endogenous heat production throughout the 72 hr of cooling.
 - a. Optimize sedation and minimize stress associated with cold and shivering.

- 1) Provide adequate sedation and pain management to reduce stress throughout the cooling therapy according to physician or AHP orders. (Refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition.)
 - 2) When using continuous drip sedation, observe carefully for oversedation because the dosage may accumulate as the result of delayed metabolism or excretion of medication.^{16(Level I)}
- b. Closely monitor the infant for evidence of seizures, which increase metabolic demand.
7. If fluctuations outside the target temperature range occur during the cooling phase:
- a. Confirm that the temperature probe is well placed and secured. If not, replace and resecure.
 - b. Confirm that all settings on cooling equipment are correctly chosen and equipment is positioned to allow proper function (e.g., good water level and flow, no kinked hoses, etc.).
 - c. Ensure that radiant warmer is off with whole body cooling and in servo-control mode for selective head cooling.
 - d. Monitor temperature continuously until the target temperature is attained.
 - e. If providing selective head cooling with the Olympic Cool-Cap System, an onscreen guide is available and should be followed:
 - 1) Make small manual adjustments of 0.1 °C–0.5 °C to the cap water temperature. Typically the cap water temperature is adjusted first until the lowest set temperature is achieved, and then adjustments are made with the radiant warmer.
 - 2) Wait 45 min to evaluate the effect of each change in set point before making an additional change.
 - f. Whole-body cooling
 - 1) If using a manually controlled blanket, make slow adjustments as needed to maintain target core temperature.
 - 2) Wait 30 min to evaluate the effect of each change in set point before making an additional change.
8. If an infant must be transported from the unit during cooling, continuously monitor the temperature and safeguard against overcooling during the transport and throughout the procedure.^{11(Level II)}
- D. Rewarming
1. It is highly recommended to resume or continue EEG or aEEG monitoring, when available, throughout rewarming to assess for and confirm the presence of clinical and subclinical seizures.^{11,20(Level II)}
 2. For infants receiving whole-body cooling
 - a. After 72 hr of maintaining core temperature at 33.5 °C, start the rewarming process by increasing the cooling system set point by 0.5 °C every hour until a core temperature of 36.5 °C is reached.
 - b. Remove the core temperature probe and place the radiant warmer on servo-control with the temperature set 0.5 °C higher than skin temperature. Increase the set temperature 0.5 °C every hour until the 36.5 °C set point is reached.
3. Selective head cooling with the Olympic Cool-Cap System
- a. Follow the Cool-Cap System guide throughout the rewarming phase.
 - b. Main steps in this phase:
 - 1) Remove the cap and the heat shield.
 - 2) Set the radiant warmer servo set point 0.3 °C above the infant's rectal temperature.
 - 3) Increase the servo set point on the radiant warmer by 0.2 °C–0.3 °C every 30 min.
4. Regardless of method, rewarming can be done more slowly if needed according to the infant's tolerance of the rewarming process but never more quickly. Rewarming will take approximately 4 hr to complete at a rate of no more than a 0.5 °C increase each hour,^{5(Level II)} but some advocate longer rewarming phases.^{11(Level II)}
5. During rewarming, expect a reversal of the side effects that were caused by hypothermia (e.g., bradycardia, hypertension, glucose instability, coagulopathies). Closely monitor the infant's vital signs and notify the physician or AHP if evidence of physiologic instability occurs.
- E. During the 24 hr after rewarming
1. Avoid hyperthermia after cooling.^{11,21(Level IV)} Set skin temperature point at 36.5 °C and adjust accordingly with frequent monitoring. Hyperthermia has been associated with adverse outcomes.
 2. Do not put a hat on the infant.
 3. Monitor for seizures.
 4. Do not expect infants to immediately awaken after rewarming. Infants may have delayed clearance of sedating medications. Recovery from HIE is prolonged, even when a long-term positive outcome is anticipated.^{20(Level II)}
- F. Follow-up care
1. Hospitals providing hypothermia for HIE outside research trials should submit data to a national or international registry (such as the Vermont Oxford Neonatal Encephalopathy Registry or the TOBY Registry), which will allow for continued benchmarking of short- and long-term outcomes of infants treated with hypothermia and monitor the incidence of adverse effects and events associated with the treatment.^{9(Level II)}

2. Magnetic resonance imaging at 7–14 days of age is recommended.^{3,9(Level I)}
3. At discharge, infants should be referred for neurodevelopmental follow-up until 18–24 months of age.^{9,20(Level VII)}

VI. Documentation

- A. Document infant temperature (esophageal or rectal) and skin temperature every 15 min for 4 hr, every hour for 8 hr, then every 4 hr until 72 hr.
- B. When rewarming begins, document esophageal temperature, the set point on the warmer, and the set point on the cooling device. Document changes in set point temperatures and correlating skin temperature.
- C. Document body temperature during rewarming according to hospital protocol (at least every 30 min).
- D. Document any adverse events that occur during cooling or rewarming.
- E. If hypothermia is discontinued before 72 hr has passed, document the time the cooling is stopped and the reason.

Related Documents

Procedure: Amplitude-Integrated Electroencephalography Monitoring

Procedure: Suctioning the Mechanically Ventilated Infant

Policy: Thermoneutral Environment

Competency: Hypothermia Therapy

Developmental Care of Newborns and Infants, 2nd edition

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

Related Web-Based Resources

Parent Information Sheet on Hypothermia: University of California, San Francisco, Neuro-Intensive Care Nursery: <http://neonatology.ucsf.edu/specialized-care/UCSF-NICN-Parent-Information-sheet.pdf>

TOBY Registry: <https://www.npeu.ox.ac.uk/tobyregister>

Vermont Oxford Neonatal Encephalopathy Registry: <https://public.vtoxford.org/database-qi-research/ner/>

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Original Date: _____

Approvals: _____

Policy: Infection Prevention

Level I, II, III, and IV Nurseries

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

II. Considerations

- A. 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.
- B. The most important infection prevention practices are:
 1. Proper hand hygiene^{1(Level I)}
 2. Aseptic technique and standard precautions
 3. Early recognition of potential problems and use of appropriate barrier techniques (e.g., isolation)
- C. The attending physician or allied health professional (AHP) should^{2(Level VII)}
 1. Assist multidisciplinary team members in formulation of infection prevention guidelines and procedures
 2. Determine criteria for admission and readmission of infants in the NICU
 3. Review status of infants to detect occurrence of transmissible infections
 4. Recognize potential problems and use appropriate barrier techniques

III. Nursing knowledge

- A. Personnel should be educated on methods to prevent transmission of infections to infants and other staff.
- B. Personnel working directly or indirectly with infants in the NICU should be screened for communicable diseases as per local policy. Decisions about allowing staff to have direct infant care contact should be made on an individual basis. These policies should be implemented in such a way as to encourage reporting of infectious conditions without fear of repercussions.^{2(Level I)}
- C. 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.
- D. General infection prevention practices include:
 1. Hand hygiene should be performed^{3(Level I)}:
 - 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, nonintact 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. Although universal gloving has shown a decrease in infections in some studies,^{4(Level V)} other studies have shown a decrease in hand hygiene associated with this practice.^{5,6(Level V)} Therefore, careful consideration of the use of gloves is necessary, and it should be implemented according to hospital policy, with continued monitoring of infection prevention measures. It is important to remember that the use of gloves does not replace the need for hand hygiene.
 3. Parents are to use germicidal wipes to regularly wipe cell phones before and after use, or other appropriate cell phone cleaning methods, and then perform hand hygiene before touching their infant. Instructions for these methods of cell phone cleaning are to be readily available. Alternatively, plastic covers may be provided by the hospital for cell phones to be placed into when parents are visiting. Instructions for the use of these covers or bags should be available as well.
 4. Parents are encouraged to wear gloves when changing diapers.
 5. Hand hygiene signage will remain readily visible to all NICU staff and visitors.
 6. “Foam in and out”: Follow hand hygiene procedures before entering and after leaving infant rooms or bed spaces, whether clean rooms or isolation rooms. Frequent use of waterless hand sanitizer is encouraged. Containers of waterless hand sanitizer should be available at each infant bedside.
 7. The wearing of gowns has been an infection control practice in many NICUs. A meta-analysis of studies evaluating this practice found that there was no benefit to routine gowning in the NICU.^{7(Level I)}
 8. Wipe down all surfaces before care, including ventilator, incubator, or warmer and monitor buttons and remote.^{8(Level I)} It is important to note that no disinfectant should be used inside the incubator, where the infant may inhale the fumes.

IV. Process

A. Infant management

1. Upon admission, all infants are checked for signs of infection and placed on isolation care as indicated.

2. Daily surveillance for signs of infection is carried out through assessment and observation by healthcare staff. In addition, all microbiology reports are reviewed daily.

B. Equipment and supplies^{2(Level 1)}

1. Each infant has his or her own supply of daily articles for care.
2. Do not stock more than 24 hr worth of supplies at any infant's bedside.
3. Shared equipment is minimized.
4. Any shared equipment (e.g., scales) is cleaned with hospital-grade cleaner before use by another infant.
5. 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.
6. Suction tubing and canisters are changed on a regular basis as defined by the hospital.
7. Bulb syringe suction devices are discarded after a single use as per manufacturer's guidelines.

C. Environmental practices

1. 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.^{8(Level 1)}
2. The entire bed space and bed are cleaned thoroughly between infants.^{2(Level 1)}
 - a. All supplies left in the bed space are discarded between infants.
3. A regular schedule is established for cleaning and disinfecting all surfaces (e.g., sinks, floors walls, ceilings).^{9(Level 1)}
4. Sterile and clean equipment is kept in a designated clean area, and equipment may not be cleaned in this area.
5. Used or soiled equipment is kept in a separate area until cleaned.
6. 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.

D. Management of infections: Although the following are guidelines, the most recent edition of the Red Book^{7(Level 1)} should be consulted regarding isolation precautions for these and other infections in neonates:

1. Diarrhea
 - a. Diarrhea in the neonate is defined as two watery, seedless stools passed in an 8-hr period.
 - b. The physician is notified promptly.
 - c. Precautions

- 1) The infant is spatially separated, and standard precautions are maintained.
- 2) If cultures are positive for *Clostridium difficile*, contact precautions are implemented and maintained per Centers for Disease Control and Prevention guidelines.
- 3) Soiled diapers are disposed of immediately.
- 4) People caring for infants with *C. difficile* must use only soap and water for hand-washing, not alcohol hand gel.

2. Suspected contagious infections: Contagious infections that occur or are suspected can be devastating. Maternal and prenatal histories, as well as the general health of visitors and employees, are reviewed to prevent and quickly identify the potential for infectious exposure. Immediately upon identification of any potential exposure, proper isolation is implemented. Refer to the latest edition of the Red Book^{10(Level VII)} for specific isolation requirements for specific infectious conditions.

E. Management of outbreaks or potential outbreaks^{2,11(Level 1)}

1. A neonate with an epidemiologically significant organism is placed on the appropriate precautions.
2. Two or more neonates identified with an epidemiologically significant organism are placed on the appropriate precautions and cohorted. Use of designated isolation rooms, when available, should be considered depending on the care needed.
3. If warranted, all affected infants should be cared for in a single area and kept on appropriate precautions until all are discharged or it is proven that the organism is no longer present.

F. Family and visitor education^{2(Level 1)}

1. Caretakers are instructed on hand hygiene techniques and isolation protocols.
2. Caretakers are instructed not to visit when they are ill or not feeling well.
3. 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.

Related Documents

Procedure: Infusion Therapy

Procedure: Peripherally Inserted Central Catheters, Insertion of

Procedure: Umbilical Arterial Catheters, Placement and Care of

Competency: Infusion Therapy

Competency: PICC Insertion

Competency: Urinary Catheterization

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Original Date: _____

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Procedure: Infusion Therapy Level II, III, and IV Nurseries

- I. Purpose: To provide guidance for the insertion, assessment, and care of vascular access devices for intravenous infusion therapy
- II. Considerations for vascular access devices (VADs)^{1(Level I)}
- A. Avoid placement of VADs in areas of infection or loss of skin integrity.
 - B. VADs should be flushed before each infusion as part of the steps to assess catheter function.
 - C. VADs should be flushed after each infusion to clear the infused medication from the catheter lumen, preventing contact between incompatible medications.
 - D. A minimum volume of twice the internal volume of the catheter system is recommended; however, a larger volume may be needed after blood sampling or blood transfusion procedures.
 - E. If resistance is met, further steps should be taken to assess patency before administration of medications and solutions. The catheter should not be forcibly flushed.
 - F. The nurse should consider replacement of the VAD when clinically indicated.
 - G. When a VAD is removed, digital pressure should be applied until hemostasis is achieved. The site should be observed periodically after removal of the device.
- III. Considerations for peripheral intravenous catheters (PIVs)
- A. Avoid placing PIVs in areas of flexion.
 - B. Avoid sites for potential central venous catheters (e.g., cephalic, brachial, greater saphenous veins).
 - C. It is recommended to begin with more distal sites and progress proximally if needed. The following is the suggested order of preference for PIV placement^{2(Level VII)}:
 1. Back of hand
 2. Foot
 3. Ankle
 4. Forearm
 5. Antecubital fossa
 6. Scalp
- IV. Considerations for peripherally inserted central catheters (PICCs)
- A. Consider PICC placement for infants needing more than 6 days of infusion therapy.^{4(Level I)}
 - B. PICC access is to be achieved by a healthcare professional trained in insertion.
 - C. Appropriate monitoring of PICCs includes periodic imaging performed by ultrasound, echocardiography, or radiography.^{4(Level I)}
- V. Considerations for intraosseous (IO) insertion^{5,6(Level VII)}
- A. Infants with a history of a recent fracture at the access site, osteogenesis imperfecta, or osteopenia are not eligible.
 - B. Infants with right-to-left cardiac shunts such as tetralogy of Fallot, persistent foramen ovale, and pulmonary atresia are at higher risk for cerebral fat or bone marrow emboli; therefore, IO infusion should be avoided.
 - C. IO access will be achieved by a healthcare professional trained in insertion.
 - D. Only one attempt can be made per access site.
 - E. The proximal tibia is the preferred site in neonates.
 1. The distal tibia and distal femur are also possible sites.
 2. The sternal site is contraindicated.
 - F. IO devices can be used in the treatment of preterm, low-birth-weight infants and neonates weighing at least 800 g.
- VI. Equipment for VAD insertion
- A. PIV insertion
 1. Intravenous (IV) catheter, 22 to 24 gauge
 2. Sterile transparent adhesive dressing
 3. Clear tape
 4. Appropriately sized and padded armboard, as needed to stabilize extremity
 5. Hospital-approved skin disinfectant
 6. Tourniquet
 7. Normal saline flush
 8. T-connector primed with normal saline flush before use
 9. Manufacturer's plastic shield to protect catheter, as needed
 10. Nonsterile gloves
 11. Transilluminator, optional
 12. Warm compress (heel warmer), optional
 13. Developmentally supportive pain management measures such as sucrose, pacifier, swaddling, containment, and protection from bright lights.
 - B. IO insertion^{6(Level VII),13(Level VII)}
 1. Hospital-approved skin antiseptic
 2. IO needle (limit needle size to decrease the opportunity for fracture). Options include bone marrow or intraosseous needle (18 gauge), short spinal needle with stylet (18–20 gauge), short hypodermic needle (18–20 gauge), and butterfly needle (16–19 gauge).

3. Gauze, 4 × 4
4. Sterile gloves
5. 5- or 10-ml syringe
6. Sterile saline wipes
7. Sterile towel or drape
8. Clear tape
9. IV tubing including stopcock and T-connector or extension tube
10. 1% Lidocaine in 1-ml syringe with 25-gauge needle
11. Normal saline flush
12. Appropriately sized and padded armboard, as needed to stabilize extremity
13. Disposable plastic cup (protection of IO site), optional
14. Sand bag or rolled towel
15. Mask and eye covering

VII. Nursing knowledge

A. VAD^{1(Level I),2(Level VII)}

1. Take care to differentiate veins from arteries.
2. When using scalp veins, avoid sites outside the hairline.
3. Place catheters in the same direction as blood flow.
4. Limit attempts to two to three per person.
5. Ensure that a neutral thermal environment is maintained. It may be necessary to transfer small infants to a radiant warmer for VAD placement to avoid cold stress. (Refer to the Thermoneutral Environment Policy.)
6. If using a transilluminator to place a VAD, follow the manufacturer's recommendations.
7. If extremity requires warming before procedure, use a heel warmer. Homemade compresses can cause severe thermal injury.
8. Use small scissors to trim scalp hair to the degree needed to stabilize the IV. Do not shave the area.
9. If using a tourniquet, apply immediately before cannulation. Prolonged use can cause stretching of the vessel and diminish the ability to palpate and visualize the vein.
 - a. Minimize time applied.
 - b. Avoid use in areas with compromised circulation.
 - c. Avoid use for scalp vessels.
10. Consider using protective skin preparation for small premature infants to prevent skin trauma upon removal of tape or dressings.^{7(Level V)}
11. The use of benzoin and other products to increase the adherence of tape should be limited, especially for premature infants.^{7(Level V)}
12. Loop IV tubing and tape onto the extremity to take tension off the VAD.

13. Frequent assessment and documentation of VAD sites is necessary to reduce complications. Cannulation sites, surrounding tissue, infusing solution, and volume of solution infused should be assessed and documented at least hourly.

14. Additional training and competency validation may be required for PICC and IO placement by an RN.

B. PIV

1. Infusions through a PIV should be limited to dextrose concentrations no higher than 12.5% and amino acid concentrations no higher than 2%.^{1,4(Level I)}

C. PICC

1. Using dedicated PICC teams decreases multiple insertion attempts, improves outcomes, and decreases infection rates.^{4(Level I)}
2. Registered nurses with verified competency should perform dressing changes, instill agents for catheter occlusions, and discontinue catheters to reduce the risk of catheter dislodgement or loss.

D. IO^{5,6(Level VII),13(Level VII)}

1. The IO device should not be in place for more than 24 hr. Remove as soon as alternative venous access can be established.
2. IO route is appropriate for normal saline, crystalloids, dextrose solutions, Ringer's lactate, blood and blood products, anesthetic agents, antibiotics, atropine, calcium gluconate, dexamethasone, diazepam, diazoxide, phenytoin, dobutamine, dopamine, ephedrine, epinephrine, heparin, insulin, isoproterenol, lidocaine, morphine sodium bicarbonate, and contrast material.
3. Use IV administration dosing, but dilute hypertonic or strongly alkaline solutions before infusion whenever possible.
4. Flushing with a bolus of saline is needed after each drug administration for better dispersement into the bone marrow and promotion of entry into the central circulation.

VIII. Process

A. VAD

1. Explain the procedure to parents if they are present.
2. Follow standard precautions when performing all steps of the procedure unless directed to use sterile precautions.
3. Check for proper patient identification.
4. Provide pain management.
 - a. IO insertion: Inject lidocaine into skin, soft tissue, and periosteum.^{13(Level VII)}
5. Use developmentally supportive techniques such as containment or swaddling and shielding from lights as needed. Offer 24% sucrose and a pacifier per policy at least 2 min before the procedure.

6. Assess sites for cannulation using a transilluminator or tourniquet as desired. Use both for only brief periods of time.
7. Use a heel warmer for approximately 5 min, if necessary to improve perfusion and visibility of vessels.

B. PIV

1. Perform hand hygiene and don gloves.
2. Prepare the site with skin antiseptic.
3. Apply a tourniquet or encircle the extremity with the fingers and hand to achieve venous distension.
4. Insert the catheter a few millimeters below the intended insertion site with the bevel of the needle facing up at a 15- to 25-degree angle.
5. Advance the needle until blood appears in the catheter.
6. If the vein is not penetrated, slowly withdraw the catheter to just below the skin and advance the needle again.
7. If the cannulation attempt is unsuccessful or a hematoma develops, apply pressure just above the insertion site, remove the tourniquet, and withdraw the needle. Dispose of the catheter appropriately. Apply pressure until bleeding stops.
8. If the cannulation attempt appears successful, remove the tourniquet, remove the needle, and carefully connect the T-connector to the catheter hub. Flush to assess patency. If tissue surrounding the catheter site swells, apply pressure just above the insertion site, remove the catheter, and apply pressure until the bleeding stops.
9. If the cannulation attempt appears successful and the T-connector is applied and flushed without difficulty, apply sterile transparent dressing over the catheter and insertion site.
10. Secure the catheter in place according to hospital policy, while not impeding venous return and maintaining visibility of the site.
11. Use evidence-based interventions to prevent medical device–related pressure injuries.
12. If using an armboard, double-back the tape or apply cotton to the tape to protect skin.
13. Use a commercially available plastic shield as needed to protect the catheter from dislodgement.
14. Place supportive or protective devices so they do not interfere with visualization of the catheter site, surrounding tissues, and involved extremities and digits.
15. Dispose of the needle in a sharps container after engaging the safety mechanism.

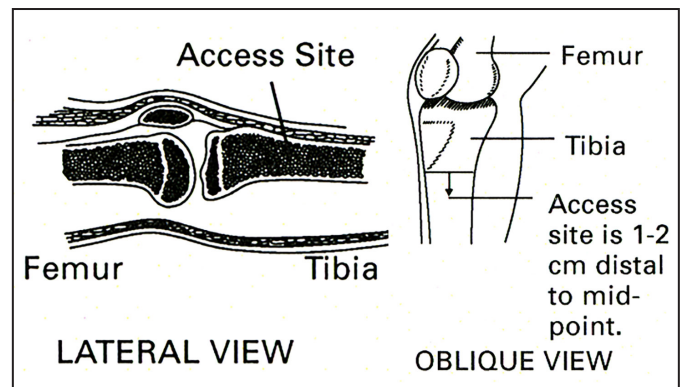
C. PICC insertion (Refer to the Peripherally Inserted Central Catheters, Insertion Of Procedure)

D. IO Insertion^{5,13}(Level VII)

1. Perform hand hygiene and don gloves.

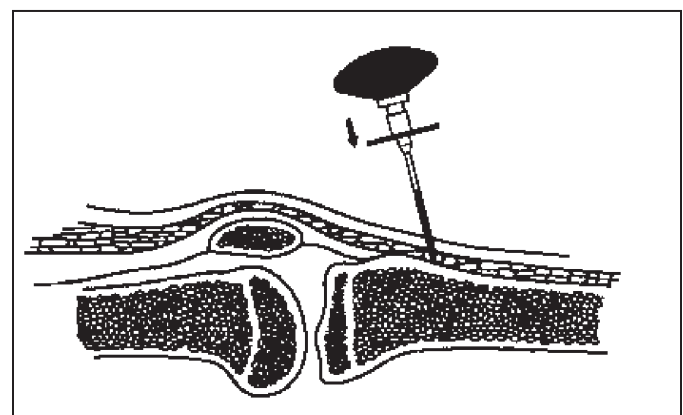
2. Stabilize the leg on a firm surface to facilitate insertion of the needle. Do not position a hand behind the puncture site because the needle may transgress through a limb.
3. Place a small towel, IV bag, or sandbag behind the knee for support.
4. Select the area in the midline of the flat surface of the anterior tibia, 1–3 cm below the tibial tuberosity, as indicated in **Figure 1**.
5. Clean the area with an approved skin disinfectant and allow it to air dry for 30 s. Place sterile drapes around the area.
6. Insert the needle at a 10- to 15-degree angle toward the infant’s foot to avoid the growth plate, as shown in **Figure 2**. Advance the needle with a downward, forward-and-backward rotary motion. Advance the needle until resistance ceases (usually insertion no deeper than 1 cm is necessary), at which point entry into the marrow space should have occurred.
7. Remove the stylet from the needle.
8. Connect a syringe to the hub of the needle.

Figure 1. Recommended Insertion Site for Intraosseous Infusion



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Figure 2. Insertion Angle for Intraosseous Infusion Needle



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9. Check placement by aspirating marrow and then flush. Blood return may occur during aspiration. Flush with 1–2 ml of normal saline solution and observe for swelling under the entry site. The solution should flush easily. If no swelling occurs, placement is confirmed. If the needle is properly inserted, it will stand without support.
 10. If placement cannot be confirmed, remove the needle, apply pressure for 5 min, and cover the insertion site with a sterile dressing. Do not attempt to reinsert the needle on the same site as (this causes leakage of fluids from the insertion site into the surrounding tissues).
 11. If placement is confirmed, attach the needle to the IV solution. Place extension tubing directly into the needle and then attach the IV tubing to the extension tubing with a stopcock. The stopcock may be used for intermittent infusion as needed.
 12. Secure the needle to the infant with tape on the flanges of the needle or a pad with gauze around the needle to assist in securing. Secure tubing to the infant's leg to prevent direct tension on the infant's extremity. Consider covering the exposed end of the needle with a disposable cup, taping the cover down. Cut off the bottom of the cup to increase visualization of the site. Secure the extremity to an armboard.
 13. Radiograph and ultrasonography with bedside Doppler ultrasound can also be used to confirm placement and rule out fracture.
 14. When removing the needle, remove any dressing in place, withdraw the needle, and apply pressure to the puncture site.
 15. Apply a dry, sterile dressing.
- IX. VAD care and maintenance^{1,3(Level I)}
- A. Change tubing per current Centers for Disease Control and Prevention recommendations.
 - B. Always “scrub the hub” with antiseptic before entering a connection.
 - C. A dedicated “closed” medication administration system is recommended.^{8(Level VI)}
 - D. Gently flush tubing before and after medication administration.
 - E. Priming volumes are usually less than 0.5 ml. Use a 5- to 10-ml syringe when needed to check catheter patency per manufacturer's recommendations for PICCs. Do not force if resistance is encountered.
 - F. Assess PIV site for patency and possible complications hourly during infusions. Observe for any signs of redness, edema, pain with flushing, increasing pump pressure reading, or increased resistance when flushing the catheter.
1. Maintain catheters used intermittently as follows:
 - a. Flush with 0.5–1 ml of normal saline flush every 4–6 hr. Flushing the catheter with a final 0.5 ml while applying the clamp may prevent blood backflow into the catheter and backflow prevention devices, prolonging the catheter dwell time.^{9(Level VII),10(Level VI),11(Level II)}
 - b. No benefit has been found in using heparin to prolong the dwell time of a PIV.^{4(Level I)}
 - c. A Cochrane review found that there was not enough evidence to determine the effects of intermittent flushing of heparin versus normal saline to prevent occlusion in long-term central venous catheters in infants and children.^{12(Level I)}
- G. Remove the catheter as soon as it is no longer medically necessary.
- H. PICC care and maintenance^{1,5(Level I)}
1. PICC dressings should be changed when damp, soiled, or nonocclusive.^{3(Level V)}
 2. Inspect the catheter insertion site with each dressing change.
 3. Use sterile technique for dressing changes (mask, cap, and sterile gloves; sterile gown is optional).
 4. The addition of small doses of heparin (0.5 U heparin/kg/hr or 0.5 U heparin/ml of IV solution) reduces the risk of occlusion and prolongs catheter patency.^{5(Level V)}
 5. Administer a constant infusion of IV solutions at a rate of at least 1 ml/hr.
 6. Do not use catheters smaller than 3 Fr for routine blood sampling.^{5(Level V)}
 7. Administering packed red blood cell transfusions through a PICC smaller than 3 Fr is not recommended.
- X. Documentation
- A. The date and time of VAD insertion
 - B. The site condition and amount of solution infused hourly
 - C. The type of solution administered
 - D. Upon VAD removal, the following information should be documented:
 1. Condition of site
 2. Condition of catheter
 3. Reason for removal
 4. Nursing interventions during removal
 5. Dressing applied, if applicable
 6. Infant response
 7. Date and time of removal

Related Documents

Policy: Infection Prevention

Procedure: Peripherally Inserted Catheters, Insertion of

Policy: Skin Care

Competency: Admission to the NICU

Competency: Infusion Therapy

Competency: PICC Insertion

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

Peripherally Inserted Central Catheters: Guideline for Practice, 3rd edition

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Procedure: Intravenous Infiltration, Treatment of Level II, III, and IV Nurseries

I. Purpose: To describe the procedure for early identification and appropriate management of intravenous (IV) infiltration or extravasation to minimize injury

II. Considerations

A. Adopt a standard scale to determine degree of extravasation.^{1,2(Level V)}

1. Pediatric Peripheral IV Infiltration Scale (has been tested for validity and interrater reliability)^{3(Level VI)}
2. Staging of Extravasation (specific to neonates)^{4(Level VI)} (**Table 1**)
3. Milliam Scale of IV Infiltrations^{5(Level VI)}
4. Infusion Nurses Society Thigpen Grading Scale of IV Infiltrations^{6(Level VI)}

B. Detailed descriptions or digital photographs provide better documentation of the extent of the wound and the healing process.

C. Implement one or more of the following treatment options for IV infiltration or extravasation^{1(Level VI)}:

1. Nonpharmacologic interventions for IV infiltration or extravasation may include:
 - a. Elevation of the site or the affected extremity
 - b. Multiple-puncture technique
2. Pharmacologic interventions for IV infiltration or extravasation may be administered by protocol or may require a written order according to hospital policy:
 - a. Administer the appropriate therapeutic agent within 12 hr after the infiltration or extravasation is identified.
 - b. Hyaluronidase may be used for many types of IV infiltration or extravasation.

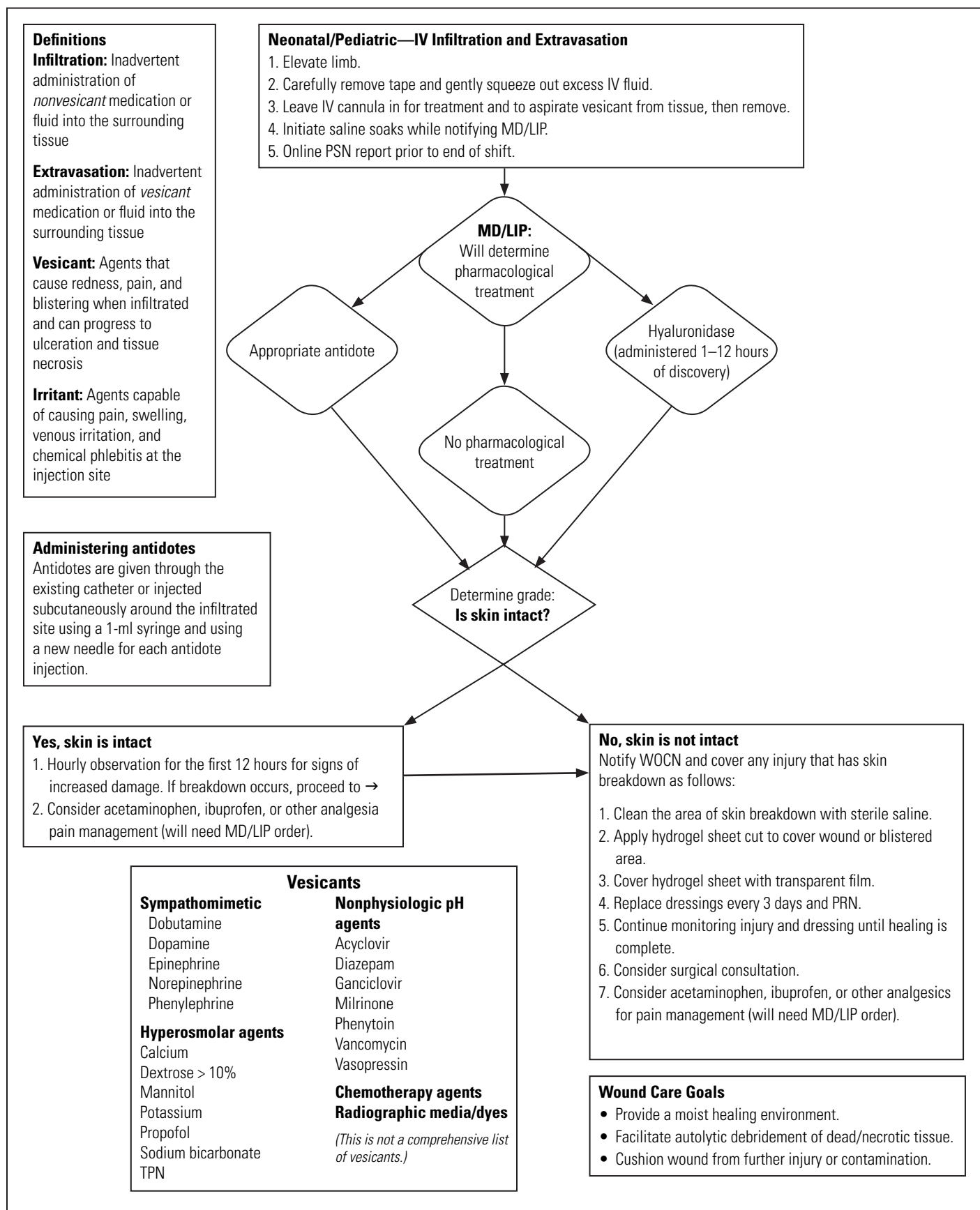
Table 1. Staging of Extravasation

Stage of Extravasation	Observation	Treatment Options
Stage 1	<ul style="list-style-type: none"> • Painful intravenous (IV) site • No erythema • No swelling 	<ol style="list-style-type: none"> 1. Generally, only supportive care is needed. 2. Elevate the extremity. 3. Apply a skin protectant ointment to damaged skin.
Stage 2	<ul style="list-style-type: none"> • Painful IV site • Slight swelling (0%–20%) • No blanching • Good pulse below infiltration site • Brisk capillary refill below infiltration site 	<ol style="list-style-type: none"> 1. Generally, only supportive care is needed. 2. Elevate the extremity. 3. Apply a skin protectant ointment to damaged skin.
Stage 3	<ul style="list-style-type: none"> • Pain at site • Marked swelling (30%–50%) • Blanching • Skin cool to touch • Good pulse below site • Brisk capillary refill below site 	<ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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 	<ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> • Any or all Stage 4 signs and • Extensive wounding, involving most of the extremity or • Very deep wounding 	<ol style="list-style-type: none"> 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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- c. Phentolamine is the antidote for infiltration or extravasation of dopamine and norepinephrine.
 - d. Nitroglycerin 2% may be a safe and effective treatment for cutaneous skin or tissue ischemia.
- D. Choose an occlusive dressing that^{1(Level V)}:
- 1. Absorbs any drainage
 - 2. Stays in place without damaging the surrounding tissue
 - 3. Protects the wound from infection
- E. Consider a wound, ostomy, and continence nurse (WOCN) consult.
- F. Avoid the application of heat or cold due to a lack of research and potential for further injury to the tissue.^{1(Level V)}
- G. Avoid use of povidone-iodine dressings because they may dry the wound site and delay healing.
- III. Equipment
- A. 1-ml syringes
 - B. 25- or 26-gauge needles
 - C. Antidote
 - D. Occlusive dressing (hydrocolloid dressing, hydrogel sheets, or amorphous gel)
 - E. Hospital-approved skin antiseptic
 - F. Normal saline flush
 - G. Nonsterile gloves
 - H. Developmentally supportive pain management measures such as sucrose, pacifier, swaddling, containment, and protection from bright lights
- IV. Nursing knowledge
- A. Infiltration is defined as leakage of nonvesicant solution or medication from a vein.^{1,2(Level V)}
 - B. Extravasation is defined as leakage of solution or medication from a vein that is toxic (vesicant) to the tissue.^{1,2(Level V)}
 - C. Assess the surrounding tissue and the catheter site for signs of infiltration or extravasation hourly.
 - D. Nurses should be knowledgeable and competent in use of a staging scale for infiltration and extravasation.
- V. Process
- A. Follow universal precautions when performing all steps of the procedure unless directed to use sterile precautions.
 - B. If there is redness, swelling, coolness, blanching, discoloration, or blistering of skin, immediately stop IV solutions. Stage the infiltration using a standard staging scale.^{2(Level VII)} Table 1 provides an example of neonatal staging criteria.
 - C. Disconnect IV tubing and attempt gentle aspiration of the residual fluid or drug.
 - D. Notify the provider and family.
 - E. Consider elevation of the extremity for 24–48 hr.
- F. Provide pain management as indicated by patient assessment.
 - G. Use developmentally supportive techniques such as containment or swaddling and shielding from lights as needed. Offer 24% sucrose and a pacifier per policy at least 2 min before the procedure.
 - H. Take a photograph of the wound. Repeat photos weekly to document healing progress.
 - I. Determine treatment based on staging criteria (refer to Table 1 and **Figure 1**).
 - J. Administer antidote as indicated or ordered.
 - 1. Hyaluronidase^{1(Level V),7(Level VII),8(Level VII)} is useful with solutions, including parenteral nutrition, antibiotics, calcium, and sodium bicarbonate.
 - a. Prompt administration is advised within 1–3 hr of infiltrate or extravasation for best effect.
 - b. Clean the area with antiseptic.
 - c. Prepare 15 units of hyaluronidase in 1 ml normal saline solution in a syringe with a 25-gauge needle. For severe extravasation, 150 units may be used.^{9(Level VI)}
 - d. Do not administer through the IV catheter because the enzyme is rapidly inactivated and will not provide interstitial relief.^{8(Level V)}
 - e. Using sterile technique, inject 0.2 ml of the remaining solution subcutaneously in four areas at the edge of the wound, changing the needle after each injection.
 - 2. Phentolamine (Regitine)^{1(Level V)} is recommended for use with infiltrations or extravasations of vasopressors such as dopamine, dobutamine, and epinephrine.
 - a. Phentolamine is most effective within 1 hr of the insult and can be used up to 12 hr.
 - b. Solution should be diluted to 0.5 mg/ml.
 - c. Remove the IV catheter.
 - d. Cleanse the area with antiseptic.
 - e. Inject 0.2 ml of solution five times into the area of the extravasation, changing needles between injections.
 - f. Do not administer through the IV catheter; this may significantly lower blood pressure.
 - g. Monitor blood pressure; a brief drop may be noted.
 - 3. Nitroglycerin 2% may be useful for extravasations of vasopressors such as dopamine, dobutamine, and epinephrine when phentolamine is not available.^{10(Level VII)} Others recommend that nitroglycerin not be used because of the high risk of adverse events, particularly hypotension.^{6(Level VII)}
 - a. Apply a maximum of 1-inch strip to the site of vasopressor extravasation.
 - b. Repeat every 8 hr as clinically indicated.

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



Note: LIP—Licensed Independent Practitioner; MD—Medical Doctor; WOCN—Wound, Ostomy, and Continence Nurse.
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K. Multiple-puncture procedure: For use in an extremity when swelling and blanching are severe and pulses to area are diminished or absent.^{6,11(Level VI)}

1. Use comfort measures or pain medications as indicated.
2. Clean the area with hospital-approved skin antiseptic.
3. Use an 18-gauge needle to puncture the skin in multiple areas of the edematous tissue.
4. Allow infiltrated or extravasated solutions to flow from sites.
5. Wrap with saline-soaked gauze and elevate the extremity.
6. Evaluate every 1–2 hr for 12 hr.

L. Hydrogel or hydrocolloid dressing may be indicated after any of the listed treatments or in the absence of any other treatment. This may be used independently or in consultation with a WOCN.^{6,12(Level VI)}

1. Assemble equipment
 - a. Aqueous gel
 - b. Hydrofiber sheet
 - c. Hydrocolloid dressing
2. Apply aqueous gel to coat the area of tissue damage but not the surrounding skin.
3. Cover with a hydrofiber sheet, slightly overlapping the wound edges.
4. Cut hydrocolloid dressing to size to cover the area.
5. Leave the dressing in place for 3–7 days or as recommended by a WOCN.

VI. Documentation

- A. Document condition of IV site hourly, with additional details when an infiltration or extravasation is discovered.
- B. Document stage of infiltration and actions taken. Document treatment performed.
- C. Photos taken of the site should be included in the medical record.

Related Documents

Procedure: Arterial Puncture and Cannulation, Peripheral
Policy: Skin Care

Procedure: Tachyarrhythmias, Management of
Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Procedure: Late-Preterm and Early Term Infants, Caring for Level I, II, and III Nurseries

I. Purpose: Late-preterm infants (LPIs) born between 34 % and 36 % weeks account for 75% of all preterm births in North America. Although they are at risk of being treated as though they are full term, these infants are more prone to morbidity and mortality.^{1(Level VI)} Researchers also have found that with each week of prematurity before 39 weeks, infants are at increasing risk for poor neurodevelopmental outcomes.^{2(Level VI),3(Level V)} Therefore, infants born between 37 % and 38 % weeks may need some of the same observation as the LPI during the immediate postnatal period. This procedure provides broad guidelines for the care of these vulnerable infants.

II. Considerations

A. The transitional period is a period of intense monitoring and observation that may be performed in any location.

B. Some of these infants may be admitted to the neonatal intensive care unit for initial assessment and transition (refer to the Admission, Transfer, and Discharge Policy).

C. The transition period may range from 2 to 24 hr.^{4,5,6(Level VII)} Vital signs (VS) should be assessed and recorded every 30 min until stability is demonstrated for at least 2 hr.^{6(Level VII)} For infants younger than 39 weeks, assessment should continue every 4 hr beyond the first 2 hr of life for at least the first 24 hr or until the following criteria are met.^{7(Level VII)}

1. Temperature, axillary 36.5 °C–37.5 °C^{8(Level VII)}
2. Respiratory rate lower than 60 breaths/min
3. Oxygen saturation maintained at 90% or higher on room air if indicators for pulse oximetry have been present
4. Blood glucose greater than or equal to hospital or provider established standards on repeated measurements^{9(Level VII)}
5. Breastfed twice, demonstrating fair to good latch using a standard assessment tool (LATCH Score,^{10(Level VII)} Infant Breastfeeding Assessment Tool,^{11(Level VII)} Mother/Baby Assessment Tool,^{12(Level VII)} or nipple-fed fair to well at least twice.

D. Refer to the Hyperbilirubinemia Policy because LPI and near-term infants are at higher risk for extended or delayed hyperbilirubinemia.^{1(Level VI),2(Level V),13(Level VII)}

E. Discharge criteria for LPIs may include all of the following; nurses caring for these infants should ensure these criteria are met and notify the physician or allied health professional (AHP) if they are not met^{4(Level VII)}:

1. VS within normal range for the 12 hr preceding discharge

- a. Respiratory rate less than 60 breaths/min
 - b. Heart rate 100–160 beats per minute (bpm)
 - c. Axillary temperature 36.5 °C–37.5 °C in an open crib with appropriate clothing
2. At least one wet diaper in the last 24 hr
 3. Spontaneous passage of one stool
 4. Successful feeding for 24 hr; able to coordinate suck, swallow, and breathing during feeding and as defined by breastfeeding assessment tool
 5. If weight loss is more than 7% since birth, consider further assessment before discharge.^{9(Level VII)}
 6. Transcutaneous or serum bilirubin has been done and evaluated for follow-up.
 7. No evidence of active bleeding is present at circumcision site for at least 2 hr, as applicable.
 8. Predischarge screens (hearing, metabolic, car safety seat, congenital cardiac defect) and immunizations are completed as indicated.
 9. Follow-up visit is arranged for 24–48 hr after discharge, as ordered.^{6,14,15(Level VI)}
 10. Parents have demonstrated adequate competence in basic infant care.

III. Nursing knowledge

- A. Nurses caring for LPIs should have competency in performing gestational age assessments so they can recognize infants at risk for complications of late prematurity.
- B. Nurses caring for LPIs should have competency in immediate and continuing care of infants at risk for hypoglycemia, respiratory distress, apnea, sepsis, and other complications of preterm infants.

IV. Process

A. Hypoglycemia^{1(Level VI)}

1. Although the definition of hypoglycemia has not been established in any infant, the LPI is at higher risk of hypoglycemia.^{6,9(Level VII)} Therefore, current references suggest that 40–45 mg/dL may be reasonable as a lower level of normal during the first 72 hr of life.^{16(Level VII)} Measures should be taken to avoid hypoglycemia in this population.
2. Facilitate breastfeeding within 1 hr of delivery. If mother does not plan to breastfeed, bottle feeding should be given in this time frame.
3. Ensure ongoing feedings are given on demand, with breastfeeding being offered at least 10 times or bottle feeding offered at least 8 times in a 24-hr period.

4. Initial blood glucose check should be done at about 1–2 hr of age. Monitor frequently for symptoms of hypoglycemia throughout the transition period.
5. If blood glucose is less than the hospital-established lower limit during the first 24 hr of life and the infant is otherwise healthy, refer to the hypoglycemia protocol.^{9(Level VII)} If the infant is not otherwise healthy (has respiratory distress, temperature instability, or other signs of illness), it is recommended that blood glucose be maintained at or above 50%.^{17(Level VII)}
6. If blood glucose is within a normal range, continue monitoring blood glucose via heel stick before the first three feedings, with one additional blood glucose at about 24 hr of age before a feeding.
7. By 72–96 hr of life, normal blood glucose levels should be comparable to levels in older children or adults,^{16(Level VII)} with levels greater than 45 mg/dL when the infant is over 24 hr of age,^{18(Level VII)} although this recommendation remains controversial.
8. Monitor blood glucose more frequently whenever any symptoms of hypoglycemia are observed.

B. Nutrition

1. Allow the mother and infant to be together as much as possible to facilitate breastfeeding.^{19(Level VII)} If the infant is not breastfeeding, feed at least 8 times in 24 hr.^{7(Level VII)}
2. Score feeding ability according to bottle-feeding skill guidelines or a breastfeeding scoring system.
3. Evaluate infants for coordination of the suck, swallow, and breathe reflex. Consider a feeding consult for prolonged (beyond 48 hr) ineffective suck and swallow patterns.
4. Maintain a supportive posture during feedings.
5. If three consecutive feedings are scored as “poor,” notify the physician or AHP.
6. Breastfeeding^{19(Level VII)}
 - a. Position the infant skin-to-skin with the mother in the delivery room.
 - b. Initiate breastfeeding within 1 hr.
 - c. A registered nurse (RN) trained in breastfeeding support or a lactation educator should see the mother and baby within 24 hr.
 - d. Record daily weight and percentage of weight loss. Report weight loss exceeding 7% since birth or more than 3% in a 24-hr period.^{6(Level VII)}
 - e. At least two different providers should score feeding ability at least twice in 24 hr.^{16(Level VII)}

- f. If sufficient milk via breastfeeding is not available after review by an RN trained in breastfeeding, encourage the mother to pump and provide breast milk for her infant or consider use of donor human milk for supplementation.^{7(Level VII)}

7. The need for nipple shields, supplementation, breast expression, or compression for breastfed LPIs is common. Provide supplementation after breastfeeding in small quantities (5–10 ml per feeding on day 1, 10–30 ml per feeding thereafter) of expressed breast milk, donor human milk, or formula.^{19(Level VII)}
 - a. Encourage mothers to pump every 3 hr until their infant is breastfeeding well.
 - b. Instruct mothers to wake their infant for feeding every 3 hr until the first pediatrician follow-up appointment.
 - c. Refer breastfeeding mothers to outpatient lactation support upon discharge.

- C. Additional supplementation may be needed and should be discussed with the physician under the following circumstances^{9(Level VII)}:
 1. More than 3% weight loss in 24-hr period or more than 7% weight loss by day 3 of life
 2. Hyperbilirubinemia in the high-intermediate or high-risk zone

D. Thermoregulation

1. Allow the infant to remain skin-to-skin with the mother in the delivery room as desired.
2. Dress the infant with a head covering and double blankets when he or she is removed from skin-to-skin contact.
3. Admit to an open warmer with skin temperature control and a probe in place.
4. Monitor temperature along with all other VS every 30 min for the first 2 hr and then hourly until transition criteria are met, and then every 4 hr and more often with any change in condition for at least 24 hr.^{6,9(Level VII)}
5. Delay bathing until the infant’s temperature is within normal limits, with two consecutive readings, and respiratory status is stable (rate lower than 60 breaths/min, with no supplemental oxygen needed).^{9(Level VII)}
6. Maintain temperature between 36.5 °C and 37.5 °C axillary.
7. Rewarm the infant as necessary. Provide additional blankets or clothing, ensuring the infant is wrapped with a head covering. If more than two blankets are needed and the infant’s temperature remains below normal, place him or her in a prewarmed incubator or radiant warmer with servo-control and slowly transition to an open crib (refer to the Thermoneutral Environment Policy).

E. Education^{7,9}(Level VII)

1. Provide parents with education about the care of their preterm infant. Providing this information before delivery may be helpful.
2. When the infant is with his or her mother, stress the importance of thermoregulation.
3. Keep infants skin to skin with mothers or wrapped in blankets with a hat and booties when not in an incubator.
4. Observe the mother and infant during breast-feeding or bottle feeding. Discuss possible signs of infant distress during feedings and assist with

breastfeeding concerns and actions to be taken that may be helpful.

5. Encourage lactation support or consultation 1–2 days after discharge and as needed.

V. Documentation

- A. Document all care provided and parent education in the infant's medical record.

Related Documents

Policy: Admission, Transfer, and Discharge

Policy: Hyperbilirubinemia

Policy: Thermoneutral Environment

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Original Date: _____

Approvals: _____

Procedure: Lumbar Puncture, Assisting with Level II and III Nurseries

- I. Purpose: To provide guidance to nurses assisting with lumbar puncture (LP)
- II. Considerations^{1,2(Level VII)}
- A. An LP is performed by a physician or allied health professional (AHP).
 - B. A platelet count greater than 50,000 and correction of any clotting factor deficiencies are desirable before an LP is performed.
 - C. An LP should be deferred for infants who are not stable. Appropriate therapy, including antibiotics, should be initiated if indicated.
 - D. Indications
 - 1. To obtain cerebrospinal fluid (CSF) to aid in the diagnosis of infectious, inflammatory, oncologic, and metabolic processes.
 - 2. 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).
- III. Equipment
- A. LP kits (usually containing at least three sterile specimen tubes, sterile drape, sterile gauze, 20- to 22-gauge spinal needle with stylet, and adhesive bandage)
 - B. Hospital-approved skin disinfectant
 - C. Sterile gloves
 - D. Sterile towels or transparent aperture drape
 - E. Saline or sterile water wipes
 - F. 1% lidocaine drawn up in a 1-ml syringe with a 27- to 25-gauge needle
 - G. Topical anesthetic, as determined by provider (e.g., 4% or 5% lidocaine)
- IV. Nursing knowledge
- A. Nurses caring for infants should receive training regarding the optimal positioning technique for LP. Training may occur at the time of the LP.
 - B. At least one assistant is needed to hold infant during procedure. Additional assistance may be needed in some cases.
 - C. All syringes on the sterile field are to be labeled, as required by the Joint Commission.^{3(Level VII)}
- V. Process^{1(Level VII)}
- A. Follow standard precautions while performing all steps of the procedure unless directed to use sterile precautions.
 - B. Verify infant's identity using two identifiers.
 - C. Provide pain management (refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition).
 - D. Verify that informed consent has been obtained as required by hospital policy.
 - E. Assemble equipment.
 - F. Open spinal tray and sterile gloves using aseptic technique.
 - G. Place skin disinfectant on the tray into the indicated area if sterile swabs are not provided.
 - H. Place the spinal needle and any other necessary supplies onto the tray using aseptic technique.
 - I. Conduct a Universal Protocol "time out" before initiating the procedure.
 - J. 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(Level VII)}
 - 2. Avoid flexion of the neck; this increases the likelihood of airway compromise.
 - K. 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.
 - L. The site should be cleansed with an approved antiseptic and allowed to completely dry before the LP.
 - M. 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.
 - N. Label the tubes according to physician or AHP order. Ensure that all specimens have a patient identification label.
 - O. Label all specimens with the date, time, and initials of the person collecting the specimen.
- VI. Documentation
- A. Document the infant's response to the procedure, appearance of CSF, condition of the infant, and tolerance to the procedure.
- Related Documents**
- Policy: Skin Care
- Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition

References

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Author: _____

Original Date: _____

Approvals: _____

Policy: Massage, Infant Level II, III, and IV Nurseries

I. Purpose: To improve feeding tolerance; promote weight gain, organized 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^{1(Level II),2(Level VI),3,4,5(Level II),6(Level III)}

II. Considerations

A. Infant massage may be performed for 15 min at a time three to four times per day on infants deemed medically stable by an attending physician. An infant's individual response to massage should guide the treatment course.^{7(Level I)}

B. A period of 5–10 days has been shown to result in positive outcomes such as improved weight gain and shorter hospital stays.^{1(Level II),8(Level I)}

C. Inclusion criteria

The infant must:

1. Be more than 48 hr old
2. Have stable vital signs for a minimum of 12 hr before the massage

D. Exclusion criteria

1. Infants requiring^{9(Level II)}:
 - a. Respiratory support
 - b. Surgery
 - c. Antibiotics
 - d. Phototherapy
2. Infants with:
 - a. Apnea, bradycardia, oxygen desaturations
 - b. Fractures, wounds, incisions
 - c. Immunizations within the last 48 hr
 - d. Skin disorders
 - e. Intraventricular hemorrhage^{1(Level II)}
 - f. Genetic anomalies, congenital heart malformations^{9(Level II)}
 - g. Central nervous system dysfunction^{9(Level II)}

III. Equipment

- A. Incubator, radiant warmer, or heat source
- B. Lotion or oil containing no perfumes or dyes^{10(Level II)}

IV. Nursing knowledge

A. Nursing staff should complete education and training provided by a certified infant developmental specialist or licensed massage therapist. Parents providing massage must receive instruction from a healthcare professional educated and trained in massage.

B. 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.

V. Process

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. Warm hands before starting the massage and decrease environmental stimuli (light, noise).

D. Provide three 15-min massage sessions that include three 5-min phases approximately 30 min before feeding. Moderate pressure is used when stroking (sufficient to produce a slight indentation on the skin).^{4(Level II)}

1. Phase 1 (tactile stimulation): Place the infant in the prone position. Massage for five 1-min periods (12 strokes at 5 s per stroking motion).
 - a. Top of head to neck and back to top of head
 - b. Neck to shoulders and back to neck
 - c. Upper back to waist to upper back
 - d. Thigh to foot to thigh
 - e. Shoulder to hand to shoulder
2. Phase 2 (kinesthetic stimulation phase): Place the infant in the supine position. Massage for five 1-min periods (flexion/extension motions are 10 s each).
 - a. Each arm
 - b. Each leg
 - c. Both legs together in a bicycle motion
3. Phase 3 (tactile stimulation): Repeat Phase 1.

VI. Documentation

A. Document the infant massage session, including infant tolerance.

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Near-Infrared Spectroscopy, Use of Level II, III, and IV Nurseries

- I. Purpose: To provide guidance in the use and management of noninvasive monitoring of cerebral and somatic oxygen saturations in critically ill neonates
- II. Considerations
- A. An order is required for the use of near-infrared spectroscopy (NIRS).
 - B. The use of NIRS has been studied in conjunction with cardiac conditions and surgeries.^{1(Level IV),2(Level VI),3(Level IV)}
 - C. NIRS is helpful in the assessment of infants with hypoxic-ischemic encephalopathy.^{1(Level IV),4(Level VI)}
 - D. NIRS can be helpful in monitoring of infants receiving high-mean airway pressure ventilation.^{1(Level IV),5(Level VII)}
 - E. NIRS monitoring should be used for trends in conjunction with other diagnostic tools already in use in the neonatal intensive care unit because normative ranges for values has not been established and consistency between devices has not been determined.^{6(Level IV),7(Level VI)}
- III. Equipment needed
- A. Gloves
 - B. Gown, mask, goggles if indicated
 - C. NIRS monitor or oximeter
 - D. Disposable neonatal sensor patches for NIRS monitor or oximeter
 - E. Sterile water
 - F. Gauze
- IV. Nursing knowledge
- A. Nurses should be trained in the application of sensors and the use of a NIRS monitor or oximeter.
- V. Process
- A. Explain equipment use to parents.
 - B. Identify the infant using two patient identifiers.
 - C. Use standard precautions while performing this procedure.
 - D. Clean the infant's skin where sensors will be placed using sterile water and gauze. Skin should be clean and dry. Skin prep is not needed.
 - E. Sensor placement varies by institution and intended use. Sensors are typically placed horizontally across the forehead, vertically on the abdomen over the kidney, and horizontally across midline on the abdomen. Avoid placing sensors over areas with skin discoloration or irritation, bony prominences, nevi, or scar tissue. Excessive light, motion, and bilirubinemia may reduce the accuracy of readings.^{8(Level VII)}
 - F. Use of pressure or reinforcing dressings is not needed.
 - G. Document time and date the sensor is applied on the sensor patch.
 - H. Remove the sensor every 48 hr for 1 hr to assess for skin breakdown. Water may be used to aid in sensor removal. If skin remains intact, the sensor can be reapplied to the same area.
 - I. Assess skin condition around the sensor with each assessment. If an area of irritation or breakdown is noted, notify the physician or allied health professional (AHP). Treat as needed.
 - J. Document the baseline regional saturations and sensor site upon initiation of monitoring and according to the infant's condition. Notify the physician or AHP for values outside the parameters ordered.
 - K. Keep the sensor, cable, and connector dry. Sensors may be left in place for X ray and computed tomography but must be removed for magnetic resonance imaging.
 - L. Remove sensors as above when monitoring is no longer needed. Clean equipment per manufacturer recommendations.

Related Document

Policy: Skin Care

References

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Author: _____

Original Date: _____

Approvals: _____

Policy: Neonatal Opioid Withdrawal Syndrome Level I, II, and III Nurseries

I. Purpose: To describe a consistent method to evaluate infants who are likely to experience opioid withdrawal as the result of opioid exposure in utero or in the neonatal intensive care unit. Opioid-like substances also have been seen to result in similar symptoms of withdrawal.^{1,2(Level IV)}

II. Considerations

A. Neonatal Opioid Withdrawal Syndrome (NOWS) scoring should be conducted for:

1. Infants exposed to opioids prenatally
2. Mothers or infants with any positive drug screen
3. Infants having withdrawal symptoms, which may include^{1(Level V)}:
 - a. Neurologic excitability: tremors, irritability, increased wakefulness, high-pitched crying, increased muscle tone, hyperactive deep-tendon reflexes, seizures, frequent yawning and sneezing
 - b. Gastrointestinal dysfunction: poor feeding, uncoordinated and constant sucking, vomiting, diarrhea, dehydration, poor weight gain
 - c. Autonomic signs: increased sweating, nasal stuffiness, fever, mottling, temperature instability
4. Infants being weaned from treatment with drugs that cause physiologic dependence (e.g., opioids), although different scoring tools may be more useful^{3(Level V)}

5. Infants for whom scoring is ordered by a physician or allied health professional

B. Various scoring tools are available including^{3(Level V),4(Level V)},

- Neonatal Drug Withdrawal Scoring System^{5(Level VI)}
- Neonatal Abstinence Scoring System (NASS)^{6(Level VI)}
- Modified Finnegan Abstinence Scoring System^{7(Level VI)}
- Modified Finnegan Abstinence Scoring System—short form^{8(Level VI)}
- Neonatal Withdrawal Inventory^{9(Level VI)}
- Eat, Sleep, Console Tool^{10(Level V)}

The American Academy of Pediatrics recommends the use of the modified NASS or the Finnegan tool.^{1(Level VII)}

1. Nonpharmacologic treatment should be implemented with the appearance of signs of withdrawal or verification of exposure to substances known to cause withdrawal.
2. In the absence of evidence-based criteria for management of neonatal opioid withdrawal, each institution should select a tool to be used consistently and develop a protocol for consistent management of infants experiencing NOWS. Consistent

management has been shown to result in shorter length of stay.^{11(Level VI)}

3. Interrater reliability remains problematic with any tool selected.^{2(Level IV)} Therefore, having two health-care providers score an infant initially (beginning of the shift or with change in care providers) may be helpful in ensuring interrater reliability within the institution. A level of acceptable interrater reliability may be 90%–100% agreement. The specific number of items that may not be the same will vary depending on the tool being used. For the modified Finnegan Abstinence Scoring System, the most commonly used tool, this would be no more than two items differing to give at least 90% reliability.^{2(Level IV)}

C. In some cases, infants may need drug therapy for neonatal abstinence for a longer period of time and will be discharged on continued therapy.

1. The importance of parent education cannot be overemphasized because many infants will be cared for by parents, even if discharged to another care provider from the hospital. In addition, symptoms may reappear at 2–6 months of age, after discharge.^{12(Level V)}

III. Nursing knowledge

- A. Use a consistent scoring tool to assess the severity of withdrawal and assist in determining the need for treatment.
- B. The infant's score represents all behavior observed during the interval selected, not a single point in time.^{2(Level VI)}
 1. Measures should be taken to assess the infant for causes of possible abstinence signs that also may indicate reversible situations or an illness.

IV. Process^{2(Level VI)}

- A. Scoring should begin at about 2 hr of age if drug exposure is known or suspected or when withdrawal symptoms are noticed.
- B. Score infants for a total of 4 days if pharmacologic intervention is not needed. If pharmacologic therapy is needed, score the infant for the duration of therapy. Continue scoring after drug therapy is discontinued until discharge or until consistently low scores are obtained to ensure that symptoms do not redevelop.
- C. Score infants every 3–4 hr depending on the frequency of feedings and provision of nursing care. Assess behaviors throughout the 3- to 4-hr interval and assign the score at the time of feeding or provision of nursing care.

- D. Increase frequency of scoring when scores are elevated according to specific instructions of the chosen tool or per hospital protocol.
- E. Nonpharmacologic measures should be implemented before and in addition to pharmacologic management of withdrawal. Nonpharmacologic measures may include nonnutritive sucking, rocking, holding, skin-to-skin care, decreased noise and lights, swaddling, and other comfort measures.^{12(Level V)} Rooming in has also been shown to decrease the need for pharmacologic treatment of NOWS and decrease length of stay.^{13(Level VI)}
- F. Report escalating withdrawal scores to the physician or AHP according to specific scoring tools.
- G. Provide education to caregivers.
 - 1. Provide parents with information about the reason for drug withdrawal.
 - 2. Encourage parents to participate in care as much as they are able.
 - 3. Instruct parents or primary caregivers in nonpharmacologic care measures both during hospitalization and after.^{12(Level V)}
 - 4. If the infant is to be discharged on continued treatment, give careful instructions regarding dosing of

medication, with follow-up for continued weaning and discontinuation of the medication.

- 5. Involve social services, case management, and child protective services as appropriate and per local and state law. Establish a safe plan of care and follow up as indicated.

V. Documentation

- A. Drug abstinence scores as outlined under “IV. Process” above
- B. Response to treatment with continued scoring
- C. Parental involvement and parent–infant interaction
- D. Discharge and follow-up plan

Related Document

Competency: Neonatal Opioid Withdrawal, Assessment for

References

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iNICQ 2015, Universal Training Solution: Improving Outcomes for Infants and Families Affected by Neonatal Abstinence Syndrome (NAS): <https://public.vtoxford.org/quality-education/inicq-2015-nas-universal-training/>

Eating, Sleeping, Consoling (ESC) Neonatal Abstinence Syndrome (NAS) Care Tool: <http://files.constantcontact.com/dfa00ff501/ce6dfaf8-dc7c-4999-bfb2-fca3ac875c86.pdf>

Author: _____

Original Date: _____

Approvals: _____

Procedure: Noninvasive Ventilation, Nursing Care Level II, III, and IV Nurseries

I. Purpose: To provide a standardized care and management plan for infants needing noninvasive ventilatory support with nasal continuous positive airway pressure (NCPAP) or nasal intermittent positive pressure ventilation (NIPPV)

II. Considerations

A. NCPAP

1. This form of respiratory therapy uses close-fitting nasal prongs or a specialized nasal mask that provides heated and humidified gas with or without supplemental oxygen to the infant at a specific positive pressure.
2. NCPAP allows spontaneous breathing while a continuous gas flow is being delivered through the breathing circuit. A rate may be applied depending on the type of flow generator used.
3. Continuous pressure inflates the lungs and facilitates alveolar gas exchange by maintaining the functional residual capacity (FRC) of the lungs. NCPAP may be used for primary respiratory ventilatory support or for weaning purposes.

B. NIPPV

1. NIPPV may be provided by a conventional mechanical ventilator via uncuffed endotracheal tube placed through the nasopharynx, nasal prongs, or a specific type of cannula called a RAM cannula.^{1(Level V)} In some cases, ventilation may be delivered via neurally adjusted ventilatory assist (NAVA), which synchronizes ventilations.^{2(Level VI)} The noninvasive use of this device is referred to as NIV-NAVA.
2. Breaths are delivered nasally with allowance for significant (25%–50%) leakage in the system, unlike when ventilation is provided via an endotracheal tube into the trachea.
3. Studies have shown that this mode reduces the incidence of extubation failure.^{3(Level I)}
4. Studies have shown that early use of NIPPV over NCPAP reduces the risk of intubation and mechanical ventilation in the presence of respiratory distress syndrome.^{4(Level I)}

C. Prong break

1. 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 freeflow oxygen via bag and mask or T-piece

continuous positive airway pressure (CPAP) to maintain FRC.^{5,6(Level VII)}

D. Floating prongs

1. NCPAP prongs should be positioned in the nares so no direct pressure is placed on nares, the nasal septum, or the upper lip.
2. 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.

III. Nursing knowledge

A. Indications for NCPAP or NIPPV^{5,7(Level VII)}

1. Abnormalities found on physical assessment, such as the presence of increased work of breathing, grunting, flaring or retracting, or cyanosis
2. Inability to maintain PaO₂
3. Presence of poorly expanded lung fields on X ray
4. Presence of
 - a. Respiratory distress syndrome
 - b. Pulmonary edema
 - c. Atelectasis
 - d. Apnea of prematurity
 - e. Recent extubation
 - f. Tracheomalacia

B. Contraindications for NCPAP or NIPPV

1. Upper airway abnormalities that make nasal support ineffective or dangerous, such as choanal atresia, cleft palate, or unrepaired tracheoesophageal fistula
2. Congenital diaphragmatic hernia before surgical repair

C. Careful attention must be paid to prong fit to avoid skin irritation and breakdown. 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.^{5,6,7(Level VII)}

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

E. Bubble CPAP provides some advantage over CPAP provided through a ventilator.^{6(Level VII),8(Level VI)} This is attributed to chest wall vibrations created by bubbling.

F. Adverse effects due to nasal CPAP or NIPPV^{7,9(Level VII)},

1. Air leaks, which may result from alveolar distension
2. Gastric distension, which can be reduced by use of an oral orogastric (OG) tube to vent the stomach. Gastrointestinal risk does not appear to be higher with the use of NIPPV compared with NCPAP.^{1(Level VI)}
3. Overdistension 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.

IV. Equipment

- A. Flow generator or bubble CPAP setup per respiratory therapist and physician or allied health professional (AHP) order
- B. Nasal interface (prongs, mask, or RAM cannula)
- C. Suction setup
- D. Skin barrier product: hydrocolloids or soft silicone dressing
- E. Scissors
- F. OG tube, large enough to allow venting
- G. Oxygen blender, bag/mask, or T-piece setup; manometer (if using bag/mask)
- H. Transcutaneous monitor as indicated

V. Process

- 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 infant identification.
- C. An order is required for NCPAP, NIPPV, or NIV-NAVA initiation per hospital policy.
- D. Assemble equipment that is appropriate to the size and weight of the infant.
 1. In collaboration with the bedside nurse, the respiratory therapist (RT) will measure nares for proper prong sizing. If a mask is used, measure the mask size to ensure proper fit.
 2. The RT will obtain occipitofrontal circumference or infant weight for proper size and type of hat or headgear, if used.
 3. In collaboration with the bedside nurse, the RT will size and supply the skin barrier product to protect the nasal area.
 4. Obtain a transcutaneous monitor if ordered and apply per manufacturer's recommendations.
- E. Initial application of NCPAP, NIPPV, or NIV-NAVA

1. Apply a properly sized hat or headgear, as indicated.
2. Suction nares as needed to clear secretions. Suction the nasal pharynx as needed.^{2(Level VII)}
3. Apply a skin protectant product before placing nasal interface in order to decrease risk of pressure damage.^{1(Level VI)}
 - a. 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. If using NAVA, the electrical activity of the diaphragm (Edi) catheter is used, which includes the sensor. Ensure proper placement at the gastroesophageal junction.^{2(Level V)}
 - a. Use an appropriate-sized feeding tube or standard Edi catheter.
 - b. Label with the depth, date, and time of placement on the tube.
 - c. Stabilize the tube at the upper lip.
 - d. For NCPAP or NIPPV, leave tube open to air for release of gastric pressure. For the Edi catheter, follow manufacturer's instructions.

F. Ongoing maintenance

1. Inspect and evaluate the nares, septum, and surrounding skin with hands-on care and document in the medical record.^{1(Level VII)}
2. Anticipate a prong break at least every 12 hr.
 - a. Gently massage and cleanse the nares during prong breaks.^{5(Level VII)}
3. Assess setup and prongs in the floating position on an ongoing basis.
4. Assess for pain per protocol.
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, if used, to vent the stomach.
 - a. Change the OG tube per the manufacturer's recommendations.
 - b. Measure girth every 8 hr with hands-on care and as needed and document in the medical record.
7. Feedings, when ordered, are given via the same 8-Fr feeding tube.

- G. Notify the physician or AHP regarding:
 - 1. Presence of nonblanching 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
- H. Involve the family in the planning and implementation of nursing care as appropriate.

VI. Documentation

- A. Document the following in the medical record at least every 4 hr:
 - 1. The positive end-expiratory pressure, flow, and temperature of the circuit
 - 2. Rate if providing NIPPV
 - 3. Condition of the nares, septum, and surrounding skin

- B. Document skin integrity in the medical record every shift using a hospital-approved population-specific skin assessment tool.

Related Documents

Policy: Skin Care

Competency: Nasal Continuous Positive Airway Pressure

Competency: Respiratory Management

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Original Date: _____

Approvals: _____

Procedure: Ostomy Care

Level II, III, and IV Nurseries

- I. Purpose: To describe care of surgically created simple and complex ileostomies and colostomies for neonates
- II. Considerations
- A. An assessment of the stoma and surrounding skin is necessary to determine proper ongoing care. Assessments should include:
1. Section of the bowel from which the stoma has been created
 2. Size and position of the stoma (i.e., single versus double barrel, location relative to incision)
 3. Quality and amount of output from the stoma
 4. Condition of surrounding skin
- B. Selecting the pouch
1. Various styles of pouches are available
 - a. One-piece (wafer and pouch combined; available in various sizes)
 - b. Two-piece (wafer and pouch separate)
 - c. Cut-to-fit with and without starter hole
 2. The one-piece pouch without a starter hole is simple to fit and cut so that the hole is off-center if needed, depending on the location of the stoma.
 3. The two-piece pouch, also without a starter hole, may be easier to customize for multiple stomas or stomas at the end of incisions and abdominal irregularities.
 4. Collaborate with the wound ostomy care team, if available, to select the best approach for applying the pouch.
- III. Equipment
- A. Nonsterile gloves
 - B. Warm water
 - C. Clean, soft cloth or wipe
 - D. Dry gauze (2 × 2 or 4 × 4)
 - E. Appropriate size and style pouch
 - F. Stoma paste or powder as needed
- IV. Nursing knowledge
- A. Additional products for stoma care
1. Stoma paste
 - a. Paste may be used around the stoma, particularly with ileostomies. The small ribbon of stoma paste helps seal around the opening and protect the skin.
 - b. Paste should not be used as an additional medium for extending the wear time of the appliance.
 2. Stoma powder
 - a. Powder is helpful in healing damaged skin under the appliance.
 - b. Apply sparingly; pat with a moist, gloved finger, and apply an additional layer as needed. This protects and heals excoriated skin under the appliance.
 - c. Take care to protect the infant's airway when applying powder.
3. An alcohol-free skin protectant should be used under the stoma pouch. A silicone-based skin barrier film also may be used to protect the skin under the adhesive.^{1(Level I)}
4. The appliance should be changed at the first sign of leakage. This may manifest as a lighter color of the pectin base around the stoma after it warms and loses adherence to the skin.^{2(Level VII)} Ileostomy appliances may last only 12–24 hr because of excessive enzymes and low pH. Colostomy appliances often have wear time up to 3 days.^{3(Level VII)}
- V. Process
- 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 infant identification.
- C. Provide pain management as needed (refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition).
- D. Family teaching
1. Instruct the family about the reason for the stoma.
 2. Teach the family how to empty and change the stoma pouch.
 3. Provide parents with written instructions about needed ostomy supplies, how and when to use them, and necessary follow-up care, including which healthcare provider to call with questions about stoma care or changes in output if the infant is to be discharged with the stoma.
- E. Changing the appliance
1. Measure the stoma with a hole guide (if not done previously, this will need to be done after the appliance is removed). Trace onto the pouch backing and cut pectin or a separate wafer (if using a two-piece pouch) approximately 1/8 inch larger. Holes cut too small may cut or constrict the stoma, and holes cut too large will allow effluent to leak onto skin, creating skin damage.^{2(Level VII)}
 2. Remove the old appliance by gently pulling up the edges and wiping with a warm, moist cloth to help release pectin from the skin.

- a. Clean the skin with warm water. If some pectin remains on the skin, there is no need to remove it completely.^{3(Level VII)} Excessive rubbing may irritate the surrounding skin.
3. Evaluate the skin condition under the pouch. Use stoma paste or powder as indicated.
4. If using a one-piece appliance, warm the pectin backing by holding it firmly in your hands. Once it is warmed, adhesion in the pouch will improve.
5. If using a two-piece appliance, apply backing to skin around the stoma after skin is prepped as above. Attach the pouch per the manufacturer's recommendation.
6. After the appliance is applied to skin, hold it firmly to the skin for 1–2 min. Ensure edges have sealed to the skin.
7. Close the end of the pouch with a pouch clamp or per pouch design.
8. Label the pouch with the date and time changed.

F. Emptying the appliance

1. The appliance should be emptied regularly and often to avoid overfilling, which will decrease appliance wear time.
2. Wearing nonsterile gloves, open the pouch closure and empty onto a diaper or remove contents with a syringe. Clean the end of the pouch and replace the pouch clamp. Measure and record output.

VI. Documentation

- A. Document the color of the stoma; the condition of peristomal skin; and the amount, color, and character of ostomy output in the medical record.

Related Documents

Policy: Skin Care

Competency: Ostomy Care

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Approvals: _____

Policy: Oxygen Administration for the Neonate Level I, II, III, and IV Nurseries; Labor and Delivery

- I. Purpose: To provide guidelines for delivery of supplemental oxygen to neonates
- II. Policy statement: 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.
- III. Considerations
- A. Oxygen may be delivered without a physician or allied health professional (AHP) order in the event of infant cyanosis or an emergency. After oxygen has been started, a pulse oximeter should be placed and oxygen adjusted according to established guidelines. The physician or AHP should be notified as soon as possible.
 - B. Unless it is an emergency, a physician or AHP order or practice guideline is required for the delivery of oxygen. Orders should include the percentage of oxygen to be delivered, parameters for pulse oximetry, and the mode of oxygen delivery. Orders should be reviewed at least every 24 hr.
 - C. Pulse oximeter alarms should be set at prescribed levels. In an emergency before a written order, pulse oximetry limit settings should be 90%–95%.^{1(Level VII),2,3(Level V)}
 - D. 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.^{4(Level V)}
 - E. Refer to the most recent publication of the American Academy of Pediatrics Neonatal Resuscitation Program for recommendations regarding the use of oxygen in the delivery room.^{5(Level I)}
 - F. For very-low-birth-weight (VLBW) infants, a pulse oximeter should be in place even during short periods of oxygen administration.
 - G. In-line oxygen analyzers and an on-site blood gas laboratory should be available when oxygen is being delivered.
- IV. Equipment
- A. Cost-effective, reliable, U.S. Food and Drug Administration–approved equipment and supplies include the following:
 1. Standardized connectors
 2. Latex free
 3. Disposable (as much as possible) for maximal infection control
 4. Artificial airway devices (oral airways, endotracheal tubes, tracheostomy tubes, and laryngeal mask airways) and clearance systems and devices (suction equipment)
 5. Placement-assistive devices (e.g., laryngoscopes, blades, glide scopes)
 6. Obturators and stylets
 7. Securing devices for airways (e.g., bars, adhesives)
 8. Maintained gas sources (cylinder tanks and large system tanks)
 9. Pulse oximeter
 10. Transcutaneous monitor (optional)
 11. Monitoring analyzers that provide moment-to-moment values
 12. Humidification systems with temperature options and sterile distilled water
- V. Nursing knowledge
- A. Sustained oxygen therapy requires expertise in several areas: infection prevention, skin care, role definitions, medical technology for monitoring and delivery, and pathophysiology for blood gas interpretation and for clinical guidelines. Ramifications of the misuse of oxygen have been reflected in the professional literature over the past 70 years.^{1(Level VII),2(Level II)}
 - B. Nursing staff should maintain competency in all modalities used in the specific clinical area for oxygen delivery.
 - C. Repeated increases and decreases in oxygen delivery particularly are damaging to VLBW infants.^{4(Level VI)}
 - D. 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.
- VI. Process
- A. The target ranges for oxygen saturation may be different for specific infant populations. Follow physician or AHP orders.
 - B. 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.^{1(Level VII)}

- C. When weaning oxygen, decrease oxygen for high saturation alarms quickly but cautiously to avoid a rebound increase in oxygen requirement.^{4(Level VI)}
- D. 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.^{4(Level VII)}
 - 1. A physician or AHP should be notified when an increase in FiO_2 of 10% or more is required and the registered nurse or respiratory therapist is unable to wean the infant back to baseline.
- E. All parameters are to be evaluated and adjusted during care procedures for the infant receiving mechanical ventilation.

F. The initial response to apnea should be tactile stimulation, followed by continuous positive airway pressure and progressing to artificial ventilation.^{2(Level VII)} Increases in oxygen without active respiratory effort or assisted ventilation are not indicated.

Related Document

Policy: Retinopathy of Prematurity, Eye Exam Screening

Competency: Admission to the NICU

Competency: Cardiac Care, Basic

Competency: Respiratory Management

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Approvals: _____

Policy: Palliative Care

Level I, II, III, and IV Nurseries

I. Purpose: Some infants in the care of neonatal nurses are born with life-limiting conditions. Other infants develop life-limiting conditions during their neonatal hospitalization. Nurses and other caregivers evaluate when intensive therapies no longer hold hope for a cure or recovery, and the focus of treatment shifts toward maximizing quality of life. Palliative care is a model through which curative and comfort interventions may coexist. End-of-life care is one aspect of palliative care that supports a peaceful, dignified, and loving death for the infant, family, and staff.

II. Considerations

A. Infant deaths

1. More than 29,000 infants younger than 1 year of age die each year in the United States.
2. Among these deaths, 66% occur during the neonatal period, with many occurring in the neonatal intensive care unit (NICU).
3. Approximately 60% of infants who die in the NICU die when life-extending technology is removed.

B. Nurses are essential to the care of infants with life-limiting conditions.

1. The International Council of Nurses^{1(Level VII)} views the nurse's role as "fundamental to a palliative approach that aims to reduce suffering and improve the quality of life for dying patients and their families through early assessment; identification; and management of pain and physical, social, psychological, spiritual and cultural needs." The American Nurses Association Code of Ethics^{2(Level VII)} confirms that the role of the nurse includes "the provision of comfort at the end of life." Both palliative and end-of-life care are consistent with these definitions.

C. Palliative care is important.

1. The World Health Organization^{3(Level VII)} defines palliative care as "comfort care that improves the quality of life near its end through exquisite anticipation, identification, prevention and relief of suffering—physical, emotional and transcendental—for patient and family."
2. The World Health Organization^{3(Level VII)} also states that palliative care should begin at the same time as curative care in a potentially life-limiting condition.
3. Palliative care should begin upon diagnosis of a life-limiting condition and should coexist with curative care, with an emphasis on minimizing suffering.

- a. Palliative care brochures should be available on the unit.
- b. Palliative care representatives should be introduced as members of the NICU team.
- c. Parents should be aware of who the palliative care team members are for consultation purposes.
- d. Parents should be aware that palliative care may be a focus during transport of fragile infants with life-limiting conditions to tertiary centers.

D. Palliative care is an interdisciplinary endeavor.

1. Care is best given when the team is in consensus and all disciplines support the transition from curative to palliative efforts. Consensus should include decisions about appropriate treatment options for individual infants.
2. Case conferences, palliative care conferences, and the ethics committee can assist in arriving at consensus.
3. Parents are shared decision makers and should be considered part of the caregiving team. Family conferences are essential to the understanding of families' needs and hopes for their infant.
4. Nonclinical staff are trained to provide assistance.
 - a. Perinatal social workers, hospital chaplains, and clergy can help provide family support, including care for parents, siblings, and grandparents.
 - b. A child life specialist or family support specialist also can offer support to siblings.
 - c. A family advocate (parent who has had a child in the NICU) also can help families navigate the NICU experience.
 - d. A lactation consultant can assist mothers who want to breastfeed their infant or donate breast milk at the end of life. The lactation consultant also can help mothers manage lactation cessation.

E. Palliative care nursing is a mindset of loving support for families to help them go through the loss of both a child and a family dream.

1. Palliative care can be offered prenatally, at the time of birth, or after birth.
 - a. When a prenatal diagnosis is made, palliative care can be offered while the fetus is in utero, and families can be supported in decision making for pregnancy termination, early induction, or a live birth and provision of palliative care and perinatal hospice after birth.
 - b. Planning and decision making include choosing who will deliver the baby, where the delivery

will take place, and who will be present; notifying all members of the obstetric and neonatal team that palliative care will be offered; delineating resuscitation status for the infant; and planning for comfort measures immediately at birth.

- c. Both palliative and curative care can be initiated for infants who do not have a clear terminal condition at birth.
2. Palliative care can be offered in the hospital or at home.
 - a. All NICUs should have a relationship with a local hospice organization that can offer seamless continuity of care. If local hospices do not provide pediatric care, pediatric home health agencies and a primary care pediatrician can oversee palliative care needs. Experienced NICU nurses can provide training to home care and hospice nurses who are unfamiliar with caring for infants in the home.
 - b. Infants should go home with all necessary medications and a letter explaining the condition for local agencies. Paperwork should include a portable nonresuscitation directive for emergency personnel. Families should keep a copy of the form with them at all times to avoid unnecessary resuscitation.
 - c. Palliative care continues after death into bereavement support.

III. Equipment

- A. Measures to anticipate and apply symptom management are essential.
 1. Pain in neonates is real and must be treated with state-of-the-art medications.^{4(Level 1)}
 2. End-of-life symptoms such as seizures and gasping also must be treated.
 3. Guidebooks may be used to suggest medications and dosages, such as Carter and Levetown's *Palliative Care for Infants, Children and Adolescents*.
 4. The neonatal pharmacist should be included in planning and have provisions for buccal, dermal, and rectal medications if intravenous access no longer is desired or available.
- B. Pain and sedation should be measured with a validated tool (refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition) such as:
 1. Premature Infant Pain Profile (PIPP) scale^{5(Level VI)}
 2. Neonatal Pain, Agitation, and Sedation Scale (N-PASS)^{6(Level VI)}
 3. Neonatal Infant Pain Scale (NIPS)^{7(Level VI)}
 4. Pain Assessment in Neonates (PAIN)^{8(Level VI)}
 5. Modified Infant Pain Scale^{9(Level VI)}
 6. Children's and Infant's Postoperative Pain Scale^{10(Level VI)}

C. A clear assessment of the infant's life-limiting condition is imperative to provide direction and agreement among the multidisciplinary team. This may be accomplished with one or more of the following instruments:

1. Score of Neonatal Physiology (SNAP)^{11(Level V)}
2. Clinical Risk Index of Babies (CRIB)^{12(Level V)}
3. Neonatal Therapeutic Intervention Scoring System (NTISS)^{13(Level VI)}
4. Pediatric Risk of Mortality (PRISM)^{14(Level VI)}

IV. Nursing knowledge

- A. Infants receiving palliative care when it is known that death may occur should be treated as normal babies.
 1. If possible, care should be given in a private location in the NICU or nearby, with a goal of keeping the family together.
 2. Infants should have access to kangaroo care.
 3. Infants should be bathed, dressed, and held.
 4. Infants should be taken outside into the sunlight if possible.
 5. Visitors should be welcomed.
 6. Spiritual support should be included in family care.
 7. If family members are not available, a nurse should hold and comfort the infant.
- B. Nurses must possess competency in pain control and symptom management.
- C. Occasionally, there is conflict regarding acceptance of the transition from curative efforts to palliative care.
 1. Conflict may exist between surgeons and neonatologists, physicians and nurses, and families and clinicians, or between family members.
 2. Support services should be offered to all members of the team and family while decisions are being sorted out.
 3. In this case, both curative and palliative end-of-life models of care should be offered simultaneously (the nurse provides to the infant all the supportive measures that a dying infant would receive).
 4. Cultural understanding and support are essential. Translators should be freely available. Handouts should be written at reading-appropriate levels in the family's preferred language.
 5. Use of the Infant Progress Chart^{15(Level VI)} is helpful so families can track their infant's progress and understand when their infant is not getting better.
 6. Nurses can ask for an ethics committee consult if conflict resolution is needed. Every hospital should have a developed protocol to access the ethics committee, and this protocol should include the means for a nurse to request a consult.
 7. When an infant is clearly coming to the end of his or her life, language from allied health professionals should not be about making choices that

include life-extending technologies. Nonbeneficial care that causes infant suffering should not be an option.

8. Choices should include ways in which the remaining time will be spent to make cherished memories and introduce the infant to extended family.
9. To address the rare occasions when consensus on transition to palliative care cannot be reached, facilities have developed nonbeneficial care policies.^{16(Level VII)} These policies allow transition of infant care orders to purely palliative care.

V. Process

A. 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. Visiting hours and sibling restrictions are waived.

B. Care of the family is a central focus.

1. Physical, emotional, and spiritual comfort is provided.
2. Mothers may need normal postpartum nursing assessments and interventions and will need assistance with lactation cessation or milk donation.

C. Making memories is an important part of palliative and end-of-life care.

1. Family photographs have been found helpful in many cultures. Many communities have photographers who specialize in this work. Photographs of the child can be kept on file for families who do not want to have them at the time of death.
2. Handprints, footprints, and locks of hair have been appreciated.
3. Special spiritual or religious ceremonies can provide comfort.
4. Introducing the child to the extended family can be important.
5. Kangaroo care has provided family comfort.
6. There are occasions of multiple births in which some infants die and some infants live. These families need special attention, such as photos of all the infants together; there are special community support groups for this type of loss.

D. Palliative care may include removal of life-sustaining technology.

1. Life-sustaining technology most often is removed in the NICU, but some families choose to remove technology at home with hospice support.
2. Before removing life-sustaining technology, a plan should be made to address the situation if the infant continues to breathe independently.

E. Removal of ventilatory support

1. Infants should be weaned off any neuromuscular blocking agents.
2. Vasopressors and antibiotics may be discontinued.
3. Parents can decide who should be present and how the process will go.
4. Nurses should explain the process to parents, including as many details as the parent wants to hear.
5. Infants should be held in a parent's or staff member's arms. Some parents may not want to hold a dying infant.
6. Gentle suction of the endotracheal tube may be done, and the endotracheal tube is removed.
7. Tape and additional lines can be removed.
8. Frequent pain and symptom assessment continues.
9. If respiratory discomfort exists, medication such as morphine should be given. Oxygen usually is not given.
10. Medications for respiratory distress or to prevent discomfort are given in normal milligram-per-kilogram doses and may be repeated if necessary. Bolus medications in larger-than-normal doses are not appropriate.

F. Decisions about nutrition and hydration

1. Recent science has found that adult patients at the end of life are more comfortable when they are not fed. When not receiving nutrients, the body releases endorphins, which provide analgesia.
2. Decisions about artificial nutrition and hydration in infants should be based on information about infant risks and benefits. When being fed at the same time as organs shut down, adults often develop complications such as pulmonary edema, cardiac failure, painful abdominal distension, or aspiration pneumonia. Parents should be made aware that insertion of a feeding tube has the potential to extend life and prevent the natural dying process. Revisit such points for all related decisions.
3. It is appropriate to offer small amounts of oral fluids as a comfort measure.
4. Mouth care and other symptom management should continue.

G. After an infant dies, care for the family continues.

1. Giving the parents a gift such as a stuffed teddy bear to take home allows them to leave the hospital without empty arms.
2. Calling the next day is helpful.
3. Sending a card from the staff is appreciated.
4. Continued contact on anniversaries of the infant's birth or death, as the family wishes, has been found to be comforting.

5. Introducing the family to a member of the local support group after infant death is very helpful. Some national support groups are Helping Hands and Resolve Through Sharing.

H. Support services also should be offered to all members of the healthcare team. Facilitated debriefing after difficult deaths is essential.

Related Document

Competency: Postmortem Care

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Perioperative Care Level III and IV Nurseries

I. Purpose: 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

II. Considerations

- A. 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.
- B. The operating room is the preferred venue for complex neonatal surgery that involves opening of a major body cavity. Because the transfer of critically ill neonates to an operating room may be associated with significant morbidity, patients who are judged by the neonatologist to be at such risk shall be considered for surgery in the neonatal intensive care unit (NICU).
- C. If the surgical procedure is going to take place in the NICU, prepare the area for surgery. Preparations include clearing appropriate space around the bedside (a minimum of 120 square ft of floor space) and walkways; gathering equipment and supplies such as masks, caps, shoe covers, and gowns; providing patient privacy by lowering window shades; and prohibiting visitation in the immediate area.^{1(Level IV)}
- D. If the surgery will take place in the operating room, prepare for transport of the neonate to the operating room.
- E. 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 preprocedure verification process (e.g., surgical checklist)
 2. Marking the procedure site
 3. A formal timeout just before beginning the procedure.^{2(Level VII)}
- F. 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. Surgeries without sidedness do not require marking. Site marking is to be completed by the surgeon before making the incision.
- G. Frequent pain assessments and adequate pain management are essential for optimum recovery (refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition).

III. Nursing knowledge

- A. Nurses working with surgical neonates should maintain validated competency in sterile procedure, effects of anesthesia, and pain management.
- B. If surgeries are performed in the NICU, nursing staff should also maintain competency in fire safety in the operating room.

IV. Process

- A. Basic care of all surgical patients^{3(Level VII)}
 1. If the infant is born in a facility without surgical capability or capability for the specific type of surgery needed, arrangements for transfer should be made as quickly as possible.
 2. For infants awaiting surgery, reduce risk of hypothermia by maintaining a neutral thermal environment.
 3. 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 physician or allied health professional (AHP) if postponing weighing is a consideration.
 4. Gastric decompression as ordered (refer to the Gastric Decompression Procedure).
 5. 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.^{4(Level VI),5(Level I)}
 - 1) This may be specific according to the epidemiology of the facility.

- 2) Centers for Disease Control and Prevention recommendations currently do not include evidence for prevention of surgical site infections.^{5(Level I)} However, other reports indicate that preoperative antibiotics in some neonatal cases may be appropriate.^{4,6(Level VI)} If administered, antibiotics for this purpose should be administered approximately 1 hr before beginning surgery unless the patient is receiving scheduled antibiotics.^{4(Level VI),5(Level I)}
6. 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.
- B. Gastrointestinal anomalies
1. Esophageal atresia and tracheoesophageal fistula
 - a. Elevate the head of bed 30–45 degrees.
 - b. Preoperatively: 10-Fr Replogle tube to esophageal pouch for low continuous suction^{3,7(Level VII)}
 - c. Postoperatively: gastric tubes and suction parameters per the medical/surgical team
 - 1) Care must be taken to avoid dislodging the orogastric tube after an esophageal repair. If it becomes dislodged, notify the physician, AHP, or surgeon and do not attempt replacement.
 - d. Special care must be taken when suctioning an infant orally. Deep suctioning or passage of a gastric tube should not occur until the suture line has healed. Location of the surgery (depth in the trachea) should be communicated.
 - e. If a gastrostomy tube is placed, observe and record the amount and characteristics of output (refer to the Gastrostomy Tube Care Procedure).
 2. Gastroschisis or omphalocele^{3,8,9(Level VII)}
 - a. Organs outside the abdomen must be protected from heat, water loss, and damage. This may be achieved by:
 - 1) Using a sterile bowel bag and sterile, warm, moist, nonwoven dressing material in the bottom of the bag. The extra-abdominal organs should be placed in the bag but not allowed to contact the moist dressing materials.
 - 2) Wrapping organs in warm, moist, nonwoven dressing material, taking care to maintain alignment and blood supply to the organs. Once the organs are covered with the warm, moist, nonwoven dressing materials, cover with a plastic wrap or bowel bag to maintain heat and moisture. NOTE: Woven dressing material (gauze) is not recommended because it tends to stick to the viscera and tissue, causing trauma or creating difficulty in removal at surgery. If only woven dressings are available, frequent rehydration is necessary.
 - 3) Alternatively, the defect may simply be covered by a sterile bowel bag without any dressing over the bowel itself. This allows continuous observation of the bowel and assessment of blood flow while awaiting surgery.^{10(Level VII)}
 - 4) Once the organs are covered, the infant should be placed on the right side with the bowel supported by towels to avoid decreased perfusion to the involved organs.^{10(Level VII)}
 - 5) The physician or AHP may place a non-surgical silo over the defect. This is usually silicone and maintains heat and moisture. It does not need to be sutured in place, and no additional wrap is needed.^{6(Level III)}
- b. Surgical management and postoperative care^{3(Level VII)}
- 1) May be primary closure or secondary closure, depending on the size of the defect and size of the abdominal cavity. If there will be a secondary closure:
 - a) Maintain elevation and support of the silo to promote reduction and prevent vascular compromise.
 - b) Assist the surgeon at the bedside with serial reductions of the silo. Monitor closely for respiratory distress or pain after reduction of the silo.
 - c) Prepare for a subsequent operative procedure to close reduced contents and remove silo apparatus.
 - 2) Maintain developmentally appropriate positioning.
 - 3) Assess for skin necrosis at base of silo and at repaired defect. Reduce risk of skin breakdown through frequent offloading of pressure and skin condition assessment.
- C. Respiratory anomalies
1. Congenital diaphragmatic eventration or hernia^{7,11(Level VII)}
 - a. Place preductal and postductal pulse oximeter probes to evaluate for persistent pulmonary hypertension.
 - b. Place an orogastric tube to low continuous suction for gastric decompression.

- c. Immediate endotracheal intubation should be performed if the infant needs artificial ventilation.

D. Cardiovascular anomalies

1. Ductal-dependent lesions (coarctation and interrupted aortic arch, hypoplastic left heart syndrome, transposition of great vessels/arteries, tetralogy of Fallot)^{12(Level VII)}
 - a. As part of the initial assessment when a ductal-dependent cardiac lesion is suspected, four-extremity blood pressure should be assessed.
 - b. Be prepared for endotracheal intubation if respiratory compromise occurs.
 - c. Place preductal and postductal pulse oximeters.
 - d. Assist with placement of umbilical catheters.
 - e. Initiate continuous infusion of prostaglandin E1 (alprostadil) as ordered.^{13(Level V)}
 - f. Monitor and correct for metabolic acidosis, as ordered.
 - g. Arrange for transfer for definitive treatment per physician or AHP arrangements.

E. Neurological defects

1. Myelomeningocele: In many cases, myelomeningocele is diagnosed prenatally. These mother/fetus dyads may undergo prenatal repair, changing postnatal management.^{14(Level VI)}
 - a. Avoid exposure to latex.
 - b. In the delivery room, wrap the lesion in a sterile, moist dressing and cover with plastic wrap.
 - c. Position prone or side-lying.
 - d. Maintain moisture on wrapped myelomeningocele.
 - e. Administer antibiotics as ordered.
 - f. A nonpermeable (plastic) drape with a self-adhesive strip can be used to prevent fecal contamination of the surgical site. The adhesive strip portion is placed at the base of the spine below the defect, with the nonadhesive portion extending up toward the head. This way, the adhesive portion is covered by the uppermost portion of the disposable diaper, limiting the stool's path to only the diaper.^{15(Level VI)}
 - g. Many infants with a myelomeningocele also will have a ventriculoperitoneal shunt placed for relief of hydrocephalus (refer to the Shunts, Internal and External Policy for care information).

F. Recovery and postoperative care of the surgical neonate

1. All infants undergoing surgery receive postanesthesia care in the NICU.
2. 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:
 - a. Medications given and reaction to medications
 - b. Abnormal occurrences during surgery
 - c. Any other additional pertinent patient information
3. 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.
4. Ensure the infant is developmentally supported and positioned for comfort. Monitor and treat for pain as indicated.

V. Documentation

- A. Specific forms as identified by an individual facility should be completed. These may include a preoperative form and a timeout form.
- B. Documentation during surgery should be completed by the anesthesiologist, including vital signs and medications administered as well as total blood loss.
- C. Postoperative documentation should include vital signs during the recovery period, blood glucose screening postoperatively, and regular pain assessments and reassessments.
- D. Document any medication given or treatment provided and the response.

Related Documents

Procedure: Enteral Tube, Insertion and Management of

Policy: Gastric Decompression

Procedure: Gastrostomy Tube Care

Policy: Shunts, Internal and External

Policy: Transport

Procedure: Urinary Catheterization

Competency: Perioperative Care in the Neonatal Patient

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Procedure: Peripherally Inserted Central Catheters, Insertion of Level II, III, and IV Nurseries

- I. Purpose: To outline the process and ensure safe practice during the insertion of a peripherally inserted central catheter (PICC)
- II. Considerations
- A. A PICC is a catheter with a tip residing in the superior vena cava (SVC) for upper-body insertions and the inferior vena cava (IVC) for lower-body insertions.
- B. Patient selection criteria should be based on:
1. Anticipated length of therapy: Consider central line placement if an infant needs more than 6 days of infusion therapy.^{1(Level 1)}
 2. Assessment findings: Determine the adequacy of venipuncture sites to use for ongoing access.
 3. Infusate properties and recommendations for vascular access devices based on^{2(Level 1)}:
 - a. Osmolarity >600 mOsm/L linked to a higher risk for phlebitis and thrombosis
 - b. pH <5 and >9
 - c. Continuous infusion of irritants or vesicants
- C. A dedicated staff with special training in insertion results in fewer catheter-related bloodstream infections.^{1(Level 1)}
- III. Equipment
- A. Supplies should be maintained in a procedure or insertion cart.
- B. Efforts should be made to provide latex-free and di-(2-ethylhexyl)phthalate (DEHP)-free products.^{3(Level V)}
1. General equipment and supplies
 - a. Sterile gown
 - b. Hair cover
 - c. Face mask
 - d. Protective eyewear
 - e. Sterile gloves (two pairs), powder- and latex-free
 - f. Restraints or swaddling device (optional)
 - g. Imaging device such as a transilluminator, infrared technology, or ultrasound and sterile sleeve or glove (if applicable)
 2. Catheter equipment and supplies
 - a. Silicone or polyurethane single- or dual-lumen catheter
 - b. Appropriate-size catheter^{2(Level 1)}
 - 1) Determining factors include the infant's weight, size of the vein, type of fluids to be infused, rate of infusion, and need for blood sampling or administration.
 - 2) Use the smallest catheter that will meet the infant's needs.
 - c. Introducer needle or cannula, in a size appropriate for the catheter; use safety-engineered introducers, if available.
3. Preassembled kit or procedure cart
- a. Tape measure
 - b. Sterile tourniquet
 - c. Skin antiseptic solution (e.g., chlorhexidine gluconate or povidone iodine)
 - d. Sterile water or saline pads
 - e. Three sterile 4 × 4 lint-free gauze sponges
 - f. Sterile tape measure for trimming the catheter (optional)
 - g. Sterile tape or skin closure tape strips
 - h. Semipermeable transparent dressing or 2 × 2 gauze and nonocclusive tape
 - i. Surgical drape to fully cover the infant (as can safely be done) and bed
 - j. Flush solution, which may include a heparinized saline solution, concentration per unit protocol (usually 0.5–1.0 units heparin/ml), or sodium chloride in a 5- or 10-ml syringe, per manufacturer's recommendation. The syringe should be labeled.^{2,3,4(Level 1)}
 - k. Needles or needleless supplies for drawing flush solution into syringes or a prefilled "sterile field" flush syringe
 - l. Nontoothed forceps
 - m. Scissors
 - n. Catheter-trimming device (optional, per manufacturer's recommendations)
 - o. Extension set (T-connector, straight connector, or multilumen device) with Luer lock and closed-end adapter. Some catheters are manufactured with an integrated extension set and do not require a separate extension set.
 - p. Water-soluble radiocontrast media (optional; may be needed for small catheters or catheters containing lower amounts of radiopacity; also may be needed when infants have extensive cardiopulmonary disease and when the catheter cannot be visualized radiographically)
- IV. Nursing knowledge
- A. Clinicians inserting PICCs should have satisfactorily completed an education program meeting National Association of Neonatal Nurses guidelines and Infusion Nurses Society Standards for insertion of a PICC and possess current clinical competency.^{2,3(Level 1)}

- B. Adhere to manufacturer's recommendations for insertion and ongoing catheter management.
 - C. Acceptable veins for the procedure (based on the infant's age, the State Nurse Practice Act, and skill level of the inserting clinician) include basilic, cephalic, axillary, temporal, posterior auricular, external jugular, greater and lesser saphenous, popliteal, and femoral veins.
 - D. The catheter tip should reside in the SVC or the thoracic aspect of the IVC.
 - E. Infection prevention strategies used during insertion should include use of maximum sterile barrier precautions for the clinician and assistant performing the procedure and having contact with the sterile field. Those who are assisting with the procedure but not touching the sterile field should wear facial masks. Unnecessary traffic should be restricted in the vicinity of the sterile field.
 - F. A procedural checklist should be used throughout insertion. The presence of an observer helps to ensure that steps outlined are followed and infection prevention principles are not breached.^{1(Level 1)}
- V. Process^{2,5(Level 1)}
- A. Family education
 - 1. Ensure that the family has been educated about the processes in place to prevent central line-associated bloodstream infection before PICC insertion.
 - 2. Ensure that the family's questions have been answered regarding PICC insertion.
 - 3. If required, ensure that a signed, witnessed PICC insertion consent has been obtained.
 - B. Insertion
 - 1. Determine the need for a PICC and obtain an order for placement.
 - 2. Verify signed informed consent.
 - 3. Verify the identity of the infant slated for the procedure using at least two identifiers.
 - 4. Perform hand hygiene before touching the infant, before setting up a sterile field, and at the conclusion of the procedure; use an alcohol-based waterless cleanser or antimicrobial soap and water.
 - 5. Assess the infant and select the vein for insertion.
 - 6. Measure the length of the catheter to be inserted.
 - a. Arm insertion site: Measure from the site of the venipuncture along the route of the vein, under the clavicle to the clavicular head, and to the right of the sternum to the third intercostal space.
 - b. Scalp or neck insertion site: Measure from the site of the venipuncture along the route of the vein to the right of the sternum and to the third intercostal space.
 - c. Leg insertion site: Measure from the venipuncture site along the route of the vein to the femoral pulse in the groin, then veer to the right of the umbilicus to the xiphoid process.
7. Assess the infant for the level of support needed during the procedure.
 - a. Nonpharmacologic support to be offered as appropriate
 - 1) Swaddling
 - 2) Pacifier
 - 3) Sucrose solution
 - b. Pharmacologic support
 - 1) Topical analgesic creams take time to achieve effect, may create local vasoconstriction obscuring the vein, and do not decrease agitation due to patient manipulation.
 - 2) Analgesic agents must be administered several minutes before the procedure and monitoring to ensure safety.
 8. Gather equipment and supplies.
 9. Position the infant and restrain as needed.
 - a. For arm insertion, turn the head toward the arm being accessed to reduce the likelihood of the catheter entering the jugular vein.
 10. Don hair covering and mask.
 11. Open equipment and prepare a sterile field.
 12. Don sterile gown and gloves.
 13. Prepare the catheter by trimming to the length needed for the procedure, per manufacturer's recommendations, and flush to ensure patency and air removal.
 14. Prep the insertion site and surrounding skin with chlorhexidine gluconate or povidone-iodine per protocol and allow to dry.
 15. Place a sterile drape under the insertion area and cover as much of the infant and bed as can be done safely.
 16. Apply the tourniquet (for an extremity insertion), as desired.
 17. Insert the introducer slowly into the vein while observing for blood return. After blood return is evident, remove the needle stylet from the cannula stylet introducers.
 18. Remove the tourniquet, if used.
 19. Using nontoothed forceps, thread the catheter through the introducer in 0.5-cm to 1-cm increments to the premeasured length.
 20. Difficulty threading the catheter may be encountered at various times during insertion and may be alleviated by flushing, repositioning the infant, retracting and reinserting the catheter, or massaging over the vein. Common causes of threading difficulty are vein specific but may include:

- a. Blockage by the venous valve
 - b. Difficulty traversing the junction of two veins
 - c. Anatomic variability
21. Apply pressure to the indwelling portion of the catheter above the introducer and carefully remove the introducer. Apply digital pressure to the site until bleeding ceases.
 22. Release the breakaway needle or peel-away cannula per the manufacturer's recommendations.
 23. Reposition the catheter if necessary to ensure it is at the premeasured length.
 24. If a stylet is present, remove it slowly while monitoring the catheter for bunching, which may indicate too-rapid removal.
 25. Aspirate for a blood return and flush the catheter. A needleless connector may be placed on the distal end of the catheter while awaiting X-ray confirmation of catheter tip location.
 26. Temporarily secure the catheter to the skin with sterile tape or skin closure tape. Alternatively, the PICC can be dressed and the sterile field disassembled. The latter practice allows the catheter to be adjusted only by pulling back but not reinserting.
 27. Maintain catheter patency by flushing intermittently with 0.5-ml flush solution in a 5-ml to 10-ml syringe or attach a positive or neutral displacement device until the position is verified.
 28. Radiographically verify the location of the catheter tip and reposition the catheter if necessary. An anteroposterior view is usually adequate, but a lateral view can reveal catheter malposition. Position the infant for the X ray by placing him or her in a neutral (or commonly assumed) position.
 - a. Water-soluble contrast agents may be instilled to slightly overfill the catheter to help visualize the catheter tip by altering the radiologic image on the viewer. Aspirate contrast agent from the catheter after radiologic verification, taking care to clear blood from the catheter once contrast media is removed.
 29. Remove the skin antiseptic agent with sterile water or saline.
 30. Attach a Luer-locking extension set, if an integrated extension set is not part of the catheter design.
 31. Secure the PICC using transparent dressing and adhesive recommended by the manufacturer. Strips of tape or wound closure strips should not be placed on catheter tubing because of risk for catheter damage, but they may be used on the catheter securement hub. Use of a securement device fosters stabilization and is recommended to decrease the likelihood of dislodgement, migration, and thrombosis and may lessen the risk of catheter-related bloodstream infection.^{1,2(Level 1)}

VI. Documentation

- A. Complete procedural checklist^{1(Level 1)}
- B. Completion of Universal Protocol (verifying right patient, procedure, and location of procedure)
- C. Procedural documentation should include:
 1. Date and time of procedure
 2. Name of clinician performing the procedure
 3. Indication for a PICC
 4. Consent and parent education
 5. Universal Protocol and infant identification
 6. Procedural medications administered with therapeutic response
 7. Catheter specifics: brand, type, size, number of lumens, lot number, initial length of catheter (i.e., length trimmed, inserted, and external)
 8. Style and size of introducer
 9. Presence of stylet
 10. Vein of insertion
 11. Solution used for skin antisepsis
 12. Number of attempts at cannulation
 13. Imaging technology used for insertion
 14. Location of catheter tip, verified radiographically, and name of the person interpreting the X ray
 15. Catheter location after repositioning and radiographic reverification of the catheter tip
 16. Type of dressing used
 17. Infant's tolerance of the procedure
 18. Complications encountered

Related Documents

Policy: Infection Prevention

Procedure: Infusion Therapy

Competency: PICC Insertion

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

Peripherally Inserted Central Catheters: Guideline for Practice, 3rd edition

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Author: _____

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Procedure: Peritoneal Dialysis

Level III and IV Nurseries

I. Purpose: Peritoneal dialysis removes toxic waste products and fluid from the body by instilling an appropriate solution into the peritoneal cavity to produce an exchange across the peritoneal membrane.

II. Considerations

A. Renal replacement therapy may be indicated for acute kidney injury with refractory fluid overload, metabolic acidosis, hyperkalemia or hyperammonemia, symptomatic uremia, and drug or toxin overdose.^{1(Level VII)} Options include hemodialysis, continuous renal replacement therapy, and peritoneal dialysis. Peritoneal dialysis does not require anticoagulation or vascular access, and because of the gradual removal of solutes and fluid, it tends to be better tolerated hemodynamically.^{1,2(Level VII)}

B. A pediatric nephrologist order is required to determine^{3(Level VII)}:

1. Type of dialysate and any additives
2. Fill volume
3. Fill time
4. Dwell time
5. Drainage time
6. Flush volume and cycles (as applicable)

C. Relative contraindications may include^{4(Level VII)}:

1. Recent abdominal surgery
2. Abdominal adhesions
3. Disruption of the diaphragm or abdominal wall
4. Acute abdomen

III. Equipment

- A. Face mask, sterile gloves, and sterile towels or drapes
- B. Closed peritoneal dialysis tubing system^{1,3(Level VII)} with an inflow burette for precise measurement, three-way flow control mechanism, and outflow meter for precise measurement
- C. Transfer set
- D. Blood or fluid warming device^{5(Level VII)}
- E. Dialysis solution bag as ordered, with Luer lock connection technology^{6(Level VII)}
- F. Sterile gauze and sterile cleansing solution

IV. Nursing knowledge

- A. Nurses caring for infants receiving peritoneal dialysis should be competent in assessment and care of high-risk neonates.
- B. In addition, registered nurses (RNs) should be knowledgeable about complications that may occur during peritoneal dialysis. These may include the following^{4(Level V)}:
 1. Perforation of the bladder, bowel, or major vessels

2. Bleeding
3. Leakage from the exit site
4. Extravasation of dialysate
5. Obstruction of the catheter
6. Dislodgement of the catheter
7. Hydrothorax
8. Hyperglycemia
9. Electrolyte imbalance
10. Lactic acidosis
11. Exit site infection and peritonitis
12. Hernia
13. Removal of therapeutic drugs

C. RNs also should be alert to the following signs of complications^{1(Level VII)}:

1. Instilled dialysate volume exceeding drained volume (immediately alert the physician) or difficulty retrieving dialysis fluid from the peritoneum
 - a. Ensure that the infant is positioned higher than the drainage system to promote gravity drainage.
 - b. Be alert for catheter tip migration, blockage of the catheter tip, or constipation.
2. Cloudy dialysate or fibrin present in drained fluid (immediately alert the physician)
 - a. Be alert for infection.
3. Difficulty with inflow
 - a. Check lines for closed clamps or kinks.
 - b. Reposition to increase flow.

V. Process

- A. Surgical insertion of a permanent peritoneal dialysis catheter by a pediatric surgeon is preferred.^{1,4(Level VII)} Alternatively, a temporary catheter or angiocatheter may be placed for a few days.^{4(Level VII)} Temporary peritoneal dialysis has also been described in mechanically ventilated very-low-birth-weight infants with an intravenous cannula or umbilical venous catheter attached to a three-way cannula.^{7(Level VI)} RNs may assist with placement of the dialysis catheter at the bedside using maximum sterile barrier precautions and sterile technique.
- B. The procedure will be preceded by proper patient identification.
- C. Before the procedure, ensure the bladder is completely drained and decompress the stomach to reduce the risk of bladder or bowel perforation.^{3,4(Level VII)}
- D. Infant preparation for bedside procedure:
 1. The infant must be on an infant warmer with the temperature probe secured to the body throughout the procedure.

2. Place the infant supine on pulse oximetry and cardiorespiratory monitoring.
 3. Immobilize the infant's extremities using developmental principles.
- E. After the dialysis catheter is placed, use should be delayed as long as possible to minimize problems with leaking.^{1,5(Level VII)} Flushing may be ordered.^{5(Level VII)}
- F. When manual exchanges are initiated or tubing changed, attach closed and primed peritoneal dialysis tubing system during a dwell time, so the first action is to drain. Ensure procedure is performed using a sterile field, mask, and sterile gloves. Warm fluids via warming device per manufacturer recommendations.
- G. If intraluminal contamination occurs, which may be associated with touch contamination, accidental disconnection, equipment failure, or stool contamination, notify pediatric nephrologist because an effluent sample for culture, prophylactic antibiotics, and sterile transfer set change may be needed.^{6(Level VII)}
- H. Exchanges are done in cycles requiring vigilant monitoring and accurate timing.
1. Perform hand hygiene before each exchange or tubing change using the following procedure.^{8(Level VII)} Wash hands with plain soap and water and thoroughly dry. Then, use hand gel with alcohol-based product until dry.
 2. Exchange procedure:
 - a. Fill burette with dialysate volume as ordered.
 - b. Clamp the outflow line and unclamp the inflow line, allowing dialysate to flow in over ordered fill time.
 - c. Clamp the inflow line and allow the fluid to dwell for the ordered amount of time.
 - d. Unclamp the outflow line and allow the fluid to drain by gravity for the ordered amount of time and then clamp the outflow line.
- I. Reserve weights and other nursing procedures for a time when the dialysate is drained and the abdomen is empty to minimize discomfort and ensure accuracy of weight.
- J. Maintain sterility of the system. Sterile gloves and mask are recommended for changing tubing. Tubing should be changed daily^{1(Level VII)} or according to manufacturer's recommendations.
- K. Ensure no tension is placed on the catheter to reduce risk of accidental displacement and promote healing.^{6(Level VII)}
- L. Assess and perform site care according to the guidelines below. Observe this area for drainage or leakage of dialysate.^{6(Level VII)}
1. Early exit site care includes weekly sterile dressing changes and as needed for excessive drainage until exit site is healed (usually 2–6 weeks). Less frequent changes are recommended to reduce

catheter manipulation, trauma, and contamination during the early healing phase.

- a. Avoid submersion bathing while site is healing.
 - b. Don mask, perform hand hygiene, and apply sterile gloves.
 - c. Clean around the site with sterile gauze soaked in sterile cleansing solution.
 - d. Do not forcibly remove crusts.
 - e. Clean exit site tubing (from exit site up tubing) with another sterile gauze soaked in sterile cleansing solution.
 - f. Allow the site to dry.
 - g. Allow the catheter to fall in its natural position, avoiding any torque.
 - h. Dress the site with several layers of sterile gauze to wick away any new drainage.
 - i. Avoid semipermeable and occlusive dressing directly on the wound to prevent pooling.
 - j. Immobilize the catheter below the exit site.
2. Chronic site care is performed daily^{9(Level IV)} after the site is healed. The goal is to immobilize the catheter and keep the site clean and dry without scab, crust, or signs of inflammation.
- a. Perform hand hygiene and don gloves.
 - b. Clean around the site with sterile gauze soaked in sterile cleansing solution.
 - c. Allow the site to dry.
 - d. Apply topical antibiotic as ordered based on susceptibilities of bacteria causing local exit site infections. There is a risk of catheter rupture if a polyurethane catheter is exposed to ointment containing polyethylene glycol base.
 - e. Immobilize the catheter with downward or lateral tunnel configuration.^{10(Level IV)}
- M. Monitoring^{5(Level VII)}
1. Accurate hourly documentation on the peritoneal dialysis flow sheet includes:
 - a. Volume in
 - b. Volume out
 - c. Net/hour (+/–)
 - d. Net over the course of dialysis
 - e. Intakes: enteral and parenteral
 - f. Outputs: urine and gastric
 2. Monitor serum glucose, electrolytes, blood urea nitrogen, creatinine, calcium, magnesium, and phosphorus and draw a complete blood count as ordered.

Related Documents

Policy: Skin Care

Competency: Peritoneal Dialysis

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Author: _____

Original Date: _____

Approvals: _____

Policy: Retinopathy of Prematurity, Eye Exam Screening Level II, III, and IV Nurseries

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

II. Considerations

A. The following infants should receive retinal screening exams^{1(Level I)}:

1. Infants with birth weight less than 1,500 g or gestational age of 30 weeks or less (as defined by the attending neonatologist)
2. Selected infants who have a birth weight between 1,500 and 2,000 g or gestational age of more than 30 weeks with an unstable clinical course, including the need for cardiorespiratory support, and are believed to be at high risk by the pediatrician or neonatologist.

B. A retinal screening exam consists of pupillary dilation using binocular indirect ophthalmoscopy^{1(Level I)} or digital retinal photography.^{2,3(Level I)} (Telemedicine screening has been shown to have excellent sensitivity and specificity in some centers).^{2(Level I)}

C. The timing of first eye exams is based on gestational age at birth.^{4(Level I)}

III. Equipment (for bedside indirect ophthalmoscopy)

- A. Sucrose and pacifier
- B. Eyedrop (mydriatic and cycloplegic) medications as ordered by the physician
- C. Eye speculum and scleral depressor
- D. Blanket for swaddling or facilitated tuck and nesting
- E. Reduced lighting and quiet environment

IV. Nursing knowledge

- A. The nurse should be knowledgeable about the stages of ROP that warrant intervention, treatment modalities, pain management,^{5,6(Level I)} and outcomes.
- B. ROP eye examinations are associated with pain and stress despite the use of nonpharmacologic and topical pharmacologic interventions.^{6(Level I)}
- C. Proper administration technique is important to prevent adverse effects of mydriatic and cycloplegic eye drops that may be administered.^{7(Level VI)}

V. Process

A. Family education

1. Instruct families on the indication for ROP examinations and provide educational handouts.
2. Ongoing communication with parents is essential.
3. Examinations that are required after discharge should be arranged before discharge, emphasizing the importance of timely follow-up. Provide

parents with a copy of the letter, with content similar to the example in **Figure 1**.

B. Nursing practice

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 infant identification.
3. Provide pain management (refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition).
4. Verify the infant meets the criteria for a ROP exam.
5. Instill mydriatic or cycloplegic agents for pupillary dilation as ordered at least 10 min before the indirect ophthalmic exam.
 - a. Provide gentle pressure over the nasolacrimal duct during and for at least 2 min after instillation of drops to minimize systemic absorption.^{8(Level VII)}
 - b. Protect eyes from bright light for 4–6 hr after mydriasis.
6. Administer sucrose with a pacifier at least 2 min before starting the bedside eye exam.
7. Provide nonpharmacologic comfort measures during the indirect ophthalmic exam such as facilitated tuck with nesting and a sucrose pacifier.
8. Monitor the infant during the exam and stop the procedure if the infant has significant changes in heart rate, respiratory rate, or oxygen saturation. Provide a rest period after each eye is examined, if necessary, to allow recovery to baseline vitals.
9. Keep lights dim or keep the infant's eyes covered for at least 4 hr after the eye exam.

VI. Documentation

- A. Document the infant's vital signs and pain score before starting the eye exam and at completion of the eye exam.
- B. Document completion and infant tolerance of the exam.
- C. An ophthalmologist should document the results of the eye exam.

Related Documents

Policy: Oxygen Administration for the Neonate

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

Figure 1. Parent Letter

Your child's eyes have been examined by _____ during your child's stay in the _____ neonatal unit. The findings of that examination indicate that your child is at risk for developing severe complications of retinopathy of prematurity (ROP), an eye disorder that can result in severe vision loss or even blindness.

Definition of ROP: If one thinks of the eye as a camera, the retina functions as the film. The retina is the inner lining of the eye that receives light and turns it into visual messages that are sent to the brain. Blood vessels that supply the retina are one of the last structures of the eye to mature; they have barely completed growing when a full-term infant is born. This means that a premature infant's retina is not yet completely developed. The smaller and younger the infant is at birth, the higher the risk of severe disease. For reasons not yet fully understood, the blood vessels in the immature part of the retina may develop abnormally in some premature infants.

When ROP develops, one of three things can happen:

1. The abnormal blood vessels heal themselves completely, usually during the first year of life.
2. The abnormal blood vessels heal only partially.
3. The abnormal blood vessels bleed and form scar tissues. These may pull the retina out of its normal position in the back of the eye. This problem results in severe loss of vision. Fortunately, there is treatment to attempt to minimize severe vision loss. Occasionally, despite all treatment, this condition can lead to blindness in one or both eyes.

In any of these situations, nearsightedness, lazy eye, or a wandering eye may develop. Glasses may be needed in early life. In some cases a scar may be left in the retina, resulting in vision problems that are not correctable with glasses.

At present, ROP can be treated with various therapies. This treatment reduces, but does not completely eliminate, the risk of severe complications from ROP. However, this treatment is effective only if it is given at the proper time. Therefore, the timing of future follow-up examinations is critical. To reduce the risk of severe complications of ROP, an appointment for follow-up examination must be made for your baby with _____.

Phone: _____

IT IS EXTREMELY IMPORTANT TO THE FUTURE HEALTH OF YOUR CHILD THAT YOU MAKE AND KEEP THAT APPOINTMENT.

FAILURE TO KEEP THAT APPOINTMENT MAY RESULT IN SEVERE EYE DAMAGE OR BLINDNESS FOR YOUR CHILD.

I have read and understand the above information on ROP.

Signature of responsible party

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Retinopathy of Prematurity, Laser Surgery for Level II, III, and IV Nurseries

- I. Purpose: To provide guidelines for the care of infants receiving laser surgery to prevent further vessel proliferation and possible retinal detachment in the presence of retinopathy of prematurity
- II. Considerations
- Perioperative care policy should be followed for the care of neonates receiving laser surgery.
 - Infants should be placed on an adjustable warmer in a quiet, dark surgical area with cardiorespiratory and pulse oximetry monitors in place.
 - Signs should be posted on the door to the room in which surgery is occurring to warn that a laser is in use. Any person entering the room should wear appropriate eye protection (per manufacturer's recommendations).^{1(Level VII)}
 - No other patients or staff should be within the radius of the infant during the laser procedure, as specified in the manufacturer's instructions. Transport the infant to a surgical suite or designated procedure room in the neonatal intensive care unit.^{2(Level VII)}
 - An anesthesiologist or neonatologist who is able to resuscitate and provide an airway should be available throughout surgery.
 - Vital signs should be documented every 5 min during the procedure. These may be printed from the cardiorespiratory monitor and verified for accuracy.
- III. Equipment
- Radiant warmer (do not turn on the warmer)
 - Cardiac monitor, blood pressure, and pulse oximeter
 - Suction or bulb syringe
 - Oxygen
 - Bag and mask
 - Oxygen flow meter
 - Emergency drug card for the infant's current weight
 - Emergency medications
 - Intubation tray
 - Mayo stand or table at the bedside for laser equipment
 - Laser equipment as requested by the ophthalmologist
 - Sterile speculum and depressor
 - Eye protection (sufficient for all staff in the room)
 - Topical dilating and anesthetic eye drops
- IV. Nursing knowledge
- Nurses assisting with laser surgery should be competent in monitoring and caring for infants receiving sedation and analgesia.
 - Nurses assisting with laser surgery should maintain competency in surgical setting safety, including necessary precautions with lasers.
- V. Process
- Follow standard precautions when performing all steps of the procedure except when directed to use sterile technique.
 - Check for proper patient identification and procedural time out.
 - Provide education to the infant's family.
 - Ensure the family's questions about indications for and expectations of laser surgery have been adequately answered.
 - Ensure the operative consent form has been signed. The consent should read as directed by the physician performing the procedure after an explanation.
 - Provide preoperative care
 - Ensure the infant is nothing-by-mouth (NPO) status as ordered before surgery.
 - Complete a surgery preoperative checklist.
 - Check blood pressure before administering ophthalmic drops and after completion of all five doses.^{3(Level I)}
 - Obtain orders and, upon notification by the physician, begin to administer eye drops.
 - Give cyclopentolate and phenylephrine ophthalmic as ordered, providing gentle pressure over the nasolacrimal duct during and for at least 2 min after instillation of drops to minimize systemic absorption.^{3(Level VII)}
 - Protect dilated eyes from light with a darkened environment or eye covers.
 - Obtain intravenous access with a saline lock or maintenance fluids as ordered by the primary care provider.
 - Place the infant in a developmentally supportive position with medical immobilization as necessary. Turn off the warmer during the procedure.
 - Cover any windows in the room.
 - Ensure that distance from other patients or staff without eye protection is at least 65 feet. It is preferred that no other patients are in the same room.^{1(Level VII)}
 - Provide intraoperative care.
 - With the operating room team, assist with laser operation and perform safety checks. (Anesthesia staff is present for the administration of anesthesia)

medications during the procedure and infant monitoring.)

2. Manage pain with appropriate medications during the procedure. Opioid narcotics^{2(Level VII)} and a systemic sedative may be needed.^{2(Level VII)}
3. Assist the physician as needed by holding the infant during the surgery.

F. Provide postoperative care

1. Ensure the infant is NPO until stable (usually 2–3 hr). Restart feedings according to neonatologist orders.
2. Follow the procedure for postoperative recovery as for any surgical procedure (refer to the Perioperative Care Procedure).
3. Refer to physician orders for photocoagulation after laser surgery. Obtain a follow-up eye exam according to physician orders.
4. Obtain any preoperative orders that are to continue postoperatively from the primary care provider.

5. Observe the infant closely for 24 hr after surgery for arrhythmia and bradycardia.
6. Assess eyes for drainage. They will be red and puffy.
7. Cover eyes for at least 6 hr after surgery.

VI. Documentation

- A. Annotate the preoperative checklist.
- B. Conduct the pain assessment before, during, and after the procedure. If scores are higher than the functional pain goal, continue assessment according to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition.

Related Documents

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

References

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Author: _____

Original Date: _____

Approvals: _____

Policy: Sedation and Analgesia Level II, III, and IV Nurseries

I. Purpose: To provide for the safe management of sedation and analgesia for procedures performed in the neonatal intensive care unit (NICU). Sedation and analgesia are pharmacologic states that permit patients to tolerate unpleasant stimuli while maintaining adequate cardiorespiratory function.^{1(Level VII)}

II. Considerations

- A. A neonatologist or allied health professional (AHP) is responsible for the care of infants in the NICU during planned sedation analgesia addressed under this policy. The neonatologist or AHP must be immediately available during the procedure and until the recovery is judged adequate.
- B. The healthcare professional performing the procedure is responsible for obtaining consent (if required) for the procedure. Informed consent also may be required to administer sedation or analgesia.
- C. The neonatologist or AHP will evaluate the infant before the procedure and determine appropriateness of feeding status and timing of the last feeding in relationship to timing of the procedure (if the infant is feeding).^{2(Level VII)}
- D. A registered nurse (RN) will complete a full assessment before the procedure and document in the medical record.
- E. All infants receiving planned sedation or analgesia should have intravenous (IV) access before, during, and after the planned procedure until it is determined there is no longer any risk for cardiorespiratory depression. If there is no IV access, someone skilled in placing an IV should be immediately available in the event access is needed.^{2(Level VII)}
- F. The following standards apply when infants in the NICU receive moderate or deep sedation. Moderate and deep sedation are defined as follows.^{3(Level VII)}
 1. Moderate sedation analgesia: a drug-induced depression of consciousness during which no interventions are needed to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.
 2. Deep sedation analgesia: a drug-induced depression of consciousness during which the ability to independently maintain ventilatory function may be impaired. Infants may need assistance maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function usually is maintained.
- G. This policy addresses care of infants by practitioners who are not anesthesiologists. Exclusions to this policy include:

1. Infants who are not undergoing a diagnostic or therapeutic procedure (receiving postoperative analgesia or sedation for treatment of agitation or irritability)
2. Infants who are already intubated with stable airway management, who are continuously monitored and observed with or without sedation analgesia with appropriate alarm limits set
3. Infants receiving peripheral nerve blocks, or local or topical anesthesia (e.g., circumcision)
4. Infants undergoing general anesthesia (perioperative management)

III. Knowledge^{2(Level VII)}

A. Nursing

1. The RN will monitor the infant and, under the supervision of the physician or AHP, administer medications for sedation and analgesia.
2. The RN will have skills and knowledge validated as evidenced by a completed sedation competency.
3. All RNs in the NICU must maintain current neonatal resuscitation program certification.

B. Physician

1. The physician will be credentialed to manage the care of infants receiving sedation and analgesia for a procedure or exam.
2. The physician will have advanced airway management training and credentialing.

IV. Process

A. Monitoring guidelines^{2(Level VII)}

1. Whenever sedation or analgesia medications are administered according to circumstances outlined in this policy, the infant must be monitored by an RN, AHP, or physician.
2. Infant monitoring must include direct visual observation to the extent the procedure allows and use of continuous cardiorespiratory and pulse oximetry monitoring. Blood pressure, if available from an invasive catheter, must be continuously monitored. If no arterial catheter is in place, noninvasive blood pressure monitoring must take place every 5 min unless it interrupts the procedure.
3. Monitoring as set forth above must be continuous, with alarm limits set at patient-appropriate parameters.

- #### B. Reversal agents for medications given for planned sedation analgesia must be readily available during the procedure.

C. All necessary emergency equipment for resuscitation and intubation must be continuously available in the NICU.

V. Documentation

- A. Medical progress notes should indicate the infant's suitability and evaluation for the procedure.
- B. Physician and AHP orders should include the procedure to be performed and medications to be given; nothing-by-mouth status, if applicable, also should be indicated before the procedure.

C. Vital signs, blood pressure, and pulse oximetry should be documented in the medical record.

D. Any alarms determined to be patient-triggered during and after the procedure should be documented, as well as any action taken to stabilize the infant's condition.

E. The physical assessment performed by the RN should be documented before the procedure.

Related Document

Competency: Sedation

References

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Author: _____

Original Date: _____

Approvals: _____

Policy: Shunts, Internal and External Level II and III Nurseries

- I. Purpose: To provide guidance in the care of reservoirs or shunts placed for cerebral spinal fluid (CSF) drainage
- II. Considerations
- A. The choice between reservoir placement and ventriculoperitoneal shunt placement is made after consultations and evaluation.^{1(Level VII)}
1. Neurosurgery and genetics consultation
 2. Diagnostic evaluation
 - a. Serial intracranial ultrasonography
 - b. Neuroimaging techniques (computed tomography scan, magnetic resonance imaging, cranial ultrasonography)
- B. 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.
- C. Measure head circumference serially. If it is increasing, measure head circumference at greater frequency (this is necessary before and after shunt or reservoir placement).
- D. Maintain accurate intake and output, including the amount of CSF removed from the reservoir.
- E. Parent education is important to ensure the development of the skills necessary for ongoing care of the infant after discharge.^{2(Level VII)} Detailed materials with illustrations and explanations are helpful.
- III. Equipment
- A. For tapping the reservoir
1. 25- or 27-gauge butterfly needle
 2. Stopcock
 3. 5- to 20-ml syringe, depending on the amount of fluid to be removed
 4. Hospital-approved skin disinfectant
- IV. Nursing knowledge
- A. Demonstrated competency in neurologic assessment of infants
- B. Ongoing assessment of shunt malfunction, signs of infection, signs of elevated intracranial pressure, skin breakdown, optimal neurodevelopmental positioning, and pain management^{2(Level VII)}
- C. Possible causes of shunt malfunction: obstruction; mechanical disconnection, displacement, or migration; failure of shunt system; infection; and overdrainage^{3(Level VII)}
1. Concern about reservoir infection resulting from repeated tapping should not be an argument against placing a reservoir.^{4(Level IV)}
- D. Symptoms of increasing intracranial pressure^{5(Level VII)}
1. Increasing head circumference
 2. Full or tense fontanel
 3. Sutures palpably more separated
 4. High-pitched, shrill cry
 5. Change in neurologic status
 6. Poor feeding or feeding intolerance
 7. Nystagmus
 8. Sunset sign of eyes
 9. Shiny scalp with distended vessels
- E. Signs of infection with reservoir or ventriculoperitoneal shunt^{2(Level VII)}
1. Redness or drainage at site
 2. Hypothermia or hyperthermia
 3. Lethargy or irritability
 4. Poor feeding or weight gain
 5. Pallor
- F. Signs of peritonitis with ventriculoperitoneal shunt^{2(Level VII)}
1. Abdominal pain or tenderness
 2. Erythema, warmth, and tenderness over the shunt tubing
- G. Precautions regarding drainage of ventricular reservoirs^{6(Level VII)}
1. Serum electrolytes should be monitored and corrected every other day if more than 10 ml is removed daily.
 2. Be prepared to provide rapid fluid replacement if the infant does not tolerate the removal of large volumes.
- V. Process
- A. Drainage of ventricular reservoirs^{6(Level VII)}
1. Place the infant with the head in a neutral position in anticipation of a 20- to 25-min procedure.
 2. Cut any long hair that interferes with the surgical area (do not shave).
 3. The physician performs the procedure with strict aseptic technique.
 4. After the procedure is completed, apply firm pressure to the needled site for 2 min or until CSF leakage from the skin stops.
 5. Clean area with sterile saline to remove the skin disinfectant.
- B. Postoperative ventriculoperitoneal shunt care^{2,5(Level VII)}: Immediate postoperative care includes positioning, pain management, ensuring proper function of the shunt device, monitoring, and care of the surgical site.

1. Position the infant.
 - a. 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.
 - b. Keep the head of the bed flat or elevated no more than 30 degrees to prevent rapid fluid loss.
 - c. Carefully support the head when moving the infant.
 - d. Turn every 2 hr from the unaffected side of the head to the back.
2. Maintain the shunt site.
 - a. Use strict aseptic technique when changing the dressing, if present.
 - b. Pump the shunt only as directed by the neurosurgeon (many shunts do not have pumps and drain through a valve set to allow a specific amount of flow or respond to pressure differences).
3. Watch for symptoms of excessive CSF drainage.
 - a. Sunken fontanel
 - b. Increased agitation or restlessness
 - c. Increased urine output
 - d. Increased sodium loss
4. Observe for and report any seizure activity or paresis.
5. Observe for signs of ileus.
 - a. Abdominal distension
 - b. Absence of bowel sounds
 - c. Increased loss of gastric content through emesis or an orogastric tube
6. Perform range-of-motion exercises on all extremities.

VI. Documentation

A. Document in the medical record:

1. All assessments
2. Head circumference
3. Intake and output
4. Condition of incision site
5. Procedures done

Related Document

Procedure: Perioperative Care

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Original Date: _____

Approvals: _____

Policy: Skin Care

Level I, II, III, and IV Nurseries

I. Purpose: 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.

II. Considerations

A. 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, transepidermal water loss (TEWL), and microbial invasion.^{1(Level I)}
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

III. Equipment

- A. Bathing equipment: tub, mild cleanser
- B. Disinfectants: chlorhexidine gluconate (aqueous for premature neonates), povidone–iodine, saline or sterile water wipes to remove disinfectants
- C. Emollient: petrolatum-based, water-miscible ointment
- D. Adhesives: hydrocolloid, hydrogel, silicone-based
- E. Diaper dermatitis skin barrier products

IV. Nursing knowledge

- A. Nurses caring for newborns should be aware of the underdevelopment of the stratum corneum, diminished cohesion, and permeability of the infant's skin at various gestational ages.

B. Nursing staff members should be competent in care measures appropriate for various procedures and development of the skin at various gestational ages according to their practice area.

C. Nursing staff should have knowledge of the current evidence-based practice guidelines for neonatal skin care.

V. Process^{1(Level I)}

A. Skin assessment

1. Assess skin condition, head to toe, daily or more frequently as needed.
2. Identify risk factors for skin injury. Risk factors for skin injury include the following^{2(Level I)}:
 - 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 Condition Score to objectively evaluate overall skin condition.^{3(Level IV)}
4. Consider the use of a dedicated interdisciplinary skin care team to improve the early identification of skin injury.^{4(Level VI)}
5. Consider the use of a risk assessment scale such as the newly modified version of the Braden Q Risk Assessment Scale, called the Braden QD, to predict pressure injury and indicate the need for prevention measures.^{5(Level IV)}

B. Bathing

1. The first bath should occur once the neonate has achieved thermal and cardiorespiratory stability. Ideally, the first bath should occur between 6 hr and 24 hr of age.^{6(Level V)}
2. Routine bathing every few days with mild cleanser and shampooing once or twice a week is usually adequate.
3. Bathe the infant according to facility protocols; ideally, infants should be bathed with immersion tub bathing or swaddled immersion bathing.^{7(Level II)} Studies have identified benefits of swaddled immersion bathing for both term and preterm infants.^{8,9(Level II)} Studies have shown no difference in bacterial colonization of the cord among infants who were immersed in water compared with those who were sponge bathed.^{7(Level II)}

4. Select a mild cleanser that has a neutral or mildly acidic pH (5.5–7.0) or one that has minimal impact on the baby’s skin surface pH; avoid antimicrobial soaps.
 5. For preterm infants less than 32 weeks’ gestation, gently clean skin surfaces using warm water only during the 2 weeks of life.
- C. 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.^{10(Level VII)}
- D. Umbilical cord care^{1(Level I)}
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 primary care provider if signs of a potential problem are present.
 5. Educate parents about normal cord appearance and healing.
- E. 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.^{11(Level I)} Some brands of disposable baby wipes contain alcohol, perfumes, or preservatives that may contribute to skin irritation and increase risk for allergic contact dermatitis.^{12(Level V)} Wipes should be reviewed for potential allergens such as methylisothiazolinone, a common preservative found in baby wipes.
 3. Implement strategies to reduce the risk or severity of diaper dermatitis; perform a focused skin assessment of the perineal area. Consider use of an evidence-based algorithm for consistency of practice for diaper dermatitis.^{13(Level VI)}
 4. Determine whether the cause is contact with fecal enzymes or *Candida albicans*.
5. Use antifungal ointment or cream to treat *Candida* dermatitis as prescribed.
 6. Avoid use of the following products in the diaper area whenever possible: topical corticosteroids, antibiotic ointments, talcum baby powders, and cornstarch.
- F. Disinfectants
1. Select a disinfectant by evaluating risks and benefits of each product relative to efficacy, potential for toxicity, and skin irritation. There is insufficient evidence to recommend a single product for all neonates and for all procedures.
 2. All disinfectants can cause skin irritation or chemical burns; remove completely with sterile saline or water.
 3. Consider potential for systemic toxicity if skin disinfectants are absorbed through the skin; remove all disinfectants as completely as possible with sterile water or saline after the procedure is complete.
 4. Skin antiseptics containing chlorhexidine gluconate (CHG) are labeled as “use with care in premature infants or infants under 2 months.”^{1(Level I)}
 5. Use isopropyl alcohol or 2% CHG in isopropyl alcohol for disinfection of needleless connectors and other IV access ports and hubs per facility protocol.
- G. Emollient use for dry skin and atopic dermatitis
1. Emollients may be used to promote skin barrier function, to restore integrity to dry or cracking skin, and to potentially prevent atopic dermatitis.^{14(Level I)} Identify risk factors for eczema and contact dermatitis and assess for signs; at the first sign of dryness, fissures, or cracking, apply an emollient at least once daily; emollients should be provided in unit dose or infant-specific containers.
 2. Use scent-free moisturizers or emollients that contain minimal ingredients. Use petrolatum-based, water-miscible ointments that have been extensively studied in premature infants on an as-needed basis.^{1(Level I)}
 3. Emollients must be safe to use for discrete areas of dry skin or fissures for infants under phototherapy or radiant warmers.
- H. 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. Avoid the use of adhesive bandages after drawing laboratory samples.
 3. Alcohol-free skin protectants can prevent adhesive damage; use around ostomy sites.

4. Consider protecting the skin from medical adhesives with silicone-based skin protective films. Silicone-based skin barrier films do not sting when applied, rapidly evaporate, and do not leave a residue.^{1(Level 1)}
 5. Use hydrogel adhesives for electrocardiogram monitoring.
 6. Select adhesives that cause the least amount of tissue trauma: hydrocolloid products and silicone-based dressings and tapes. 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.
 7. 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 retaping 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.^{15(Level VII)}
 8. Provide pain control measures during adhesive removal, including skin-to-skin care, sucrose, or expressed human milk.
- I. TEWL control (refer to the Thermoneutral Environment Policy). Recognize that preterm infants less than 30 weeks' gestation or weighing less than 1,200 g are at risk for insensible water loss.^{16(Level IV)}
1. Polyethylene bag or wrap technique in the delivery room
 2. High humidity (greater than 70%) for the first week of life to reduce TEWL; use servo-controlled humidification systems in incubators that actively heat and evaporate water separately from circulating heat.
 3. Consider the effect of various phototherapy devices on TEWL.
- J. Skin breakdown
1. Prevent or minimize the risk of skin breakdown by:
 - a. Assessing the skin under medical devices frequently (every 1–4 hr) to identify pressure points secondary to medical device use
 - b. Using products to prevent skin surface breakdown, such as alcohol-free skin protectants or devices that help prevent pressure ulcers and barrier devices to prevent nasal injuries from noninvasive ventilatory support
 2. Assess the wound stage of skin breakdown and treat as ordered.
- K. 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^{2(Level 1)}:
 - 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 prevent 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 and dressings with medical-grade honey.^{17–20(Level VII)}
 - 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.^{17,18 (Level VI)}
 - b. Medical-grade honey is particularly useful for treating wounds that require debridement and has been successfully used with surgical wounds, pressure ulcers, extravasation injuries, ischemia of toes, and epidermal stripping.^{19(Level VI),20 (Level V)}
- VI. Documentation
- A. The infant's skin condition should be documented on a regular basis as defined by the hospital.
 - B. Document the presence of skin irritation or breakdown and actions taken.

Related Documents

Procedure: Arterial Puncture and Cannulation, Peripheral

Procedure: Blood Sampling

Policy: Circumcision, Preparation and Care

Procedure: Exchange Transfusion: Double Volume and Partial Volume

Policy: Guidelines for Nursing Care

Procedure: Infusion Therapy

Policy: Intravenous Infiltration, Treatment of

Procedure: Lumbar Puncture, Assisting with

Procedure: Near-Infrared Spectroscopy, Use of

Procedure: Noninvasive Ventilation, Nursing Care

Procedure: Ostomy Care

Procedure: Peritoneal Dialysis

Policy: Thermoneutral Environment

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Procedure: Suctioning the Mechanically Ventilated Infant

Level II, III, and IV Nurseries

I. Purpose: 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.

II. Considerations

- A. Suctioning of the endotracheal tube (ETT) may be performed at the discretion of the nurse or respiratory therapist.
- B. Indications for ETT suctioning include any of the following:
 1. Audible gurgling respirations, synchronous with air movement in and out of the ETT, often accompanied by tactile fremitus on the chest
 2. Visual movement of secretions in the ETT
 3. Increased coarse tubular breath sounds or coarse moist crackles on auscultation that indicate the presence of secretions in large airways accessible by suction
 4. Gradual increase in peak inspiratory pressures with volume-controlled ventilation or ventilator alarms for high pressure with greater frequency
 5. Decreased tidal volume during pressure-controlled ventilation
 6. Changes in monitored flow and pressure graphics
 7. Infant restlessness, elevated heart rate, increased respiratory rate, decreased oxygen saturation
 8. Tracheal aspiration for laboratory specimen
 9. Decreased chest movement with mechanical ventilation, with or without any of the above also noted
 10. Increased work of breathing
 11. After a respiratory treatment
 12. Any clinical condition that would indicate the possibility of secretions in the airway

C. Contraindications

1. 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^{1(Level 1)}:
 - a. Unstable cardiovascular status
 - b. History of poor tolerance to suctioning
 - c. Recent esophageal or tracheal surgery
 - d. Anticoagulant therapy or pulmonary hemorrhage

D. Hazards and complications^{1(Level 1)}

1. 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.

III. Equipment

- A. Suction regulator
- B. Suction canister
- C. Connecting tubing for canister and regulator
- D. Closed-system suction device (with appropriate-size inner diameter for endotracheal or tracheostomy tube)
- E. Sterile gloves
- F. 3-ml vial of sterile saline for clearing the suction catheter
- G. Oxygen flow meter or blender (air-oxygen mix)
- H. Resuscitation bag (weight-appropriate flow-inflating or self-inflating)
 - I. Mask, appropriate size for resuscitation bag (in case of unplanned extubation)

IV. Nursing knowledge

- A. Nurses providing care to infants must be knowledgeable in respiratory care and support of infants.
- B. The nurse must be knowledgeable about the adverse effects of suctioning and response to those effects.
- C. Frequency of suctioning: Suctioning should be performed only as needed, with careful assessment of the indications described above, and not on a routine schedule.^{1(Level 1),2(Level III)}
- D. Measured suctioning is the recommended routine. Suction should be only to the tip of the ETT to prevent mucosal irritation and injury.^{1,3(Level 1)}
- E. A reference sheet should be readily available, labeled with the infant's name, correct-size ETT or tracheostomy tube, and correct depth of suction for the infant specific to the brand of closed-system suction catheter.
- F. Use of saline during suctioning: 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.^{1(Level 1)}
- G. Selecting an appropriate-size suction catheter: 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.^{1(Level 1)} 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.^{4(Level VII)}

V. Process

- A. Determine the need for suctioning.
- B. Follow standard precautions while performing all steps of the procedure unless directed to use sterile technique.
- C. The procedure will be preceded by proper patient identification.
- D. Provide developmental support as indicated.
- E. A second person should be available for endotracheal suctioning to manage complications and provide developmental support for the infant.
- F. ETT suction setup should remain closed as much as possible. Closed-suction catheters should be changed out according to manufacturer's recommendation or hospital infection control protocol.
- G. The mouth should be suctioned before nasal or endotracheal suctioning. A separate suction device is used for oral suctioning.
- H. Determine the depth for insertion of the suction catheter. It should not be inserted past the end of the ETT. When closed suctioning is used, measurements may vary. Follow the manufacturer's recommendation for catheter measurement. Once determined, measurement should be posted at the bedside for quick reference.
- I. Assemble equipment.
- J. Gently rouse infants from sleep to avoid startling them. Provide support to infants during the procedure.
- K. Avoid the use of saline lavage for suctioning.
- L. When applying suction, regulate suction to 80–100 mm Hg pressure.^{1(Level I)} 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.
- M. All modes of respiratory support are to be evaluated and adjusted to minimize oxygen desaturation during

suctioning. It may be more appropriate to transiently increase ventilator settings when infants are being mechanically ventilated instead of simply increasing the fraction of inspired oxygen.^{5(Level 1),6(Level VII)}

- N. Insert the suction catheter as measured into the end of the ETT. Apply suction and withdraw the suction catheter in a rotating/rolling motion. The entire motion should last no longer than 15 s.^{1(Level I)}
 - O. Allow the infant to recover until oxygen saturation has returned to baseline. Allow time for adequate recovery of heart rate and oxygen saturation. Vigorous suctioning may cause hypoxemia and reflex bradycardia. If the infant is not recovering and a plugged ETT is suspected, suction immediately. If no improvement results, the ETT should be removed and the infant should be ventilated with bag and mask ventilation.
 - P. Rinse the catheter with sterile water or sterile normal saline to clear it.
 - Q. Repeat step N as needed, evaluating the need for continued suctioning.
 - R. Adjust ventilator settings as necessary for recovery. Ensure that oxygen saturation stabilizes in a patient-appropriate range before leaving the infant's bedside.
 - S. Assess breath sounds after suctioning.
 - T. Reposition the infant from side to side, supine to prone.
- #### VI. Documentation
- A. Quality of breath sounds before and after suctioning, the way in which the procedure was tolerated, and necessary actions taken to stabilize the infant
 - B. Color, consistency, and quantity of secretions obtained
 - C. Changes in ventilator settings or new maintenance oxygen level
 - D. Position of the infant when the procedure is completed

Related Documents

Procedure: Hypothermia, Induced

Competency: Respiratory Management

Developmental Care of Newborns and Infants, 2nd edition

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Procedure: Suctioning: Oral, Nasal, or Pharyngeal Level I, II, III and IV Nurseries

- I. Purpose: 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).
- II. Considerations
- A. Suctioning should be performed based on patient assessment.
 - 1. Assessment may include breath sounds, respiratory rate, presence of retractions, grunting, visible presence of secretions, or decrease in monitored oxygen saturation.^{1(Level VII)}
 - 2. Suctioning should be avoided for 30 min to 1 hr after feeding unless it is necessary to establish a patent airway.
 - B. 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.
 - C. 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.
 - D. All suction canisters and connecting tubing should be changed when grossly soiled or at least once weekly. They should be dated and timed when placed into service.
 - E. Change out the nasal aspirator every 24 hr or as needed if unable to clear secretions from the device. Replace the bulb syringe after every use as per manufacturer's recommendation.
 - F. Emergency equipment shall be placed at the infant's bedside, including oxygen delivery equipment. (Refer to the Guidelines for Nursing Care Policy.)
 - G. Monitor for and manage any adverse events; these may include hypoxemia, vagal stimulation, bronchospasm, gagging, emesis, uncontrollable coughing, pain, cardiac dysrhythmias, and mucosal trauma.
- III. Equipment
- A. Suction regulator
 - B. Suction canister
 - C. Connecting tubing for canister and regulator
 - D. Suction catheter kit or nasal suction device
 - E. Clean gloves
 - F. Sterile water-soluble lubricant
 - G. Small vial of sterile saline or 0.45% saline
 - H. Oxygen flow meter
 - I. Oxygen delivery device (mask, cannula, bag-mask device)
 - J. Personal protective equipment (gown, eye protection, mask)
 - K. Measuring device (paper tape)
- IV. Nursing knowledge
- A. Nurses providing care to infants must be knowledgeable in respiratory care and support of the infant.
 - B. Nurses must be knowledgeable about adverse effects of suctioning and response to those effects.
 - C. During oral and nasal suctioning, the mouth always should be suctioned first to avoid inhalation of oropharyngeal contents when the nose is suctioned.^{1(Level VII)}
- V. Process
- A. Before the procedure
 - 1. Set the suction regulator to 80 mm Hg negative pressure.^{2(Level V)}
 - 2. Occlude the open end of the suction tubing to verify suction reaches the desired negative pressure.
 - 3. Select the smallest catheter size that allows aspiration of secretions. The outer diameter of the catheter should be smaller than the inner diameter of the nares if nasal suctioning is to be performed. Ensure appropriate-sized catheters are available at the infant's bedside.
 - 4. 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.
 - B. Patient applications
 - 1. Follow universal 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 as indicated (refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition).
 - 4. Nasal pharyngeal suction
 - a. Measure from the earlobe to the opening of the nares 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 nares. Do not force the catheter.^{1(Level VII)}
 - 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.
 - j. Rinse catheter secretions with sterile saline.
 - k. Allow the infant to recover and repeat the process as needed (no more than three passes at one time) to clear secretions.
 - l. Discard the catheter and remove gloves.
 - m. Assess the infant.
5. 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 nares 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.^{1(Level VII)}
 - 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.

6. Oral suctioning
- a. Prepare the suction device. A catheter, nasal aspirator, or bulb syringe may be used.
 - 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.
 - d. Avoid the midline of the tongue because the device may stimulate a gag reflex.
 - e. When the catheter reaches the predetermined insertion depth, occlude the suction port to apply negative pressure or release the bulb.
 - f. Continue applying constant negative pressure while slowly withdrawing the catheter.
 - g. Do not apply negative pressure for more than 15 s.
 - h. Allow the infant to recover and repeat the process as needed to clear secretions.
 - i. 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.

VI. Documentation

A. Document the following:

- 1. Color, quantity, and consistency of the secretions
- 2. Quality of breath sounds before and after suctioning
- 3. Infant response to therapy
- 4. Complications or additional actions taken

Related Documents

Policy: Guidelines for Nursing Care

Competency: Respiratory Management

Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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2. American Heart Association; American Academy of Pediatrics. *Textbook of Neonatal Resuscitation*. 7th ed. Elk Grove Village, IL: The Academy; 2016.

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Procedure: Tachyarrhythmias, Management of Level II, III, and IV Nurseries

- I. Purpose: To describe the various procedures for treating abnormally fast cardiac rhythms (tachyarrhythmias)
- II. Considerations
- A. 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.^{1(Level VII)}
- B. Specific dysrhythmias that are amenable to cardioversion include SVTs and wide-complex ventricular tachycardias. These dysrhythmias are characterized as follows^{2(Level VII)}:
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).^{3(Level VII)}
- C. Specific dysrhythmias that are amenable to defibrillation include ventricular fibrillation and ventricular tachycardia (without a pulse).^{2(Level VII)}
- III. Equipment
- A. Ice pack method^{1,2(Level VII)}
1. One cup crushed ice
 2. Snap-lock plastic bag
 3. Thin linen cloth
- B. Adenosine method^{1,2(Level VII)}
1. Secured and patent intravenous (IV) access (central or peripheral)
 2. Vial of IV adenosine
 3. Sterile normal saline as a diluent for adenosine may be needed
 4. Vial or bag of sterile normal saline or flush solution for the IV line
 5. Appropriate sizes of Luer lock syringes
 6. Calculator
 7. Medication label and pen
- C. Electrical method (cardioversion or defibrillation)
1. Defibrillator with fully charged battery, with attached or attachable pediatric electrocardiographic leads and cable, pediatric defibrillator electrode pads, and pediatric accessible paddles
 2. Conductive gel, paste, or pads for paddles
- IV. Nursing knowledge
- A. The registered nurse (RN) should be competent in recognizing abnormal rhythms and their effects.
- B. The RN should be knowledgeable about the effects and side effects of medications given to treat tachyarrhythmias.
- C. The RN should be knowledgeable about the recommended initial dosages for cardioversion (0.5–1 joule/kg) and defibrillation (2 joules/kg).^{2(Level VII)}
- V. Process
- A. Maintain the infant on a cardiorespiratory monitor with printout capability before, during, and immediately after the procedure.
- B. Consider sedation and pain management with cardioversion.
- C. Take universal precautions during the performance of all steps of the procedure unless directed to use sterile precautions.
- D. Check for proper patient identification.
- E. Upon recognition of an arrhythmia, the RN prints a strip with the rhythm on it and notifies a physician or an allied health professional (AHP) as soon as possible.
- F. When the decision is made to convert a rhythm, the RN assists as needed.
- G. Ensure that all emergency equipment is available for immediate use during the procedure.
- H. Ice pack method^{1,2(Level VII)}
1. Place crushed ice in a plastic bag and snap it closed.
 2. Wrap the ice bag in thin linen cloth.
 3. Start a rhythm strip printout.
 4. 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.
 5. Continue strip recording for a least 1 min after conversion to sinus rhythm, checking for return to SVT.
 6. Continue cardiorespiratory monitoring.
 7. Notify the pediatric cardiologist or neonatologist if further interventions are needed.
- I. Adenosine method^{1,2(Level VII)}
1. Start a rhythm strip printout.
 2. Dilute (as indicated) and prepare the adenosine dose as ordered. An RN, physician, or AHP may administer adenosine.
 3. The preferred IV site for adenosine is as close to the heart as possible,^{4(Level VII)} which may be a central or peripheral IV.
 4. Adenosine must be administered very quickly because of its short half-life.
 5. Immediately follow the adenosine push with 1–3 ml saline flush administered rapidly.

6. 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.
7. Continue to monitor the infant and repeat adenosine doses as ordered.

J. Electrical method (synchronized mode of defibrillation)^{2(Level VII)}

1. Start the rhythm strip printout to record before, during, and after each attempt.
2. Set lead switch to paddles or lead (if monitor leads used) according to manufacturer's instructions.
3. Select and apply appropriately sized adhesive pads or paddles according to manufacturer's instructions.
4. Consider IV sedation and analgesia for the infant, but do not delay cardioversion while awaiting administration if unstable.
5. Place the defibrillator in the synchronized mode.
6. Select joule dose of 0.5–1 joule/kg as ordered, announce "charging," and charge according to manufacturer's instructions.
7. Call "clear" before delivering the charge and ensure all persons are clear of the infant.
8. Deliver shock according to manufacturer's instructions.
9. 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.
10. Continue to monitor the infant.

K. Defibrillation^{2(Level VII)}

1. If the infant is determined to be in a rhythm that is amenable to defibrillation, cardiopulmonary resuscitation (CPR) should be initiated immediately. Defibrillation should occur when the defibrillator is available.
2. Continue CPR during preparation.
3. Start a rhythm strip printout to record before, during, and after each attempt.

4. Set lead switch to paddles or lead (if monitor leads used) according to manufacturer's instructions.
5. Select and apply appropriately sized adhesive pads or paddles according to manufacturer's instructions.
6. Select joule dose of 2 joules/kg as ordered, announce "charging," and charge according to manufacturer's instructions.
7. Call "clear" before delivering the charge and ensure all persons are clear of the infant. Suspend compressions at this time.
8. Deliver shock according to manufacturer's instructions.
9. Immediately resume CPR for 2 min.
10. If ventricular fibrillation or ventricular tachycardia without a pulse persists, increase to 4 joules/kg as ordered and repeat above sequence.

L. Postcardioversion and postdefibrillation care^{2(Level VII)}

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 physician or AHP.

VI. Documentation

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

Related Documents

Procedure: Intravenous Infiltration, Treatment of

Competency: Cardiac Care, Advanced

Competency: Hemodynamic Monitoring, Invasive

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Policy: Thermoneutral Environment

Level I, II, III, and IV Nurseries; Labor and Delivery; Maternity Units

I. Purpose: To maintain a thermoneutral environment in which an infant's metabolic rate is minimal and core temperature is within normal range

II. Considerations

A. Temperatures in neonates are commonly measured via the axillary route.^{1(Level VII)} Rectal temperature measurement carries risk,^{1,2(Level VII)} and other site measurements approximate rectal values. Axillary temperature was found to correlate with rectal temperature in a sample of full-term newborns.^{2(Level VI)} Continuous skin temperature using the “zero heat flow” method correlated with continuous rectal temperature in a sample of preterm infants.^{3(Level VI)} There were no differences between abdominal, flank, and axillary skin temperatures and digitally measured axillary temperatures in a separate sample of preterm infants.^{4(Level VI)}

B. Axillary temperature should be maintained at 36.5 °C–37.4 °C (97.7 °F–99.3 °F)^{5(Level VII)} unless the newborn is a candidate for therapeutic hypothermia. (Refer to the Hypothermia, Induced Procedure.)

C. Infants on radiant warmers must be maintained on a patient control mechanism with a skin temperature probe in place. A reflective patch must cover the skin temperature probe while the infant is under a radiant warmer to prevent the heater from heating the probe rather than the probe measuring the infant's temperature.^{6(Level VII)}

D. Infants in a hybrid bed or an incubator may be cared for in a patient-controlled or air-controlled mode.

III. Equipment^{6(Level VII)}

A. Bed

1. Open crib
2. Radiant warmer with attached skin temperature probe
3. Hybrid bed or incubator with skin temperature probe capabilities and humidification option

B. Infant thermometer

C. Plastic (polyethylene) cover or wrap

D. Thermal mattress

E. Electric warming mattress filled with water

F. Hydrogel temperature probe cover

G. Optional hydrocolloid skin barrier

IV. Nursing knowledge

A. Mechanisms of heat loss include conductive, convective, evaporative, and radiant.

B. Temperature probe placement, infant position, and environment should be considered when thermoregulation is being monitored. There is little

evidence to guide optimal site selection for skin temperature probe placement.^{7(Level VII)} Position, particularly prone, may change the difference in abdominal and back temperatures, with the abdominal temperature being warmer.^{8(Level IV)} Abdominal skin temperature in clothed and blanketed or simply blanketed supine preterm infants may be warmer when compared with no blanket or clothes.^{4(Level VI)} Light-emitting diode fiberoptic phototherapy pads with high irradiance may be a hidden source of heat, raising axillary temperature.^{9(Level IV)}

V. Process

A. To prevent hypothermia in the delivery room and in the immediate newborn period in preterm or low birth weight infants, the following interventions come from moderate-quality evidence or emerging evidence and should be cautiously combined to prevent hyperthermia^{10(Level I)}:

1. Plastic wrap or bag
2. Plastic cap
3. Thermal mattress
4. Skin-to-skin care

B. The World Health Organization^{11(Level VII)} recommends a delivery room temperature for all neonates of 25 °C–28 °C (77 °F–82.4 °F). Neonatal resuscitation guidelines^{12(Level VII)} recommend a room temperature of 23 °C–25 °C (74 °F–77 °F) for preterm infants.

C. Upon admission, identify the appropriate thermal support for the infant based on weight and physiologic needs.

D. Monitor temperature frequently during stabilization.

E. If a temperature probe is needed to maintain axillary temperature between 36.5 °C and 37.4 °C, secure the temperature probe to the infant with an insulated temperature probe cover.^{13(Level VI)}

F. To maintain and conserve environmental heat (and, when applicable, humidity), keep incubator portholes closed except during direct patient care. Work through portholes whenever possible without opening the incubator door or canopy.^{14(Level VI)}

G. Use of humidification

1. Mature skin barrier function may not be present until 30–32 weeks' postconceptional age.^{15(Level VI)}

Humidification is one strategy to reduce transepidermal water loss and improve temperature stability in neonates less than 30 weeks' gestation. Evidence-based strategies include the following:

- a. 70%–80% relative humidity for the first week of life in neonates weighing less than 1,000 g,

then 50%–60% relative humidity until 30–32 weeks.^{16(Level IV)} Note: When compared with no humidity, this strategy resulted in less fluid intake, urine output, and insensible water loss in the first week, fewer episodes of hyponatremia in the first week, and increased growth velocity in the first 28 days.

- b. 85% relative humidity for the first week of life in neonates 23–27 weeks' gestation, then a stepwise reduction to 50% versus 75% for 21 additional days.^{17(Level II)} The group that reduced to 50% for the additional 21 days had less transepidermal water loss, indicating improved skin barrier function.
- c. 80% versus 70% relative humidity for 1 week in neonates born at 28 weeks or earlier, then a reduction of 10% per day to 40% with a normal temperature for 24 hr.^{18(Level II)} There was no difference between the 70% group and 80% group in the mean area outside the targeted temperature range, but 22% of the recorded temperatures were outside 36.5°C–37.5°C.
2. High humidity of 80% and 90% or more with water condensation may reduce irradiance levels with halogen and light-emitting diode phototherapy devices.^{19(Level VI)}
3. Humidity chambers should be cleaned regularly and as needed, as directed by the manufacturer, to reduce the risk of infection.^{20(Level VII)}

H. Weaning from an incubator or hybrid incubator

1. When the infant is medically stable, dress with a cap, shirt, and diaper days to weeks before weaning to provide insulation.^{21(Level VI)}
2. Weaning from the incubator may be done when these conditions exist:
 - a. Weight of 1,600 g^{22,23(Level II)}
 - b. 5 days of consistent weight gain^{21(Level VI)}
 - c. Medically stable^{21(Level VI),22,23(Level II)}
3. Weaning may occur over several days.^{21(Level VI)}
 - a. If the incubator is not on air control, switch to air control.
 - b. Dress the infant in a diaper, shirt, and hat and swaddle in a blanket, if not already done.
 - c. Manually decrease the incubator air temperature while monitoring the infant's temperature. When the incubator temperature is at or near 28°C and the infant's temperature is stable for at least two consecutive readings, place the infant in an open crib.

- d. Position the open crib in a draft-free area.
- e. Maintain environmental temperature in the room or pod at 22 °C–26 °C.^{5,24(Level VII)}
- f. Check the infant's temperature 1 hr after the infant is placed in the open crib and hourly until two consecutive axillary readings of 36.5 °C or higher are obtained.^{23(Level II)}
 - 1) If the temperature is unstable, check temperature hourly and add an additional blanket, if necessary.
 - 2) If the temperature is lower than 36 °C more than 1 hr after the second blanket is added, consider returning the infant to the incubator.
 - 3) If the infant returns to the incubator, reconsider weaning to an open crib after 24–72 hr of stable temperatures.
- g. Do not bathe the infant on the first day the infant is placed in an open crib.
- h. After temperature is stable, continue to monitor the infant's temperature every 3–4 hr.
- i. Monitor the infant's weight daily.

VI. Documentation

- A. Document skin, control, and environmental temperatures as applicable, infant's temperature, daily weights, and interventions to maintain thermoneutral environment.

Related Documents

Policy: Admission, Transfer, and Discharge

Policy: Code Blue

Policy: Hypothermia, Induced

Procedure: Late-Preterm and Early Term Infants, Caring for

Policy: Skin Care

Competency: Admission to the NICU

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Policy: Transport Level I, II, III, and IV Nurseries

I. Purpose: To provide early stabilization and initiation of advanced care at a referring institution with continuation of critical care therapies and monitoring during transport to ensure safety and positive neonatal outcomes^{1(Level VII)}

II. Considerations

A. Neonatal transfers are categorized as follows^{2(Level VII)}:

1. Intrahospital transport
 - a. As a means to facilitate specialist management of neonates
 - b. Retrieval from a peripheral hospital for ongoing intensive care within a Level III or IV neonatal intensive care unit (NICU)
 - c. Returning infants to local neonatal units after they receive care elsewhere
 - d. In response to bed availability or capacity issues
2. Criteria for neonatal transfer depend on the capability of the referring hospital as defined by the American Academy of Pediatrics policy statement on levels of neonatal care and as dictated by local and state public health regulations.^{3(Level VII)}

B. The family should be provided an opportunity to see and touch the infant before transfer.^{4(Level VII)}

1. The transport team should meet with the family to explain what the team will be doing en route to the receiving hospital.^{4(Level VII)}
2. The family should be offered the opportunity to accompany the infant whenever possible.^{5(Level VII)}

C. Neonatal transport team configuration

1. Neonatal transport teams involve a variety of professional staff including specialty-trained physicians, transport physicians, physicians in training (fellows, residents), advanced practitioners (nurse practitioners, physician assistants), neonatal nurses, respiratory therapists (RTs), paramedics, and emergency medical technicians. Potential team compositions include:
 - a. Nurse-nurse
 - b. Nurse-physician
 - c. Nurse-RT
 - d. Nurse-physician-RT
2. Most infants can be safely transported from a Level I or Level II center to a Level III or IV center by a team of well-trained transport nurses without direct physician supervision. Physicians or allied health practitioners (AHP) may be necessary in the care of critically ill infants needing stabilization.^{6(Level VII)}
3. At least two patient care providers should be present on every acute care transport. These providers

are present in addition to personnel serving as drivers or pilots.^{6(Level VII)}

4. The transport team is available 24 hr a day and can respond within 45 min.^{7(Level VII)}
 5. A registered nurse (RN) should be a member of the team during every transport. The rationale is that an RN is most likely to offer the level of education, versatility, and license requirements to provide acute transport care.^{8(Level VII)}
 6. Many neonatal teams are led by AHPs, a configuration that is well accepted.^{4(Level VII)}
 7. The skills of the team should match the population served.^{8(Level VII)}
 8. Nonphysician or AHP transport teams should have written protocols to direct infant care under the authority of the transport team medical director.^{8(Level VII)} Neonatal transfer orders should be completed by the physician and include:
 - a. Reason for the transfer
 - b. Name of receiving hospital and physician
 - c. Acceptance of transfer
 - d. Other medical orders as indicated
 9. Patient care guidelines, standing orders, and verbal communication with the designated transport physician are to be used to initiate and maintain patient care interventions during transport.^{4(Level VII)}
 10. If the transport is done by the referring hospital, the referring physician and hospital retain responsibility until the transport team arrives with the infant at the receiving hospital.^{4(Level VII)}
 11. If the transport team is sent by the receiving hospital, the receiving physician assumes responsibility for patient care from the time the infant leaves the referring hospital.^{4(Level VII)}
- D. Neonatal transport team communication^{5(Level VII)}
1. Interfacility transport requires coordination and communication between multiple entities.
 2. Dispatching units are responsible for the following activities^{4(Level VII)}:
 - a. Providing rapid coordination of vehicles and staff
 - b. Serving as a communication link between the transport team and the referring and receiving hospitals
 - c. Communicating the transport team's estimated time of arrival at the referring hospital so that planned therapeutic or diagnostic interventions can be completed on time

- d. Communicating the infant's estimated time of arrival at the receiving center so that all resources can be mobilized and available
 - e. Coordinating any connections that need to be made between air transport and ground ambulances
3. Facilities must standardize the way in which patient information is transferred from one caregiver to another during handoffs that occur any time care of an infant is transferred to another person, unit, department, or facility.
 4. Where available, a centralized communication center should coordinate all activities related to an interfacility transport request.^{3(Level VII)}
- E. Informed consent should be obtained from a parent or guardian for transfer of an infant.^{9(Level VII)}
1. Telephone consent may be obtained, when necessary, but requires the signature of two healthcare professionals who witness the consent.
 2. The attending physician should list on the certificate of transfer the benefits and risks that were considered and communicated to parents before transport.
- F. A transfer summary should be completed by the infant's physician or advanced practice nurse before transport. A copy of the transfer summary should be provided for the receiving hospital.^{3(Level VII)}
- G. The transport record serves as a medical record of the transport and should be signed by all members of the transport team.
- H. A quality improvement program provides a positive mechanism to review all activities related to patient care, communication, and transport operations.
1. Transport checklists should be used to organize transports as they occur.
 2. Transport evaluation forms should be used upon completion of each transport to evaluate various aspects, address any problems or suggestions, and provide recommendations.
- I. The Commission on Accreditation of Air Medical Transport Services (CAMTS) is dedicated to assisting transport programs in offering quality service. CAMTS is directly responsible for accreditation decisions, policies and procedures, marketing, and budgeting.^{7(Level VII)}
- III. Equipment (**Box 1, Box 2**)^{5,10(Level VII)}
- A. Interfacility or intrafacility transport of neonates requires basic and specialized equipment and medications appropriate for the needs of neonates.
 - B. Transport equipment must be lightweight, portable, rugged, and easy to clean and must meet or exceed all hospital, local, state, federal, and Federal Aviation Administration requirements.

Box 1. Equipment Used in Neonatal Transport* ^{5,10(Level VII)}

- Transport incubator
- Ventilator, humidification, and oxygen delivery equipment; nitric oxide administration equipment
- Cardiovascular, blood pressure (invasive and noninvasive), and pulse oximetry monitors with cuffs and appropriate electrodes, probes
- Stethoscope
- Portable transilluminator, chest tubes, and Heimlich valves
 - For needle thoracentesis: 23-gauge butterfly or 22-gauge over-the-needle catheter, T-connector, stopcock, 20- to 30-ml syringe
- Portable glucometer, lancets, and test strips (essential)
- Point-of-care testing equipment, including blood gas analyzer (optional)
- Chemical mattress, polyurethane wrap or bag, stocking cap, blankets, diapers
- Temperature monitoring probes and devices
- Airway equipment (endotracheal tubes [2.5–4.0 mm], stylet, laryngoscopes [with Miller 0 and 1 blades, light bulbs, and batteries], resuscitation bag with manometer and mask, and laryngeal mask airways)
- Bulb syringe, orogastric tubes (5 Fr and 8 Fr)
- Portable suction and various sizes of suction catheters (5/6, 8, and 10 Fr)
- Continuous positive airway pressure nasal prongs and nasal cannula
- Air-oxygen blender capable of delivering 21%–100% oxygen with a flow meter up to 15 L/min
- Infusion pumps with low (0.1 ml/hr) to high (100 ml/hr) capability
- Intravenous, intraosseous, and umbilical lines and associated equipment
 - Sizes 22- and 24-gauge, armboard in premature and newborn sizes, skin cleansing agent, T-connector, tape, clear transparent dressing, rubber bands, cotton balls, sterile 2 × 2s
 - Umbilical insertion tray, suture 4-0 silk with needle

**All electrical equipment must have an independent (battery) power source. Anticipated battery life should be twice that of the anticipated transport time.*

- C. All electrical equipment must have independent, rechargeable power sources that easily connect to power outlets in ground and air transport vehicles.
 - D. Approved methods must be used to secure all equipment inside transport vehicles and aircraft, whether equipment is portable or a permanent part of the vehicle.
 - E. Proper storage and dispensing of medications is essential to provide safe, effective medication administration.
 1. Transport medications should be stored in a safe, dedicated place between transports.
 2. Medications must be checked routinely and restocked before and after every transport and their use appropriately documented.
- IV. Nursing knowledge
- A. Extensive orientation programs are needed to transition a critical care provider to the more independent transport environment.^{8(Level VII)}
 - B. Neonatal transport teams must undergo initial and periodic training to ensure knowledge and performance competencies. Simulation-based training has been linked to improved outcomes in high-risk situations, decreased mortality, and reduced costs.^{11(Level VII)}

Box 2. Basic Groups of Medications and Intravenous Solutions Used by Neonatal Transport Teams^{5,10(Level VII)}

- Intravenous solutions (250-ml bag of each)
 - D10W, D5W, 0.45 normal saline, lactated Ringer's, normal saline
 - Heparin 100 U/ml
- Inotropic agents (standard premixed concentrations if possible)
 - Dopamine, dobutamine, epinephrine, norepinephrine, milrinone
- Code medications
 - Epinephrine 1:10,000, 4.2% sodium bicarbonate, lidocaine, amiodarone, adenosine, calcium chloride
- Reversal agents (naloxone, flumazenil injection)
- Rapid-sequence intubation medications (medications selected by institution)
- Diuretics (furosemide)
- Antibiotics (ampicillin, gentamicin, cefotaxime, ceftriaxone, cefazolin)
- Prostaglandin E1
- Surfactant preparations selected by institution
- Analgesics (fentanyl, morphine)
- Anticonvulsants (lorazepam, phenobarbital, fosphenytoin)

C. Licensure and certification are requirements used to facilitate advanced education among staff members.^{5(Level VII)} Specialty certification examinations are available for competency validation.^{11(Level VII)}

V. Process

A. Outbound transport

1. The attending neonatologist or physician at the referring facility
 - a. Determines the need for transfer
 - b. Selects the appropriate receiving institution based on the necessary level of care
 - c. Communicates with the receiving neonatologist to ensure acceptance and provides pertinent clinical information
 - d. Completes a certificate of transfer and explains the risks and benefits of transport to the parents or guardian. If a certificate of transfer is not completed, this information may be placed in the physician's progress notes. This practitioner obtains informed consent for transfer from the infant's parents or guardian.
 2. The attending neonatologist or physician at the referring or receiving facility
 - a. Selects the transfer mode and determines the appropriate transport team composition
 - b. Directs the efforts of team members
 - c. Ensures the infant is stabilized
 3. The designated nurse at the referring facility
 - a. Communicates with the admitting unit's charge nurse to provide report in collaboration with the attending nurse
 - b. Verifies that parental consent for transport has been obtained
 - c. Verifies completion of any physician orders already received
 - d. Verifies completion of the certificate of transfer
 - e. Notifies the appropriate person to have the entire chart photocopied and to obtain recent X rays
 - f. Notifies the RT, if involved, of the transport and the planned departure time
 - g. Notifies the attending RN to have the infant prepared at the scheduled time
 - h. Obtains a properly labeled, red-topped tube of maternal and umbilical cord blood with label identification consistent with newborn identification bands
 - i. Provides parents a transfer packet, if applicable
 - j. Notifies the receiving institution's admitting unit of the time of the transport team's departure, as requested
4. The attending RN at the referring facility
 - a. Prepares the infant for transport
 - b. Collaborates with the designated nurse in providing report to the receiving hospital
 - c. Ensures that vascular access devices are in place and secured and intravenous (IV) solutions are available, if applicable
 - d. Stabilizes the infant's airway in collaboration with the physician or RT
 - e. Provides report to the transport RN
 - f. Verifies the infant's identity with the transport RN
 - g. Offers psychosocial support to the family, providing information about the transport and the receiving hospital
 5. The transport RN
 - a. Obtains report from the attending RN
 - b. Initiates the transport record
 - c. Confirms the infant's identity with the attending RN
 - d. Assists with necessary stabilization or preparation of the infant for transport
 - e. Performs a pretransport assessment
 - f. Updates attending physician at receiving facility before departure
 - g. Transports the infant when stable; takes the chart, X rays, cord blood, and maternal blood, if appropriate
 - h. While en route, provides for and ensures the infant's safety and stability; monitors and documents vital signs (at least every hour or more frequently as required) and IV solutions
 - i. Contacts the receiving physician if questions arise during transport
 - j. At the receiving institution
 - 1) Confirms the infant's identity with the admitting RN

- 2) Provides an update on the infant's condition, including the amount of IV solutions and any medications administered en route
 - 3) Relinquishes care of the infant to the admitting RN
 - 4) Provides a copy of the completed transport record and chart to the admitting RN
- k. Upon return to the facility
- 1) Cleans and restocks all transport equipment
 - 2) Completes the transport evaluation
 - 3) Forwards the checklists and evaluation to the transport coordinator
 - 4) Notifies the transport coordinator and the charge nurse of any operational issues or equipment needing follow-up
 - 5) Rechecks the medication and airway boxes, secures them with a tamper-resistant tag, and signs the transport checklist
- B. Return or reverse transport
1. Infants needing transport to another NICU or special care nursery upon completion of diagnostic studies or stabilization or in transition to discharge should be transported by the neonatal transport team.
 2. The attending neonatologist or physician at the referring facility
 - a. Arranges for transfer in collaboration with the receiving physician or the infant's private pediatrician
 - b. Completes a certificate of transfer and explains the risks and benefits of transport to the parents or guardian and obtains informed consent for transfer from the infant's parents or guardian
 - c. The transport system then should be activated.
 3. Charge nurse responsibilities
 - a. Determines staffing for transport based on the infant's condition in collaboration with the referring physician
 - b. Contacts the receiving hospital's admitting unit to provide a detailed report and schedule the transport time
 - c. Notifies the transport RN and other team members of the scheduled departure time
 - d. Notifies the ambulance or airline company of the transport and departure time
 - e. Ensures parental consent is obtained for transport
 - f. Notifies the appropriate personnel to have the entire chart photocopied and to obtain recent X rays
 - g. Notifies the attending RN to prepare the infant for the scheduled departure time
 - h. Verifies the completion of NICU or special care nursery (SCN) transfer orders
 - i. Notifies the receiving hospital at the time of the transport team's departure
4. Attending RN responsibilities
 - a. Prepares the infant for transport
 - b. Provides report to the admitting unit in collaboration with the charge nurse
 - c. Provides report to the transport RN
 - d. Confirms the infant's identity with the transport RN
 5. Transport RN responsibilities
 - a. Obtains report from the attending RN
 - b. Confirms the infant's identity with the attending RN
 - c. Performs a pretransport assessment
 - d. Initiates the transport record
 - e. Prepares and transports the infant to the NICU or SCN
 - f. Contacts the receiving physician if questions arise during transport
 - g. While en route to the receiving facility, provides and ensures the infant's safety and stability; monitors vital signs (at least every hour or more frequently as required) and IV solutions
 - h. At the receiving institution
 - 1) Confirms the infant's identity with the admitting RN
 - 2) Provides an update on the infant's condition, including the amount of IV solutions and any medications administered en route
 - 3) Relinquishes care of the infant to the admitting RN
 - 4) Provides a copy of the completed transport record and chart to the admitting RN
 - i. Upon return to the facility
 - 1) Cleans and restocks all transport equipment
 - 2) Completes the transport evaluation
 - 3) Forwards to the transport coordinator the checklists and evaluation
 - 4) Notifies the transport coordinator and the charge nurse of any operational issues or equipment needing follow-up
 - 5) Rechecks the medication and airway boxes, secures them with a tamper-resistant tag, and signs the transport checklist
- C. Intrafacility transport
1. Infants needing procedures away from the neonatal unit
 - a. Should be transported in a heated transporter with the temperature controlled to maintain a thermoneutral environment; the following equipment also should be present:
 - 1) Cardiopulmonary monitor
 - 2) Pulse oximeter

- 3) Oxygen
 - 4) Infant anesthesia and self-inflating bag and mask
 - 5) Bulb syringe
 - 6) Other equipment as necessary
- b. The infant must be accompanied by an RN, physician, or advanced practice nurse, who should remain with the infant during the entire procedure. An RT also may be needed depending on the infant's condition.
 - c. A bulb syringe should be available at all times during transport and oxygen set up as necessary.
 - d. Confirm the infant's identity with the technologist before the procedure.
 - e. Prepare and stabilize the infant for the procedure.

VI. Documentation

- A. All assessments and interventions performed during the transport should be documented as they would be in the neonatal unit.
- B. Calls received by the Level III/IV center for transport should be logged, whether transport is accepted or not. Information documented during this call should include the time the call or request was received and the time the patient transfer was accepted.
- C. A certificate of transfer may be required for transfer of any unstable or acutely ill infants, indicating that transfer is medically necessary despite risks of transport.
- D. Parental or guardian consent for transfer may be required.

Related Documents

Policy: Admission, Transfer, and Discharge

Procedure: Perioperative Care

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Original Date: _____

Approvals: _____

Procedure: Umbilical Arterial Catheters, Placement and Care of Level II, III, and IV Nurseries

- I. Purpose: To provide a consistent approach in the use and management of umbilical arterial catheters (UACs)
- II. Considerations
- A. Indications for placement of a UAC may include continuous monitoring of arterial blood pressure, frequent blood sampling, and blood sampling for arterial blood gas monitoring.^{1(Level I),2(Level II)}
 - B. Relative contraindications for UAC placement include evidence of local vascular compromise, peritonitis, necrotizing enterocolitis, omphalitis, omphalocele, and acute abdomen etiology.^{1(Level I)}
 - C. A physician or allied health professional (AHP) order is required for placement and removal of the UAC.
 - D. Universal Protocol must be performed before insertion, except during emergent placement.
 - E. Infusion of blood, medications, or maintenance solutions through a UAC is controversial. However, if another intravenous (IV) route is not available, routine IV solutions may be administered through a UAC.^{3(Level VII),4(Level II)}
 - F. Do not infuse vasoactive medications, including epinephrine, dopamine, or dobutamine, via a UAC.^{3(Level VII),4,5,6(Level II)} Administration of phenytoin, phenobarbital, calcium gluconate, and indomethacin is not recommended.^{4,5(Level II)}
 - G. Catheter tip placement
 - 1. High catheter tip placement is preferred (tip between T6 and T9).^{1,7(Level I)}
 - 2. Low catheter tip placement: The tip is between L3 and L4.^{1,7(Level I)}
 - H. A continuous infusion of IV solution will be ordered by the physician or AHP.
 - 1. All solutions infused via the UAC should contain at least 0.25 U/ml of heparin.^{8(Level I)}
 - I. A transducer should be placed in the line with blood pressure alarm limits set to appropriate parameters for each infant.
 - J. Double-lumen catheters are not recommended for exchange transfusions.^{1(Level I)}
 - K. All connections are to be connected with Luer lock connections.
- III. Equipment
- A. Insertion
 - 1. Prepared sterile umbilical catheter tray
 - 2. Umbilical catheter as indicated^{1(Level I)}
 - a. 5-Fr catheter for infants weighing more than 1,200 g
 - b. 3.5-Fr catheter for infants weighing 1,200 g or less
 - 3. Chart for measurement of insertion, if desired
 - a. Calculations may also be used to determine the appropriate insertion depth.
 - 4. 4-0 silk
 - 5. Scalpel, no. 15
 - 6. Sterile towels
 - 7. Sterile gloves, sterile gowns, surgical caps, and masks (two of each)
 - 8. Spotlight or exam light
- B. Care and maintenance
- 1. Approved skin disinfectant
 - 2. Sterile saline wipes
 - 3. 2 × 2 gauze
 - 4. Dressings to secure the catheter (tape, “bridge,” or clear occlusive dressing and a hydrocolloid skin barrier)
 - 5. IV administration set and solutions
 - 6. Pressure transducer system (all arterial lines must be attached to a pressure transducer system)
 - 7. Masks, caps, sterile gowns, sterile gloves (two of each)
 - 8. 5-ml syringe
 - 9. 1-in. tape
- C. Sampling
- 1. Flush solution as ordered with or without heparin (new vial or prefilled syringe)
 - 2. Appropriate syringe for blood samples being obtained
 - 3. Disinfectant to clean needleless ports on catheter
 - 4. Appropriate tubes for labs being obtained
- D. Removal
- 1. Sterile gloves
 - 2. Sterile 4 × 4 gauze
 - 3. Suture removal kit
 - 4. Hemostat
- IV. Nursing knowledge
- A. UACs should be placed under sterile conditions with maximum barrier precautions.^{9,10(Level I)}
 - B. Nurses assisting with placement and caring for infants with UACs should be educated about measures to prevent central line–associated bloodstream infections.
 - C. UAC position is verified every shift by observing and recording the centimeter mark at the umbilicus.
- V. Process
- A. Follow universal or sterile precautions while performing maintenance of the catheter. Either may be

appropriate and should be established by hospital policy.

B. The procedure will be preceded by proper patient identification and Universal Protocol if nonemergent placement.

C. Insertion

1. Place the infant supine with thermoregulatory assistance on pulse oximetry and cardiorespiratory monitoring with alarms set and audible.
2. Immobilize the infant's extremities using developmental principles.
3. Obtain the infant's length or shoulder-to-umbilical length, as indicated. This may be used to determine insertion depth.
4. Assess for and document any bruising or pallor of the infant's lower extremities, including the feet and toes before the procedure.
5. Assess the infant's vital signs, glucose, and other physiological functions before beginning the procedure.
6. During the procedure:
 - a. Minimize the risks of hypothermia and hyperthermia.
 - b. Continually monitor cardiorespiratory and oxygen saturation status.
 - c. Ensure visibility of the infant. The use of transparent drapes ensures clear visibility.
 - d. Carefully observe the procedure, helping to both establish and maintain the integrity of the sterile field.

D. Care and maintenance

1. After UAC insertion, an anteroposterior abdominal radiograph should be obtained to confirm placement before securing the catheter.
2. The catheter may be repositioned as needed if the sterile field has been maintained. If the catheter needs to be advanced and the sterile field has been compromised, a new catheter must be inserted.
3. Ensure all air bubbles have been removed from the UAC before flushing or infusing solutions.
4. Do not enter the line for sampling or infusion until the position is verified.
5. After verifying the catheter position, secure it as follows:
 - a. Determine the appropriate catheter-securing device for the infant's skin condition, weight, and size.
 - b. Remove residual disinfectant from the infant's skin after placement with sterile normal saline wipes.
 - c. Note centimeter markings at the umbilicus before securing. The UAC may be secured with a commercially available device, bridge or goalpost taping, or a hydrocolloid skin barrier

applied to the umbilical area with tape or clear occlusive dressing.^{4(Level II),5(Level II)}

6. If a venous line is also placed, mark the individual catheters appropriately as arterial and venous.
7. If a silicone catheter is used, do not clamp it; instead, fold and pinch it closed or use padded hemostats.
8. Umbilical tape may be left on for up to 24 hr to control bleeding. Carefully assess the color and perfusion of the skin around the umbilicus if the tape is left in place.
9. After the catheter is stabilized, begin maintenance infusion as ordered. The IV administration set is to be changed at a frequency recommended by the most current Centers for Disease Control and Prevention Guidelines.^{9(Level I)}
10. Perform appropriate hand hygiene and adhere to strict aseptic technique when changing IV solutions and administration sets, administering medications, or obtaining specimens.
11. Assess the infant's lower extremities, including the buttocks, hourly while the UAC remains in place. Adequacy of circulation is noted by a pink color and pulse in the lower extremities. Vascular compromise associated with umbilical catheters is much more common with UACs with the tip in the low position.^{1(Level I),5(Level II),6(Level II)} High placement is recommended due to fewer vascular complications.^{7(Level I)}
12. Monitor the temperature and color of the infant's toes, legs, groin, abdomen, and buttocks for signs of spasm, clots, or emboli. In the event of pallor or cyanosis of the toes, feet, legs, or buttocks, place warm wrap on the opposite extremity. If there is no improvement within 15 min, contact the physician or AHP for direction regarding further treatment or removal of the catheter.^{5(Level II),6(Level II)}
13. Maintain an airtight system and do not allow air bubbles to infuse into the infant. Ensure all connections are Luer locked and tightened (avoid overtightening because this may crack connections). Arterial catheters are to be connected to a transducer with appropriate alarm limits.
14. Position and protect the administration set and catheter to prevent the infant from accidentally dislocating or removing the catheter. Institute developmentally appropriate measures to limit access to the administration set and catheter.
15. Position infant side-lying or supine. The prone position should be avoided because of the potential for accidental kinking or dislodgement. If the prone position is used, monitor the catheter continuously; ensure pressure alarms are on with parameter settings that would rapidly detect pressure changes.^{11(Level VII)}

E. Sampling

1. A closed system should be used to obtain samples from the umbilical catheter. This may be a commercially available product or a system that is created with two three-way stopcocks connected to the UAC. Each stopcock should be capped with a needleless port. A closed system is preferred to avoid increased risk of infection.^{2(Level VII),9(Level I)}
 2. When ready to obtain a sample, if using a commercially available system, follow manufacturer's instructions. If using a stopcock system, clean the port with an approved disinfectant and allow it to dry. Place an empty 3-ml syringe onto the most distal port. Place a syringe of an appropriate size for the sample to be obtained onto the proximal port. Note: Stopcocks are not recommended because they have been linked to increased risk of infection.^{2(Level VII)}
 3. Turn the stopcock to allow withdrawal of approximately 1.5 ml of blood, at a rate of 1 ml per 30 s to clear infusing solution.^{12(Level II),13(Level II)} Turn the stopcock off to IV solution and the syringe. Open the proximal stopcock to the infant and withdraw the sample for testing, slowly at a rate of 1 ml per 30 s.
 4. Open the stopcock to the distal port and open the stopcock to the infant. Reinfuse blood used to clear tubing to the infant slowly at a rate of 1 ml per 30 s.
 5. Close the stopcock to all ports and remove and discard the syringe. Clean the port with an approved disinfectant and allow it to dry. Place the syringe containing flush solution onto the distal port and slowly clear residual blood from the tubing at a rate of 1 ml per 30 s.
 6. Open stopcocks to the infant and infusate and resume infusion.
 7. Appropriately label and process the blood samples obtained.
 8. Document the time the samples were obtained, the quantity of blood withdrawn, and the flush infused.
- ## F. UAC removal^{11-3(Level I,VII)}
1. Verify the order for catheter removal.
 2. Turn the stopcock off to the infant. Turn the transducer alarm off. Verify the centimeter marking at the umbilicus.
 3. Observing universal precautions and using sterile gloves, open a sterile 4 × 4 gauze and suture removal kit and place it within reach on the infant's bed.
 4. Cut and remove suture securing the catheter.
 5. Grasp the catheter firmly with one hand and slowly pull it out until the 5-cm mark is reached. The other hand may be used to stabilize the cord.

When the catheter has been pulled out to that point, tighten umbilical tape around the umbilical stump.

6. Gently withdraw the remainder at a rate of 1 cm/min (to allow for vasospasm).
7. If bleeding occurs, clamp the artery with a thumb and forefinger or hemostat or tighten the umbilical tape for 3–5 min until the bleeding stops. If unable to grasp the artery, apply point pressure with a 4 × 4 gauze.
8. A small amount of oozing may occur. Position the infant to allow observation of the umbilical area.
9. Do not cover the artery or place the infant prone for 1 hr after removing the catheter.
10. Check the catheter to ensure it has been completely removed.
11. Verify and document that the catheter is complete and intact.

VI. Documentation

- A. Document baseline vital signs before UAC insertion.
- B. Document the date and time of the procedure, credentials, and name of the person inserting the catheter.
- C. Document the infant's tolerance of the procedure and appearance of the umbilicus and lower extremities, including color, temperature, and pulses.
- D. Document the catheter size and insertion depth (at the umbilicus).
- E. Continue to document the condition of the umbilicus and noninvasive blood pressure every 8–12 hr. Central blood pressure from transducer readings should be recorded at the same time to document correlations, although these values are not expected to be identical.
- F. Document the infusion rate of solutions being infused via UAC and the type of solutions.
- G. Document blood withdrawn, the flush used on intake and output, and the purpose of the blood withdrawn.
- H. Document waveform, blood pressure, and the ease or lack of ease aspirating or flushing the catheter.
- I. Document hourly the color, temperature, perfusion, and pulses of the infant's lower extremities.
- J. Document catheter removal, including the entire length removed and any associated blood loss.

Related Documents

Procedure: Exchange Transfusions, Double Volume and Partial Volume

Policy: Infection Prevention

Procedure: Umbilical Venous Catheters, Placement and Care of

Competency: Admission to the NICU

Competency: Hemodynamic Monitoring, Invasive

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Policy: Umbilical Cord Management

Level I, II, III, and IV Nurseries; Labor and Delivery

I. Purpose: To provide guidelines for umbilical cord management, including delayed umbilical cord clamping and cord milking

II. Considerations

- A. Delayed cord clamping (DCC) is recommended for at least 30 seconds after birth for vigorous term and preterm infants because of its proven health benefits.^{1,2(Level I)} DCC also may be continued for as long as the cord is pulsating, although some studies have shown that blood transfer is not necessarily dependent on pulsation.^{3,4(Level VI)}
1. In term infants, DCC not only increases hemoglobin levels at birth but also improves iron stores in the first few months of life and may result in improved neurodevelopmental outcomes.^{5(Level VI)}
 2. In preterm infants, DCC has significant benefits, including improved transitional circulation, improved red blood cell volume, less need for transfusions, and decreased incidence of necrotizing enterocolitis and intraventricular hemorrhage.^{2(Level I)}
- B. Umbilical cord milking is the process of grasping the cord between two fingers and moving from the placenta to the infant in order to push blood toward the infant.
1. A systematic review of studies comparing DCC and cord milking found no increased risk to the infant and revealed similar benefits.^{6(Level I)}
 2. Limited research is available comparing the two methods, and the exact method of milking often is different or unknown.^{6(Level I)} According to the American Academy of Pediatrics, there is insufficient evidence to confirm or deny the benefit of umbilical cord milking.^{2(Level VII)}
 3. Nevertheless, cord milking may be used when resuscitation is indicated and DCC would result in a delay in starting resuscitation.
- C. Exclusion criteria for DCC may include monozygotic multiples, placenta previa, concern about abruption, Rh sensitization, hydrops, congenital malformations, or obstetrician or neonatologist decision.^{7(Level II)}
- D. Standardization of management should include obstetric providers, pediatricians, neonatologists, and nursing staff.

III. Nursing knowledge

- A. Identified risks to DCC are mostly theoretical or with limited observances.
1. The most common potential concern is a delay in resuscitation.

2. Other perceived or potential risks include hypothermia, hyperemia, and hyperbilirubinemia, although these risks do not seem clinically significant.^{7(Level VI),8(Level I)}

IV. Process

- A. Before delivery, the obstetrician and neonatology team should determine whether the infant is a candidate for DCC or cord milking. Resuscitation practices still adhere to the current National Resuscitation Program guidelines for all deliveries.
- B. Effective communication between obstetric and neonatology teams is paramount to curtail DCC for additional resuscitative measures.
- C. If cord milking is chosen, the method of milking should be standardized, including length to be milked, time over which the compression occurs, and number of times the cord is intended to be milked.^{7(Level VI)}
- D. DCC at vaginal delivery
1. The newborn can be placed at the level of the introitus or on the maternal abdomen or chest for skin-to-skin care during drying and stimulating, and a warm blanket should be placed over the infant.^{9(Level V)}
 2. DCC is performed for at least 30 s, but if immediate resuscitation is needed, the cord is clamped without delay.^{2(Level V)}
- E. DCC at cesarean delivery
1. The infant is placed on the maternal abdomen or legs, close to the level of the placenta.^{9(Level V)}
 2. DCC is performed for at least 30 s, but if immediate resuscitation is needed, the cord is clamped without delay.^{2(Level V)}

V. Documentation

- A. All provisions of care are documented in the infant's medical record.
- B. Document rationale for not performing DCC or when the cord is clamped short of the 30-s time frame.
- C. Document reason for cord milking when this is performed rather than DCC.

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Umbilical Venous Catheters, Placement and Care of Level II, III, and IV Nurseries

- I. Purpose: To provide a consistent approach in the use and management of umbilical venous catheters (UVCs)
- II. Considerations
- A. Indications for placement of a UVC include administration of solutions and medications, emergency vascular access, continuous monitoring of central venous blood pressure, total or partial exchange transfusion, and administration of blood products when necessary.^{1,2(Level VII)}
- B. Relative contraindications for UVC placement include peritonitis, necrotizing enterocolitis, omphalitis, and omphalocele.^{1(Level VII)}
- C. A physician or allied health professional (AHP) order is required for placement and removal of UVCs. Placement of a UVC for emergency administration of medications may be authorized under specific circumstances.
- D. Universal Protocol must be conducted before insertion, except during emergent placement.
- E. Catheter tip placement
1. For emergency access: tip below the liver, approximately 2–4 cm deep in full-term infants (just below the skin in preterm infants)^{1,2(Level VII)}
 2. For continued use: at the junction of the inferior vena cava and right atrium, projecting just above the diaphragm^{1–3(Level VII)}
- F. A continuous UVC infusion of intravenous (IV) solution will be ordered by the physician or AHP.
1. All solutions infused via the UVC should contain at least 0.25 U/ml of heparin.^{4,5(Level II)}
- G. Transducer may be placed in the line on a UVC if central venous pressure (CVP) monitoring is required, with alarm limits set to appropriate parameters for the infant.
- H. A double-lumen catheter may be placed when multiple infusions are needed. A double-lumen catheter is usually placed as a UVC because most solutions and medications can be infused at this site (as opposed to an umbilical arterial catheter).
- I. All connections are to be connected with Luer lock connections.
- III. Equipment
- A. Insertion
1. Prepare a sterile umbilical catheter tray.
 2. Select the umbilical catheter (size and type determined by suggested sizes, use of dual lumen).
 3. Chart for measurement of insertion, if desired.
 - a. Calculations also may be used to determine the appropriate insertion depth.
 4. 4-0 silk
 5. Scalpel, no. 15
 6. Sterile towels
 7. Sterile gloves, sterile gowns, surgical caps, and masks (two of each)
 8. Spotlight or exam light
- B. Care and maintenance
1. Approved disinfectant
 2. Sterile saline wipes
 3. 2 × 2 gauze
 4. 5-ml syringe
 5. Dressings to secure catheter (tape, “bridge,” or clear occlusive dressing and a hydrocolloid skin barrier)
 6. Pressure transducer system (if monitoring CVP)
 7. IV administration set and solutions
 8. Masks, caps, sterile gowns, sterile gloves (two of each)
 9. 1-in. tape
- C. Sampling
1. Flush solution as ordered with or without heparin (new vial or prefilled syringe)
 2. Appropriate syringe for blood samples being obtained
 3. Disinfectant to clean needleless ports on catheter
 4. Appropriate tubes for labs being obtained
- D. Removal
1. Sterile gloves
 2. Sterile 4 × 4 gauze
 3. Suture removal kit
 4. Hemostat
- IV. Nursing knowledge
- A. UVCs should be placed under sterile conditions with maximum-barrier precautions.^{6,7(Level I)}
- B. Nurses assisting with placement and caring for infants with UVCs should be educated about measures to prevent central line–associated bloodstream infections.
- C. UVC position is verified every shift by observing and recording the centimeter mark at the umbilicus.^{8–10(Level VII)}
- V. Process
- A. Follow standard or sterile precautions while performing maintenance of the catheter. Either may be appropriate and should be established by hospital policy.

B. The procedure will be preceded by proper infant identification and Universal Protocol if nonemergent placement.

C. Insertion

1. Place the infant supine with thermoregulatory assistance on pulse oximetry and cardiorespiratory monitoring, with alarms set and audible.
2. Immobilize the infant's extremities using developmental principles.
3. Obtain the infant's length or shoulder-to-umbilical length, as indicated. This may be used to determine insertion depth.
4. Assess for and document any bruising of the infant's lower extremities, including feet and toes, before the procedure.
5. Assess the infant's vital signs, glucose, and other physiological functions before beginning the procedure.
6. During the procedure:
 - a. Minimize the risks of hypothermia or hyperthermia.
 - b. Continually monitor cardiorespiratory and oxygen saturation status.
 - c. Ensure visibility of the infant. The use of transparent drapes ensures visibility.
 - d. Carefully observe the procedure, helping to establish and maintain the integrity of the sterile field.

D. Care and maintenance

1. After UVC insertion, obtain an anteroposterior abdominal radiograph to confirm placement before securing the catheter.
2. For an emergency placement, a radiograph is not necessary. The catheter tip should be just beyond the skin line, inserted approximately 2–4 cm, to ensure the tip is not in the liver.^{1–4 (Level VII)}
3. The catheter may be repositioned as needed if the sterile field has been maintained. If the catheter must be advanced and the sterile field has been compromised, a new catheter must be inserted.
4. Do not enter the line for sampling or infusion until the position is verified unless placed in a low position for emergent use.
5. Ensure all air bubbles have been removed from the UVC before flushing the line or infusing solutions.
6. After verifying the catheter's position, secure it in the following way:
 - a. Determine the appropriate catheter-securing device for the infant's weight and size.
 - b. Remove any residual disinfectant from the skin after placement with sterile normal saline wipes.
 - c. Note centimeter markings at the umbilicus before securing. The UVC may be secured

using a commercially available device, bridge or goalpost taping, or a hydrocolloid skin barrier applied to the umbilical area with tape or clear occlusive dressing.^{3(Level VII),4,9,10 (Level II)}

7. If an arterial line is also placed, mark the individual catheters appropriately as arterial and venous.
8. If a silicone catheter is used, do not clamp it; instead, fold and pinch it closed or use padded hemostats.
9. Umbilical tape may be left on for up to 24 hr to control bleeding. Carefully assess the color and perfusion of the skin around the umbilicus if tape is left in place.
10. After the catheter is stabilized, begin maintenance infusion as ordered.
11. IV administration set is to be changed at a frequency recommended by the most current Centers for Disease Control and Prevention (CDC) guidelines.^{6,7(Level I)}
12. Perform appropriate hand hygiene and adhere to strict aseptic technique when changing IV solutions and administration sets, administering medications, or obtaining blood specimens.^{6,7,9(Level I)}
13. Assess the infant's lower extremities, including the buttocks, hourly while the UVC remains in place.^{9,10(Level VII)}
14. Maintain an airtight system and do not allow air bubbles to infuse into the infant. Ensure that all connections are Luer locked and tightened (avoid overtightening because this may crack connections).
15. Position and protect the tubing and catheter to prevent the infant from accidentally dislocating or removing the catheter.
16. Institute developmentally appropriate measures to limit access to the tubing and catheter.
17. Position the infant side-lying or supine. The prone position should be avoided because of the potential for accidental kinking or dislodgement.^{9,10(Level VII)}

E. Sampling

1. If both an arterial and venous umbilical catheter are in place, it is preferable to draw blood samples from the arterial catheter.^{3(Level VII)} If samples must be drawn from the UVC, use the following steps.
2. A closed system should be used to obtain samples from the umbilical catheter. This may be a commercially available product or a system that is put together with two three-way stopcocks connected to the UVC. Each stopcock should be capped with a needleless port. A closed system is preferred to reduce the risk of infection.
3. When ready to obtain a sample, if using a commercially available system, follow the manufacturer's instructions. If using a stopcock system, clean the port with an approved disinfectant and allow it

to dry. Place an empty 3-ml syringe onto the most distal port. Place a syringe of appropriate size for the sample to be obtained onto the proximal port.

4. Turn the stopcock to allow withdrawal of approximately 1.5 ml of blood at a rate of 1 ml/30 s to clear the infusing solution.^{11(Level II)} Turn the stopcock off to IV solution and the syringe. Open the proximal stopcock to the infant and withdraw the sample for testing, at a rate of 1 ml/30 s.
 5. Open the stopcock to the distal port and open this stopcock to the infant. Reinfuse the blood used to clear the tubing to the infant at a rate of 1 ml/30 s.
 6. Close the stopcock to all ports and remove and discard the syringe. Clean the port with an approved disinfectant and allow it to dry. Place the syringe containing the flush solution onto the distal port and slowly clear residual blood from the tubing at a rate of 1 ml/30 s.
 7. Open stopcocks to the infant and infusate and resume infusion.
 8. Appropriately label and process blood samples obtained.
 9. Document the time, the samples that were obtained, the quantity of blood withdrawn, and the flush infused.
- F. Guidelines for using a double-lumen catheter
1. Placement, general care, and removal are as outlined for a single-lumen catheter.
 2. Blood samples should be drawn from the larger lumen. The other lumen's infusion solution should be paused to prevent contamination of the blood sample.
 3. Follow the manufacturer's recommendations for use and care. Some catheters have one lumen that is larger than the other. If this is the case and one lumen must be heparin-locked, the larger lumen should be locked. However, it is preferable to keep an infusing solution that can be split between the two lumens until the catheter is no longer needed.^{4(Level II),5(Level VI)}
 4. If heparin-locked, the lumen should be flushed at least every 8 hr with 0.5 ml of heparin flush solution.^{4(Level II),5(Level VI)} Needleless caps should be changed according to the most current CDC guidelines.^{6,7(Level I)}
 5. Blood products may be infused through this line, preferably through the larger lumen, if there is a difference in lumen size.
 6. If there is a need to infuse solutions that may have a questionable interaction, consult the manufacturer's product information. Some catheter lumens allow mixing of solutions, and others do not.
 7. Clamps used on a silicone catheter could destroy the interseptum. Fold and pinch the catheter during administration set changes.

G. Removal

1. Verify the order for catheter removal.
2. Turn the stopcock off to the infant. Turn the transducer alarm off if it is being used. Verify the centimeter marking at the umbilicus.
3. Observing standard precautions and, using sterile gloves, open a sterile 4 × 4 gauze and suture removal kit and place it within reach on the infant's bed.
4. Cut and remove the suture securing the catheter.
5. Grasp the catheter firmly with one hand and slowly pull it out. If the vein bleeds, apply gentle pressure.
6. A small amount of oozing may occur.
7. Do not cover the umbilical stump or place the infant prone for 1 hr after removing the catheter.^{10,12 (Level II, VII)}
8. Verify and document that the catheter is complete and intact upon removal.

VI. Documentation

- A. Document baseline vital signs before UVC insertion.
- B. Document the date and time of the procedure, credentials, and the name of the person inserting the catheter.
- C. Document the infant's tolerance of the procedure and appearance of the umbilicus and lower extremities, including color, temperature, and pulses.
- D. Document the catheter type (single- or dual-lumen), size, and insertion depth (at umbilicus).
- E. Continue to document the condition of the umbilicus every 8–12 hr and with changes.
- F. Document the infusion rate of solutions being infused via UVC and the types of solutions.
- G. Document blood withdrawn, flush used on intake and output, and specimens collected.
- H. Document waveform (if using a transducer to measure CVP), CVP, and the ease or lack of ease flushing the catheter, as applicable.
- I. Document catheter removal, including the entire length removed and any associated blood loss.

Related Documents

Procedure: Exchange Transfusion, Double Volume and Partial Volume

Procedure: Umbilical Arterial Catheters, Placement and Care of

Competency: Admission to the NICU

Competency: Hemodynamic Monitoring, Invasive

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Author: _____

Original Date: _____

Approvals: _____

Procedure: Urinary Catheterization Level II, III, and IV Nurseries

- I. Purpose: 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
- II. Considerations
- The infant should not have voided within 1–2 hours of the procedure.^{1(Level V)}
 - Portable ultrasound may be helpful to determine whether there is adequate urine present in the bladder.^{1(Level V),2(Level VI),3(Level VII)}
 - Use of a feeding tube as a urinary catheter may increase the risk of coiling and should be avoided.^{3(Level VII),4(Level VI),5(Level VI),6(Level VII)}
 - Foley catheters should not be used with younger infants and neonates because of the risk of serious urethral injury if the balloon is inflated in error while still in the urethra.
 - The longer the catheter is in place, the higher the risk of infection.^{1(Level V),7 (Level II),8(Level I)}
 - Use the smallest-diameter catheter to avoid complications.^{1(Level V)}
 - Recommended length of insertion for intermittent urinary catheterization^{4,5(Level VI)}:
 - Female
 - Neonate: 5 cm
 - Infant: 5 cm
 - Extremely-low-birth-weight infant weighing less than 750 g: less than 2.5 cm
 - Male
 - Neonate: 6 cm
 - Infant: 6 cm
 - Extremely-low-birth-weight infant weighing less than 750 g: less than 5 cm
- III. Equipment
- Three povidone-iodine-impregnated swabs
 - Closed-system indwelling urinary catheter kit for continuous bladder drainage
 - Sterile towels for draping
 - Sterile gloves
 - Sterile specimen container
 - Water-soluble lubricant
 - 3.5-Fr silicone urinary catheter for infants weighing less than 1,000 g^{1(Level V)}
 - 5-Fr silicone urinary catheter for larger infants^{1(Level V)}
 - Sterile cotton-tipped applicators
 - Saline or sterile water wipes
- IV. Nursing knowledge
- Registered nurses (RNs) who have completed competency training may perform urinary catheterization.^{8(Level VII)}
 - Avoid vigorous cleansing of the perineum to prevent introduction of bacteria into the urinary tract.^{1(Level V)}
 - Avoid wide separation of the labia minora to prevent tearing.^{1(Level V)}
 - Insert the catheter only as far as necessary to obtain urine and to avoid coiling and knotting of the catheter.^{1(Level V)}
 - Recommendations to prevent catheter-associated urinary tract infections (CAUTI) when using closed-system indwelling urinary catheter^{8(Level I)}:
 - Maintain unobstructed urine flow.
 - Keep the catheter and collecting tube free from kinking.
 - Keep the collecting bag below the level of the bladder at all times. Do not rest the bag on the floor.
 - 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.
 - Use standard precautions, including the use of gloves and gown as appropriate, during any manipulation of the catheter or collecting system.
 - Do not clean the periurethral area with antiseptics to prevent CAUTI while the catheter is in place. Routine hygiene (e.g., cleansing of the meatal surface during daily bathing) is appropriate.
 - Clamping indwelling catheters before removal is not necessary.
 - Removal of the catheter should occur as soon as possible to limit the potential for infection.
- V. Process^{1(Level V),2(Level VI),8(Level I),9(Level VI)}
- Follow standard precautions while performing all steps of the procedure unless directed to use sterile precautions.
 - The procedure will be preceded by proper infant identification.
 - Provide pain management. (Refer to *Newborn Pain Assessment and Management: Guideline for Practice*, 3rd edition.)
 - Provide developmental care with facilitated tucking or blanket swaddling and nonnutritive sucking.
 - Set up a sterile field using an infant or pediatric catheterization kit.
 - Select the appropriate catheter size to avoid trauma.

- F. Position the infant supine with knees bent and legs apart. Developmentally support the infant as necessary.
- G. Perform hand hygiene and don sterile gloves.
- H. Place the hub of the catheter into the specimen container to maintain sterility or connect it to a closed system for an indwelling catheter.
- I. Cleaning of meatus
 - 1. Female: Separate the labia with a thumb and index finger.
 - a. Clean the urethral meatus with povidone-iodine from front to back.
 - b. Wipe once downward over the meatus, then once on either side of the meatus with each swab.
 - c. Do not wipe a swab over the same area more than once.
 - 2. Male: With one hand holding the penis upward:
 - a. Use the other hand to clean the glans with povidone-iodine.
 - b. The foreskin of uncircumcised boys must be partially retracted to locate the meatus (do not force retraction of the foreskin).
 - c. Wipe in a circular motion over the glans, beginning over the meatus and ending at the proximal penile shaft.
 - d. Drape sterile towels across the lower abdomen and the infant's legs.
- J. Lubricate the catheter generously with a water-soluble lubricant and insert it into the meatus, just until urine returns.
 - 1. Refer to Section II for recommended length of insertion.
 - 2. If the infant is crying or straining, pause the procedure and attempt to calm the infant before continuing.
- 3. 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. Abort the procedure if obstruction is suspected and notify the physician or AHP.
- 4. To prevent urethral trauma, do not move the catheter in and out.
- 5. To prevent trauma or coiling, do not insert more than the recommended length.
- 6. Collect specimen.
- 7. If the catheter is indwelling, connect it to a closed urinary draining system.
- 8. If the catheter is to be removed, gently withdraw when urine flow ceases.
- 9. Secure and stabilize the catheter to the inner thigh.
- 10. In male infants, the catheter may be taped to the lower abdomen
- K. Gently cleanse the area to remove povidone-iodine with saline or sterile water wipes.
- L. Replace the diaper and developmentally reposition the infant.
- M. Ensure the specimen is properly labeled and submit for testing as indicated.
- VI. Documentation
 - A. 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 collected.
 - B. Document urinary output every 3–4 hr.
 - C. Document periurethral care daily.

Related Documents

Procedure: Perioperative Care

Competency: Urinary Catheterization

Developmental Care of Newborns and Infants, 2nd edition
Newborn Pain Assessment and Management: Guideline for Practice, 3rd edition

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Author: _____

Original Date: _____

Approvals: _____

Competency Assessments

Competency Assessment Overview

Definition

A competency assessment describes work-related skills, abilities, and behaviors needed to effectively perform nursing care. These competencies are focused on technical skills. There is great importance in validating a nurse's understanding of the science behind the skills, critical thinking abilities, and ability to function in a crisis situation.¹ Several options are given in each document as methods to validate competency. Some methods serve to validate different aspects of competency—for instance, a written exam can validate knowledge of science behind a skill; a case study or simulation functions better to validate critical thinking or working in a crisis situation.

Core competencies are required for all nurses. Specific competencies are required for nursing roles and areas of practice to meet standards of care. Competence does not infer that a nurse is an expert—only that he or she can effectively perform a job. Competencies reflect evidence-based nursing practice and the correlation among policies and procedures, guidelines, technology, patient populations, and a nurse's necessary skills.

Components

1. Priority code (individualize this priority for a specific population or unit):
 - a. Initial: Required during orientation
 - b. Completion within 90 days: Required by the end of orientation or by the second month of employment
 - c. Completion within 6 months: Required by mid-year of the first year of hire.
 - d. Specialty: Advanced competencies based on particular needs
2. Objective: Identifies a short-term, measurable action or skill toward achieving competency
3. Required: Specific described measures or essentials of competency that may be individualized
4. Required Reading: Identified materials that provide a background for learning for the novice nurse and may be helpful for more advanced nurses as a review. This also can also be individualized.
5. Self-Assessment: Orientee identifies their clinical stage of competence. This may be particularly helpful for experienced NICU nurses moving to a new location.
6. Validation of Demonstrated Skill:
 - Simulation: Designed to strengthen cognitive, technical, and behavioral skills with either low- or high-fidelity experience
 - Case study: Uses written or oral case studies to assess critical thinking
 - Clinical practice/independent/performs without assistance: Demonstrates competence in care of patients without prompting or instructions
7. Each task is designed to be scored as “satisfactory” or “unsatisfactory” for each required element listed. If scored as “unsatisfactory,” a remediation plan should be made and can be documented in this tool.

Reference

1. Wright D. *Competency Assessment Field Guide: A Real World Guide for Implementation and Application*. Minneapolis, MN: Creative Healthcare Management, Inc;2015.

COMPETENCY: Admission to the NICU

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
 - Completion within 90 days
 - Completion within 6 months
 - Specialty competency
-

Objective: To ensure safe, competent, and standardized care for neonates admitted to the NICU

Required: Didactic instruction Pretest Posttest Observation N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Admission, Transfer, and Discharge
- _____ Procedure: Arterial Puncture and Cannulation Peripheral
- _____ Competency: Arterial Puncture
- _____ Procedure: Blood Sampling
- _____ Policy: Glucose Homeostasis
- _____ Policy: Guidelines for Nursing Care
- _____ Procedure: Infusion Therapy
- _____ Policy: Oxygen Administration for the Neonate
- _____ Policy: Thermoneutral Environment
- _____ Procedure: Umbilical Arterial Catheters, Placement and Care of
- _____ Procedure: Umbilical Venous Catheters, Placement and Care of
- _____ Competency: Hemodynamic Monitoring, Invasive
- _____ Competency: Physical Exam

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
 I need assistance while performing this skill. I am unable to perform this skill.
-

VALIDATION OF DEMONSTRATED SKILL

Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Obtains necessary supplies for an admission to the NICU	<ul style="list-style-type: none"> • Obtains appropriate emergency equipment and sets up at bedside • Verifies equipment is functional • Obtains necessary supplies and equipment for admission • Prepares appropriate monitoring equipment • Sets alarm limits according to hospital policy 			
Incorporates infection prevention and control measures according to hospital policy	<ul style="list-style-type: none"> • Performs appropriate hand hygiene • Dons appropriate personal protective equipment before contact with infant • Doffs personal protective equipment after contact with infant 			
Executes newborn identification (ID) verification process according to hospital policy	<ul style="list-style-type: none"> • Applies ID bands (if appropriate) and verifies the ID bands and birth record with the transferring nurse • Completes allergy ID 			
Appropriately collects admission labs	<ul style="list-style-type: none"> • Obtains ordered laboratory specimens using aseptic or sterile technique 			
Performs an initial comprehensive physical assessment	<ul style="list-style-type: none"> • Performs and documents a developmentally appropriate physical assessment of all systems • Identifies and reports abnormal findings • Performs and documents skin risk assessment and implements appropriate interventions according to hospital policy 			
Accurately obtains newborn vital signs, including pain assessment	<ul style="list-style-type: none"> • Obtains, documents, and monitors vital signs according to hospital policy • Identifies and reports abnormal assessments • Assesses, documents, and monitors pain according to hospital policy • Implements appropriate pain management or comfort measures 			
Accurately obtains newborn measurements	<ul style="list-style-type: none"> • Obtains and documents <ul style="list-style-type: none"> – Height – Weight – Head circumference – Gestational age – Intrauterine growth and maturity – Gestational age exam such as modified Ballard • Reports abnormal measurements or assessments 			
Prepares and maintains a sterile field during insertion according to hospital policy	<ul style="list-style-type: none"> • Developmentally positions the infant for the procedure • Sets up procedural tray using sterile technique • Uses a standardized insertion checklist 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Executes Universal Protocol according to hospital policy	<ul style="list-style-type: none"> • Verifies the infant's identity using at least two identifiers • Ensures documentation of the Universal Protocol 			
Provides a thermoneutral environment	<ul style="list-style-type: none"> • Defines the concept of a neutral thermal environment • Verbalizes the four mechanisms of heat loss • Incorporates measures to maintain a thermoneutral environment • Initiates humidity therapy according to hospital policy 			
Reviews and implements provider orders according to hospital policy	<ul style="list-style-type: none"> • Initiates infusion therapy • Administers antimicrobial therapy • Administers prophylactic therapy (erythromycin and vitamin K) 			
Initiates infant safety care measures	<ul style="list-style-type: none"> • Completes an emergency medication reference form based on infant's birth weight • Displays the emergency medication reference form in designated area 			
Initiates a customized care plan	<ul style="list-style-type: none"> • Initiates a multidisciplinary plan of care • Individualizes plan of care 			
Provides family and caregiver education	<ul style="list-style-type: none"> • Assesses for knowledge deficits and barriers to learning • Orients family and caregiver to the unit • Informs family and caregiver about handwashing and visitation policy • Documents family and caregiver education in the medical record 			

*Performance ratings: S = satisfactory; US = unsatisfactory.

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Amplitude Integrated Electroencephalography (aEEG) Monitoring

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
 - Completion within 90 days
 - Completion within 6 months
 - Specialty competency
-

Objective: To safely care for neonates with aEEG monitoring

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Amplitude-Integrated Electroencephalography (aEEG) Monitoring
- _____ Sievert W. It looks like chicken scratch to me (or making the most of today's technology): a practical guide for the bedside nurse to optimize amplitude-integrated EEG monitoring. *Newborn Infant Nurs Rev.* 2015;16:28-35.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
 - I need assistance while performing this skill. I am unable to perform this skill.
-

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Verbalizes or demonstrates knowledge of and purpose for aEEG monitoring	<ul style="list-style-type: none"> • Indications include: <ul style="list-style-type: none"> – Suspected seizures or high risk for seizures – Hypoxic ischemic encephalopathy – Preterm infants at risk for seizures 			
Verbalizes or demonstrates ability to care for an infant undergoing aEEG	<ul style="list-style-type: none"> • Selects appropriate lead based on equipment, infant, and unit policy • Measures for correct lead placement • Prepares skin for lead placement • Maintains leads 			
Verbalizes or demonstrates knowledge of interventions for dislodged or failed leads	<ul style="list-style-type: none"> • Understands interventions for <ul style="list-style-type: none"> – Dislodged leads – Artifact 			
Demonstrates knowledge of when to notify a healthcare provider	<ul style="list-style-type: none"> • Notifies a healthcare provider regarding <ul style="list-style-type: none"> – Signs and symptoms of infection – Drainage or bleeding at lead site – Suspected seizures – Abnormal waveform on aEEG 			
Prepares the family for monitoring	<ul style="list-style-type: none"> • Describes the need for aEEG monitoring to the family 			
Documentation	<ul style="list-style-type: none"> • Documents care, interventions, and family teaching • Marks events on aEEG machine 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Arterial Puncture

Departments Affected: _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
 - Completion within 90 days
 - Completion within 6 months
 - Specialty competency
-

Objective: To ensure that proper technique is used to minimize complications secondary to radial arterial puncture

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Arterial Puncture and Cannulation, Peripheral
- _____ Competency: Admission to the NICU
- _____ Gupta AO. Arterial puncture. In: MacDonald MG, Ramasethu J, Rais-Bahrami K, eds. *Atlas of Procedures in Neonatology*. 5th ed. Philadelphia, PA: Lippincott Williams and Wilkins; 2013:95-98.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.
-

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Performance without assistance

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Describes purpose for percutaneous arterial blood sampling	<ul style="list-style-type: none"> • Verbalizes approved sites and equipment needed • Verbalizes or demonstrates procedure per institutional policy 			
Demonstrates ability to safely perform arterial puncture	<ul style="list-style-type: none"> • Verbalizes or demonstrates <ul style="list-style-type: none"> – Allen’s test (for radial arterial puncture) – Standard precautions to prevent infection – Proper technique to prevent complications 			
Recognizes symptoms of circulatory compromise that necessitate calling a provider	<ul style="list-style-type: none"> • Verbalizes symptoms of circulatory compromise and the need to promptly notify MD, NNP, or PA 			
Provides education for family or caregiver	<ul style="list-style-type: none"> • Assesses for knowledge deficit and barriers to learning • Explains arterial puncture procedure to family or caregiver 			
<i>*Performance ratings: S = satisfactory; US = unsatisfactory.</i>				

Employee’s Signature, Date: _____

Preceptor’s Signature, Date: _____

COMPETENCY: Blood Sampling

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
 - Completion within 90 days
 - Completion within 6 months
 - Specialty competency
-

Objective: To ensure that proper technique is used to minimize complications secondary to blood sampling

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Blood Sampling
- _____ Gupta AO. Venipuncture. In: MacDonald MG, Ramasethu J, Rais-Bahrami K. *Atlas of Procedures in Neonatology*. 5th ed. Philadelphia, PA: Lippincott Williams and Wilkins; 2013:89-94.
- _____ Folk LA. Capillary heelstick blood sampling. In: MacDonald MG, Ramasethu J, Rais-Bahrami K. *Atlas of Procedures in Neonatology*. 5th ed. Philadelphia, PA: Lippincott Williams and Wilkins; 2013:99-102.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
 - I need assistance while performing this skill. I am unable to perform this skill.
-

VALIDATION OF DEMONSTRATED SKILL

- Simulation Performance without assistance Observation of daily work

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Differentiates indications for venipuncture and capillary blood sampling	<ul style="list-style-type: none"> • Describes indications for venipuncture • Lists contraindications to performing heel sticks 			
Develops a plan for use of nonpharmacologic comfort measures for neonates undergoing painful procedures	<ul style="list-style-type: none"> • Describes nonpharmacologic comfort measures appropriate for procedure • Swaddling • Sucrose • Nonnutritive sucking 			
Safely performs venipuncture and capillary blood sampling	<ul style="list-style-type: none"> • Demonstrates or verbalizes standard precautions to prevent infection • Gathers necessary equipment and supplies • Locates appropriate sites • Performs procedures for venipuncture and capillary sampling • Uses proper technique to prevent complications and erroneous lab values 			
Demonstrates the ability to obtain laboratory specimens	<ul style="list-style-type: none"> • Gathers appropriate supplies • Cleanses needle-less connector with hospital-approved antiseptic • Removes appropriate volume of waste • Collects specimen appropriately • Flushes line with appropriate volume • Resumes continuous infusion 			
Provides education for family or caregiver	<ul style="list-style-type: none"> • Assesses for knowledge deficit and barriers to learning • Explains procedures to family or caregiver 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Breast Pumping, Educating Mothers

Departments Affected: Level I, II, and III Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
 - Completion within 90 days
 - Completion within 6 months
 - Specialty competency
-

Objective: To ensure safe, competent care of the mother/infant breastfeeding dyad

Required: Didactic instruction Pretest Posttest N/A

- _____ Successful completion of breastfeeding and benefits of breast milk class
- _____ Shadow experience with lactation consultant or counselor

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Human Milk: Pumping, Use, and Storage

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.
-

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Describe importance of breast milk for neonatal nutrition	<ul style="list-style-type: none"> • Explains why human milk is exclusively recommended for 6 months • Lists benefits of human milk for neonates. 			
Provides information and support to mother	<ul style="list-style-type: none"> • Assesses knowledge deficits and barriers to learning • Encourages initiation of pumping within the first 6 hr of life <ul style="list-style-type: none"> – For mothers choosing not to pump: identifies reasons or barriers and corrects misinformation • Informs mother of available resources, including lactation consultant • Describes the process of hand expression, as indicated • Summarizes the recommended frequency and duration of pumping <ul style="list-style-type: none"> – 8 times in a 24-hr period – At least once during the night – Double pump for approximately 15 min • Identifies needed equipment <ul style="list-style-type: none"> – Breast pump – Breast pump kit – Storage containers – Labels • Explains the pumping, storing, and transporting process <ul style="list-style-type: none"> – Hand hygiene – Pump setup and usage – Proper labeling – Proper storage of milk – Safe transport of milk to the NICU – Cleaning of pump kit parts 			
Provides nursing interventions to facilitate pumping	<ul style="list-style-type: none"> • Identifies available breast pumping resources such as handouts, websites, lactation services, and classes • Describes pharmacologic and nonpharmacologic interventions to relieve breast or nipple discomfort • Identifies factors that may lead to decreased milk production and breast pumping obstacles • Encourages skin-to-skin holding, bedside pumping, early nuzzling or nonnutritive suckling 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Breastfeeding Dyad Care

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
 - Completion within 90 days
 - Completion within 6 months
 - Specialty competency
-

Objective: To ensure safe, competent care of the mother/infant breastfeeding dyad

Required: Didactic instruction Pretest Posttest N/A

- _____ Breastfeeding and benefits of breastmilk class

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Human Milk: Pumping, Use, and Storage
- _____ World Health Organization. Infant and young child feeding: model chapter for textbooks for medical students and allied health professionals; 2009. Available at <http://www.who.int/nutrition/publications/infantfeeding/9789241597494/en/index.html>.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.
-

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Possesses knowledge of lactation anatomy and physiology	<ul style="list-style-type: none"> • Describes the physiological process of colostrum and milk production • Identifies factors that may lead to decreased milk production and breastfeeding obstacles 			
Provides information and support to mother and family	<ul style="list-style-type: none"> • Assesses for knowledge deficits and barriers to learning • Encourages breastfeeding for all mothers/babies <ul style="list-style-type: none"> – For mothers choosing not to breastfeed: identifies reasons or barriers and corrects misinformation – Advocates breastfeeding for short periods of time if acceptable to the mother, then supports the decision to bottle feed • Distinguishes between proper and improper latch • Describes positions to facilitate the optimal breastfeeding experience for the dyad • Discusses nutritional requirements in breastfed infants <ul style="list-style-type: none"> – Normal percentage of weight loss – Normal voiding and stool patterns – Normal timing to regain birth weight • Identifies hunger cues to help the mother respond to infant needs <ul style="list-style-type: none"> – Rooting – Hand-to-mouth movements – Looking around environment – Mouth opening in response to tactile stimulation • Provides support for rooming-in to mother and family when available and appropriate 			
Provides nursing interventions to facilitate breastfeeding	<ul style="list-style-type: none"> • Identifies available breastfeeding resources such as handouts, websites, lactation services, and classes • Describes pharmacological and nonpharmacological interventions to relieve breast or nipple discomfort • Explains rationale and technique for manual expression of colostrum • Demonstrates breast pump setup and verbalizes steps to ensure proper cleaning of equipment 			
<p>*Performance ratings: S = satisfactory; US = unsatisfactory.</p>				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Car Seat Screening

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure safe transportation of infants at discharge

Required: Didactic instruction Pretest Posttest

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Car Seat Observational Monitoring
- _____ Bull MJ, Engle WA; Committee on Injury, Violence, and Poison Prevention; Committee on Fetus and Newborn; American Academy of Pediatrics. Safe transportation of preterm and low birth weight infants at hospital discharge. *Pediatrics*. 2009;123:1424-1429.
- _____ Davis NL. Car seat screening for low birth weight term neonates. *Pediatrics*. 2015;136(1):89-96.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Describes infant population needing car seat, observational monitoring	<ul style="list-style-type: none"> • Indicated for all infants born at less than 37 weeks' gestation • Mature infants who are at risk for obstructive apnea, bradycardia, or hypoxemia, including infants with hypotonia (e.g., Down syndrome), micrognathia (e.g., Pierre Robin sequence) • Infants who have undergone cardiac surgery 			
Describes infant population appropriate for car bed or alternative safety device	<ul style="list-style-type: none"> • Infants with documented cardiopulmonary compromise 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates proper placement of infant in car seat for observational monitoring	<ul style="list-style-type: none"> • Places car seat on a clean, level surface • Ensures the car seat is in the correct recline angle position as directed by the manufacturer's instructions • Connects infant to cardiopulmonary monitor and pulse oximetry • Obtains baseline vital signs before observation period • Positions and secures infant in car seat with parent involvement, as appropriate • Ensures buttocks and back are flat against the back of the car seat • Secures harness straps snugly at or below shoulder level • Positions chest clips at midpoint of the infant's chest (at armpit level); avoids positioning chest clips at the abdomen or in front of the neck • Does not place blankets under or behind the infant in the car seat 			
Demonstrates appropriate monitoring of the infant during car safety seat observation	<ul style="list-style-type: none"> • Observes infant for 90–120 min or the duration of travel, whichever is longer • Monitors vital signs (heart rate, respiratory rate, and oxygen saturations) every 30 min throughout observation period • Discontinues observation if infant is unable to maintain appropriate oxygen saturation or has apnea or bradycardia during the observation period; notifies healthcare provider of results • At the completion of the observation, removes the infant from car seat and places infant in crib using safe sleep practices 			
Provides family education on car seat safety and positioning	<ul style="list-style-type: none"> • Instructs families on correct positioning of their infant in the car safety seat based on results of the car safety observation • Ensures that families demonstrate proper positioning of their infant in the car safety seat • Advises families that car safety seats should be used only for travel and that an infant should never be left unattended in a car safety seat inside or outside the car • Instructs parents that the back seat of a vehicle is the safest place for children to travel • Advises parents that they should arrange for an adult to be seated in the rear seat adjacent to the infant whenever possible during travel for close observation of the infant 			
Documents intervention and family education	<ul style="list-style-type: none"> • Documents care, interventions, and family teaching in the medical record 			

*Performance ratings: S = satisfactory; US = unsatisfactory.

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Cardiac Care, Basic

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
 - Completion within 90 days
 - Completion within 6 months
 - Specialty competency
-

Objective: To provide safe basic cardiac care for the well-appearing and at-risk newborn

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Oxygen Administration for the Neonate
- _____ Sadowski SL. Cardiovascular disorders. In: Verklan MT, Walden M, eds. *Core Curriculum for Neonatal Intensive Care Nursing*. 5th ed. St. Louis, MO: Elsevier Saunders; 2015:527-582.
- _____ Karlsen KA, Tani LY. *S.T.A.B.L.E.—Cardiac Module: Recognition and Stabilization of Neonates With Severe CHD*. Park City, UT: The S.T.A.B.L.E. Program; 2003.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
 - I need assistance while performing this skill. I am unable to perform this skill.
-

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Performs a cardiac assessment	<ul style="list-style-type: none"> • Assesses respiratory rate and effort • Auscultates breath sounds, heart sounds and murmur, and heart rate and rhythm • Assesses perfusion including color, blood pressure, pulses, oxygen saturation, capillary refill, skin temperature, and urine output • Differentiates cyanosis with pulmonary versus cardiac origin 			
Describes transitional circulation and expected newborn findings	<ul style="list-style-type: none"> • Differentiates central from peripheral cyanosis • Describes expected clinical assessment during transition 			
Performs universal pulse oximetry screening, including actions for a positive screen and suspicious screen	<ul style="list-style-type: none"> • Performs universal pulse oximetry screen on qualifying neonate • Takes appropriate action for positive screen and suspicious screen 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Cardiac Care, Advanced

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To provide cardiac care for neonates with suspected or confirmed congenital heart disease and abnormal electrocardiogram (ECG) rhythms

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Tachyarrhythmias, Management of
- _____ Sadowski SL. Cardiovascular disorders. In: Verklan MT, Walden M, eds. *Core Curriculum for Neonatal Intensive Care Nursing*. 5th ed. St. Louis, MO: Elsevier Saunders; 2015:527-582.
- _____ Karlsen KA, Tani LY. *S.T.A.B.L.E.—Cardiac Module: Recognition and Stabilization of Neonates With Severe CHD*. Park City, UT: The S.T.A.B.L.E. Program; 2003.
- _____ Pilcher J. *Pocket Guide to Neonatal ECG Interpretation*. 3rd ed. Petaluma, CA: NICU Ink; 2016.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Recognizes presenting signs in the neonate with congenital heart disease	<ul style="list-style-type: none"> • Collects applicable family history • Identifies physical features that may be associated with congenital heart disease • Identifies presenting signs associated with decreased pulmonary blood flow • Identifies presenting signs associated with increased pulmonary blood flow • Identifies presenting signs associated with left heart obstruction 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Differentiates right-to-left versus left-to-right intracardiac shunting	<ul style="list-style-type: none"> • Identifies appropriate sites for preductal and postductal saturation or partial pressure of oxygen (PaO₂) measurement • Verbalizes direction of shunt based on saturation or PaO₂ in preductal and postductal locations • Applies shunting physiology to appropriate interventions 			
Identifies factors affecting cardiac output and intervenes to optimize cardiac output	<ul style="list-style-type: none"> • Verbalizes components of cardiac output including heart rate and stroke volume (including preload, contractility, and afterload) • Verbalizes effect of electrolyte imbalance, hypoxia, acidosis, and cold stress on cardiac output • Identifies strategies to improve specific components of cardiac output 			
Differentiates a normal versus abnormal ECG rhythm	<ul style="list-style-type: none"> • Identifies a normal ECG rhythm including P, Q, R, S, and T waves, P-R interval, QRS interval, and rate • Assesses associated perfusion if abnormal ECG rhythm • Recognizes complete heart block, supraventricular tachycardia, ventricular tachycardia, and ventricular fibrillation 			
Performs vagal maneuvers while ensuring an open airway	<ul style="list-style-type: none"> • Performs vagal maneuver by stimulating a gag • Performs vagal maneuver by suctioning the nasopharynx • Performs vagal maneuver by applying an ice pack to the nose and forehead area • Ensures an open airway with all vagal maneuvers 			
Administers cardiac medications safely and effectively	<ul style="list-style-type: none"> • Verbalizes administration guidelines for common cardiac medications, including: <ul style="list-style-type: none"> – Adenosine – Digoxin – Dobutamine – Dopamine – Ibuprofen – Indomethacin – Milrinone – Prostaglandin E1 – Propranolol 			
Monitors blood gases, electrolytes, and other applicable labs	<ul style="list-style-type: none"> • Verbalizes rationale for monitoring blood gases, electrolytes, and other applicable labs 			
Assists with cardioversion and defibrillation	<ul style="list-style-type: none"> • Verbalizes initial dose in joules for cardioversion and defibrillation • Assists with cardioversion and defibrillation according to procedure 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Chest Tube Management

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure safe and competent management of chest tubes

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Chest Tube Management

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Independent

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Describes basic anatomy and physiology of the respiratory system	<ul style="list-style-type: none"> • Describes the anatomy of the chest and the breathing mechanism 			
Describes clinical indications for chest tube drainage or needle aspiration	<ul style="list-style-type: none"> • Identifies or describes <ul style="list-style-type: none"> – Pneumothorax – Hemothorax – Hemopneumothorax – Tension pneumothorax – Pleural effusion or chylothorax – Empyema 			
Sets up chest tube drainage system	<ul style="list-style-type: none"> • Identifies and describes the function of each chamber • Describes the importance of the water seal chamber • Sets up the system • Sets up two drainage systems with one-wall suction • Connects chest tube from infant to the water seal chamber 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates the ability to assess an infant with a chest tube	<ul style="list-style-type: none"> • Assesses the insertion site and dressing • Assesses tubing for patency • Assesses the collection chamber for the amount and nature of drainage • Evaluates the water seal chamber • Monitors the suction control chamber 			
Safely performs care of infants with chest tubes	<ul style="list-style-type: none"> • Monitors <ul style="list-style-type: none"> – Pertinent laboratory values – Hemodynamic parameters – Chest tube output (amount, color) • Appropriately changes dressing at the insertion site • Identifies potential complications: <ul style="list-style-type: none"> – Tension pneumothorax – Acute blood loss (output greater than 3 ml/kg/hr) – Infection – Pulmonary compromise – Chest tube dysfunction and leakage – Chest tube dislodgement • Documents appropriately in the medical record output and complications 			
Discusses other nursing care related to the infant with a chest tube	<ul style="list-style-type: none"> • Frequent positioning • Stabilization of the chest tube • Hemostats at bedside • Assesses and intervenes for pain • Administers medication ordered for pain as indicated • Documents all interventions 			
Demonstrates the ability to assist in removal of the chest tube	<ul style="list-style-type: none"> • Describes the procedure • Discusses complications 			
Provides for family and caregiver education	<ul style="list-style-type: none"> • Assesses for knowledge deficits and barriers to learning • Explains chest tube or needle aspiration to the family or caregiver 			
<i>*Performance ratings: S = satisfactory; US = unsatisfactory.</i>				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Congenital Cardiac Defects

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: Use of pulse oximetry for timely identification of infants with critical congenital heart defects (CCHDs) before discharge from the birth hospitalization

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Critical Congenital Heart Defects (CCHDs), Screening for
- _____ Mahle WT, Martin GR, Beekman RH III, Morrow WR, Section on Cardiology and Cardiac Surgery Executive Committee. Endorsement of Health and Human Services recommendation for pulse oximetry screening for critical congenital heart disease. *Pediatrics*. 2012;129(1):190.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Describes the importance of early identification of newborns with critical congenital heart defects	<ul style="list-style-type: none"> • Congenital heart disease is the most common congenital disorder in newborns. • Critical congenital heart defects are those that necessitate surgery or catheter-based intervention in the first year of life. • Benefits of early screening with pulse oximetry include identification, intervention, and minimizing morbidity and mortality of infants with congenital heart defects. • Consequences of late detection can lead to poor outcomes, including a 30% risk of mortality. 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Performs or verbalizes appropriate completion of congenital cardiac screening	<ul style="list-style-type: none"> • Identify infant more than 24 hr of age or shortly before discharge if less than 24 hr of age. • Place pulse oximetry probes, one on right hand (preductal) and one on lower extremity (postductal). • Obtain pulse oximetry reading from both extremities when infant is quiet and not crying. • Notify healthcare provider of positive screen and need for further evaluation. 			
Recognizes positive screening results for congenital heart defects	<ul style="list-style-type: none"> • Oxygen saturation (SpO₂) measurement less than 90% in either extremity • SpO₂ measurement 90% to 94% in both upper and lower extremities on three measurements, each separated by 1 hr • SpO₂ difference greater than 3% between the upper and lower extremities on three measurements, each separated by 1 hr 			
Teaches parents about screening process and benefits	<ul style="list-style-type: none"> • Describe screening process to parents and importance of early detection of congenital heart defects. • Inform parents that the screening will be performed at 24 hr of age or shortly before discharge if sooner. 			
Documentation	<ul style="list-style-type: none"> • Document oxygen saturation of both preductal and postductal pulse oximetry sites. • Document parent understanding of screening process. 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Exchange Transfusion, Double Volume and Partial Volume

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To safely care for infants undergoing exchange transfusion

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Exchange Transfusion, Double Volume and Partial Volume
- _____ Ramesethu J. Exchange transfusions. In: MacDonald M, Ramesethu J, Rais-Bahrami K, eds. *Atlas of Procedures in Neonatology*. Philadelphia, PA: Lippincott Williams & Wilkins; 2013.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates knowledge of and purpose for partial-volume and double-volume exchange transfusions	<ul style="list-style-type: none"> • Verbalizes an understanding of the purpose for exchange transfusions and instances when the therapy may be necessary 			
Describes important aspects of nursing care for baby needing exchange transfusion	<ul style="list-style-type: none"> • Verbalizes important aspects of nursing care with exchange transfusions: <ul style="list-style-type: none"> – Obtaining vital signs frequently throughout procedure – Accurate documentation of volume exchanged in and out – Monitoring pertinent labs 			
Demonstrates appropriate verification and administration of blood products	<ul style="list-style-type: none"> • Verbalizes or demonstrates how to <ul style="list-style-type: none"> – Properly identify infant – Verify blood products to be transfused 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates knowledge of equipment and supplies needed for exchange transfusion	<ul style="list-style-type: none"> • Verbalizes or demonstrates how to <ul style="list-style-type: none"> – Assist with assembly of supplies needed in exchange transfusion while maintaining sterile technique – Prepare blood for administration with a blood warmer – Disassemble or dispose of supplies needed for procedure – Prepare lab samples for transport to lab 			
Prepares the family for procedure	<ul style="list-style-type: none"> • Explains the need for the exchange transfusion • Supports family during and after procedure 			
Documentation	<ul style="list-style-type: none"> • Documents care, interventions, and family teaching 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Gastrostomy Tube Care

Departments Affected: Level II, III, IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To safely care for neonates with gastrostomy tubes

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Gastrostomy Tube Care
- _____ Gracey K, Burd A, Burd RS; National Association of Neonatal Nurses. Guide for home gastrostomy tube care. *Adv Neonatal Care. Family Teaching Toolbox.* 2008.
- _____ Soscia J, Friedman JN. A guide to the management of common gastrostomy and gastrojejunostomy tube problems. *Paediatr Child Health.* 2011;16(5):281-287.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Discusses purpose for gastrostomy tubes (GTs)	<ul style="list-style-type: none"> • Discusses the purpose for and the different types and sizes of GTs 			
Demonstrates the ability to care for an infant with a new or established GT	<ul style="list-style-type: none"> • Verbalizes or demonstrates how to <ul style="list-style-type: none"> – Assess for signs and symptoms of infection around the GT site – Vent a GT – Ensure a good fit or proper positioning of a GT – Secure a GT – Clean the site – Troubleshoot and manage problems related to GTs • Describes when the first change of a new GT should occur 			
Demonstrates knowledge of interventions if a new GT is dislodged or falls out	<ul style="list-style-type: none"> • Describes the interventions for GT dislodgement from <ul style="list-style-type: none"> – A new track – An established track 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Describes when to notify a healthcare provider	<ul style="list-style-type: none"> • Notifies a healthcare provider regarding <ul style="list-style-type: none"> – Signs and symptoms of infection – Persistent leakage, drainage, or bleeding – Vomiting, abdominal pain, constipation, or diarrhea – Dislodgement of a GT that has been in place less than 6 weeks – A blocked GT despite efforts to troubleshoot 			
Identifies learning needs of the family Performs GT teaching	<ul style="list-style-type: none"> • Verbalizes or demonstrates family teaching <ul style="list-style-type: none"> – Assesses family readiness to learn and barriers to learning – Completes a teaching record for an infant with a new GT before discharge – Provides GT teaching materials, as appropriate 			
Prepares the infant and family for discharge	<ul style="list-style-type: none"> • Verbalizes or demonstrates the ability to <ul style="list-style-type: none"> – Distribute GT home management and site care handouts, as appropriate – Ensure the family receives a backup GT before discharge • Ensure family knows how to manage GT dislodgement <ul style="list-style-type: none"> – Ensure that home care supplies have been coordinated 			
Documentation	<ul style="list-style-type: none"> • Documents care, interventions, and family teaching 			
<i>*Performance ratings: S = satisfactory; US = unsatisfactory.</i>				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Golden Hour: Immediate Stabilization and Care of High-Risk Infants

Departments Affected: Level I, II, and III Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure safe care of newborns after delivery

Required: Didactic instruction Pretest Posttest N/A

- _____ Passing of Neonatal Resuscitation Program and exam
- _____ Simulation-based training

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Code Blue
- _____ Policy: Deliveries, Attendance At
- _____ Policy: Golden Hour: Initial Management of the Very-Low-Birth-Weight Infant
- _____ Weiner GM, Zaichkin J, American Academy of Pediatrics, American Heart Association. *Textbook of Neonatal Resuscitation (NRP)*, 8th ed. Elk Grove Village, IL: American Academy of Pediatrics;2018.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Independent

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Prepares and uses equipment needed for a delivery resuscitation.	<ul style="list-style-type: none"> • Prepares needed equipment for delivery (term and preterm) <ul style="list-style-type: none"> – Radiant warmer, including temperature probe and Apgar timer – Suction, oximeter, and oxygen sources – Intubation supplies; includes checking resuscitation bag, T-piece – Neonatal resuscitation medications 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Follows Neonatal Resuscitation Program (NRP) recommendations to perform a neonatal delivery room resuscitation, with appropriate differences based on gestational age	<ul style="list-style-type: none"> • Cord clamping <ul style="list-style-type: none"> – Identifies inclusion and exclusion criteria for delayed cord clamping (DCC) – Verbalizes when cord milking may be preferred – Supports 30- to 60-s delay in access to infant in order to accomplish DCC, when indicated • Thermoregulation <ul style="list-style-type: none"> – Uses equipment to support delivery room thermoregulation appropriately. – Monitors for hyperthermia when resuscitation is extended, particularly if multiple types of heat are used – Identifies humidification as an aid to thermoregulation in very-low-birth-weight infants – Dries the infant, as indicated • Respiratory support <ul style="list-style-type: none"> – Positions and opens airway – Assesses for and acts on ventilatory needs • Free flow oxygen <ul style="list-style-type: none"> – Continuous positive airway pressure – Positive pressure ventilation with mask or via endotracheal tube – Assists with intubation as indicated – Uses pulse oximetry to determine need for supplemental oxygen • Cardiopulmonary support <ul style="list-style-type: none"> – Assesses for and reports signs of poor perfusion – Identifies expected treatment – Chest compressions: knows ratios and NRP techniques – Monitors for hypoglycemia within 30–60 min of delivery – Identifies risks of delayed initiation of maintenance fluids – Verbalizes and demonstrates developmental positioning during initial stabilization 			
Assigns Apgar score appropriately	<ul style="list-style-type: none"> • Assigns Apgar score reliably as compared to preceptor for three deliveries <ul style="list-style-type: none"> – Reviews Apgar score and interpretation – Explains when additional Apgar scores are needed 			
Describes indications for medications used during a neonatal resuscitation	<ul style="list-style-type: none"> • Identifies medications that may be administered • States appropriate dosage, route, indication 			
Completes an initial newborn exam	<ul style="list-style-type: none"> • Performs a newborn exam and interprets findings • Documents findings appropriately in infant’s clinical record 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Communicates effectively with members of the resuscitation team	<ul style="list-style-type: none"> • Uses closed-loop (crucial information read-back) communication • Uses hospital-recommended standardized format for handoff communication 			
Accurately documents delivery resuscitation	<ul style="list-style-type: none"> • Locates and completes delivery room documentation in the medical record 			
Provides family and caregiver education	<ul style="list-style-type: none"> • Promotes family presence and information sharing in delivery room and during stabilization • Assesses for knowledge deficits and barriers to learning • Describes care in the delivery room • Prepares the family for possible transfer to the neonatal intensive care nursery after delivery 			
* Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Hearing Screening

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To perform newborn hearing screening accurately in the NICU

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Hearing Screening

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Describes importance of early identification and intervention services for children with hearing loss	<ul style="list-style-type: none"> • Lists infants at risk for hearing loss in the newborn period 			
Provides family education about hearing screening	<ul style="list-style-type: none"> • Assesses barriers to learning and knowledge deficits • Explains hearing screening to family • Provides written information about newborn hearing screening • Explains hearing screening results • Provides written information about any necessary follow-up • Uses teach-back method to verify family understanding of education 			
Prepares the environment to perform hearing screening	<ul style="list-style-type: none"> • Ensures a quiet area with low ambient noise 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Performs hearing screening	<ul style="list-style-type: none"> • Demonstrates procedure: <ul style="list-style-type: none"> – Determines infant is in appropriate state for testing – Positions infant for screening – Places ear couplers and electrodes on infant – Operates auditory brainstem response equipment per the manufacturer’s recommendations – Troubleshoots problems – Removes and disposes of applicable screening items – Observes infection control policy (cleans equipment after use) 			
Documents screening results	<ul style="list-style-type: none"> • Documents hearing screening results per hospital protocol • Describes follow-up mechanism for infants who do not pass screening 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee’s Signature, Date: _____

Preceptor’s Signature, Date: _____

COMPETENCY: Hemodynamic Monitoring, Invasive

Departments Affected: _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure safe, consistent management of invasive hemodynamic monitoring catheters

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Arterial Puncture and Cannulation, Peripheral
- _____ Policy: Guidelines for Nursing Care
- _____ Procedure: Tachyarrhythmias, Management of
- _____ Procedure: Umbilical Arterial Catheters, Placement and Care of
- _____ Procedure: Umbilical Venous Catheters, Placement and Care of
- _____ Competency: Admission to the NICU
- _____ Gordon M, Bartruff L, Gordon S, Lofgren M, Widness JA. How fast is too fast? A practice change in umbilical arterial catheter blood sampling using the Iowa Model for Evidence-Based Practice. *Adv Neonatal Care*. 2008;8(4):198.
- _____ Bradshaw WT, Tanaka DT. Physiologic monitoring. In: Gardner SL, Carter BS, Hines ME, Hernandez JA, eds. *Merenstein & Gardner's Handbook of Neonatal Intensive Care*. 8th ed. St. Louis, MO: Elsevier; 2016:129-144.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates knowledge of safe use of invasive catheters for hemodynamic monitoring	<ul style="list-style-type: none"> • Follows hospital-recommended standard precautions and standardized vascular access protocols • Identifies complications regarding insertion and removal of the line • Identifies normal pressure values and waveforms • Identifies abnormal waveforms and verbalizes how to intervene • Identifies medications used for hemodynamic support and infant monitoring and precautions for these medications • Identifies medications and fluids contraindicated for use with catheters that may be used for hemodynamic monitoring 			
Demonstrates the ability to assist with insertion	<ul style="list-style-type: none"> • Gathers appropriate equipment • Developmentally prepares infant for the procedure (positioning and pain management) • Monitors the infant during the procedure 			
Demonstrates the ability to initiate invasive hemodynamic monitoring	<ul style="list-style-type: none"> • Gathers appropriate equipment • Flushes tubing and transducer • Connects tubing to catheter • Initiates continuous infusion • Levels transducer at the level of the heart • Calibrates transducer • Sets alarm limits according to parameters or orders 			
Demonstrates the ability to monitor, provide care, document, and troubleshoot hemodynamic catheters	<ul style="list-style-type: none"> • Performs ongoing assessment and documentation of infant's blood pressure • Performs ongoing assessment and documentation of perfusion distal to the insertion site • Assesses and documents catheter insertion length at the umbilicus • Maintains transducer at the level of the heart • Ensures line patency • Calibrates the transducer every shift or as indicated • Monitors and intervenes for air in the catheter, dislodgement, position of the transducer, dampened pressure tracing, pressure values out of range, and loss of pressure reading 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Hyperbilirubinemia, Care of the Infant with

Departments Affected: _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To demonstrate safe care of the infant receiving phototherapy

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Exchange Transfusion: Double Volume and Partial Volume
- _____ Policy: Hyperbilirubinemia
- _____ Bhutani V and the Committee on Fetus and Newborn. Phototherapy to prevent severe hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. *Pediatrics*. 2011;128:e1046-e1052.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
<p>Lists risk factors for the development of hyperbilirubinemia</p> <p>Describes signs and symptoms of hyperbilirubinemia</p>	<ul style="list-style-type: none"> • Identifies risk factors that may place neonates at risk for hyperbilirubinemia • Recognizes assessment criteria and abnormal laboratory values • Contrasts direct and indirect bilirubin and describes its implications for care • Demonstrates how to access and use hyperbilirubinemia guidelines for infants older than 34 weeks' gestation (http://bilitool.org/) 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Provides safe nursing care for neonates receiving phototherapy	<ul style="list-style-type: none"> • Describes the rationale for phototherapy • Safely implements amount of phototherapy prescribed <ul style="list-style-type: none"> – Checks irradiance of light every shift or according to unit policy • Identifies ideal temperature settings for incubators to prevent hyperthermia • Demonstrates the safe application of eye patches • Describes appropriate nursing care: <ul style="list-style-type: none"> – Frequency of vital sign monitoring – Thermal management – Fluid maintenance – Feeding – Laboratory monitoring – Skin care – Patient safety 			
Recognizes learning needs of the family related to hyperbilirubinemia and possible complications	<ul style="list-style-type: none"> • Facilitates interventions to support infant/family bonding • Identifies discharge needs of the family including: <ul style="list-style-type: none"> – Home care of the infant – Possible complications – Importance of frequent feedings – Hydration assessment • Uses educational resources to improve parental understanding 			

*Performance ratings: S = satisfactory; US = unsatisfactory.

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Hypothermia Therapy

Departments Affected: _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
 - Completion within 90 days
 - Completion within 6 months
 - Specialty competency
-

Objective: To provide therapy for moderate or severe hypoxic ischemic encephalopathy

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Hypothermia, Induced
- _____ Ibrani D, Molacavage S. The six-hour window: how the community hospital nursery can optimize outcomes of the infant with suspected hypoxic-ischemic encephalopathy. *Neonatal Netw.* 2018;37(3):155-163.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.
-

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates setup and management of cooling equipment	<ul style="list-style-type: none"> • Describes the infant population for which this therapy is used • Prepares the cooling unit for infant use • Prepares infants for cooling by placing an esophageal or rectal temperature probe • Initiates cooling per manufacturer's directions and physician orders 			
Describes care of infants receiving cooling therapy	<ul style="list-style-type: none"> • Explains potential changes to infant's vital signs and possible side effects during cooling 			
Demonstrates the manner in which infants are rewarmed at the end of therapy	<ul style="list-style-type: none"> • Demonstrates the manner in which the cooling unit is set to slowly rewarm the infant • Explains potential changes to vital signs and possible side effects after cooling therapy has finished 			
Describes post-therapy equipment care	<ul style="list-style-type: none"> • Describes the manner in which cooling blankets are drained and the cooling unit is stored 			
Provides for family/caregiver education	<ul style="list-style-type: none"> • Explains therapy to the family/caregiver • Assesses for knowledge deficits and barriers to learning 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Infusion Therapy

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure safe, competent, and standardized care for neonates requiring infusion therapy

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Infection Prevention
- _____ Procedure: Infusion Therapy
- _____ Pettit J. Assessment of the infant with a peripheral intravenous device. *Adv Neonatal Care*. 2003;3(5):230-240.
- _____ Furdon SA, Hogan MJ, Bradshaw WT, Clark DA. Nurses' Guide to early detection of umbilical arterial catheter complications in infants. *Adv Neonatal Care*. 2006;6(5):242-256.
- _____ Bradshaw WT, Furdon SA. A nurse's guide to early detection of umbilical venous catheter complications in infants. *Adv Neonatal Care*. 2006;6(3):127-138.
- _____ Pettit J. Assessment of infants with peripherally inserted central catheters: part 1. Detecting the most frequently occurring complications. *Adv Neonatal Care*. 2002;2(6):304-315.
- _____ Pettit J. Assessment of infants with peripherally inserted central catheters: part 2. Detecting less frequently occurring complications. *Adv Neonatal Care*. 2003;3(1):14-26.
- _____ NANN Board of Directors, eds. Medication Safety in the Neonatal Intensive Care Unit Position Statement #3060. Chicago, IL: National Association of Neonatal Nurses; 2014.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates safety and environmental considerations related to infusion therapy in the neonatal and pediatric population	<ul style="list-style-type: none"> • Demonstrates vascular access device planning and appropriate site selection • Demonstrates proper: <ul style="list-style-type: none"> – Insertion procedures – Use of specialized infusion-related equipment • Recognizes physiologic characteristics and effects related to: <ul style="list-style-type: none"> – Dosage and volume limitations with reference to age, height, weight, or body surface area • Recognizes pharmacologic: <ul style="list-style-type: none"> – Actions – Interactions – Side effects – Adverse effects – Monitoring parameters – Response to infusion therapy 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates initiation and maintenance of infusion therapy within the scope of practice and in accordance with hospital policy	<ul style="list-style-type: none"> • Uses medication safety interventions: <ul style="list-style-type: none"> – The “six rights of drug administration” – Appropriate dosage calculations and independent double-check verification – Verifies verbal orders by reading back the complete order – Uses available drug references to verify compatibility with other infusates – Standardized drug concentrations 			
	<ul style="list-style-type: none"> • Executes the established principles of medication administration: <ul style="list-style-type: none"> – Obtains an independent double-check by a second physician when administering high-risk medications – Consistently flushes thoroughly before and after medication administration when indicated – Ensures medication is compatible with other infusates 			
	<ul style="list-style-type: none"> • Assembles and changes administration sets using aseptic or sterile technique • Disinfects needleless access devices and allows adequate drying time • Maintains aseptic technique during medication administration and blood sampling • Uses sterile technique during dressing changes 			
	<ul style="list-style-type: none"> • Verifies that the infusion pump is programmed for the correct dosage, at the correct rate and volume to be infused • Obtains an independent double-check of infusion pump settings by a second physician when infusing high-risk medications 			
	<ul style="list-style-type: none"> • Demonstrates how to assess and maintain vascular access devices • Monitors the infant and infusion according to hospital policy 			
	Provides family and caregiver education	<ul style="list-style-type: none"> • Assesses for knowledge deficits and barriers to learning • Discusses the benefits, management, and potential risks of infusion therapy • Educates about the potential impact and risks and benefits of medications • Documents family and caregiver education 		

*Performance ratings: S = satisfactory; US = unsatisfactory.

Employee’s Signature, Date: _____

Preceptor’s Signature, Date: _____

COMPETENCY: Nasal Continuous Positive Airway Pressure

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To optimize care of infants on nasal continuous positive airway pressure (NCPAP)

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Noninvasive Ventilation, Nursing Care

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Explains the rationale and care for NCPAP	<ul style="list-style-type: none"> • Understands that NCPAP inflates the lungs, allowing alveolar gas exchange by maintaining functional residual capacity of the lungs 			
Identifies the appropriate product for delivery of NCPAP	<ul style="list-style-type: none"> • Recognizes the different unit-specific NCPAP devices • Demonstrates how to apply the devices 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Safely administers NCPAP	<ul style="list-style-type: none"> • Obtains an order from a physician or allied health professional (AHP) for the institution of NCPAP • Recognizes monitored values on the ventilator • Adjusts the FiO₂ on the ventilator as needed • Understands ventilator alarm values, the responsibilities of both the registered nurse and respiratory therapist, and the interventions that are appropriate for each discipline • Recognizes and is able to expel excess water in the tubing • Recognizes accepted temperature ranges for ventilators • Recognizes what a prong break entails and is able to safely care for infants during such breaks • Understands the need for the prongs to float in the nares and is able to implement strategies to maintain ideal prong position 			
Provides maintenance of NCPAP	<ul style="list-style-type: none"> • Works collaboratively with the respiratory therapist to establish and maintain NCPAP • Applies an appropriate skin protectant product under the prongs • Understands the use of the otoscope to check the inner nares for breakdown • Understands the rationale for and demonstrates the ability to place and maintain an orogastric (OG) tube • Applies an appropriate skin protectant product to the upper lip to stabilize the OG tube • Works collaboratively with the respiratory therapist to use the NCPAP checklist to optimize infant care 			
Assesses for pain per protocol	<ul style="list-style-type: none"> • Uses an appropriate pain-scoring tool to evaluate, record, and relieve pain associated with NCPAP 			
Assesses infants for skin integrity while on NCPAP	<ul style="list-style-type: none"> • Understands skin irritation signs • Initiates care to decrease and alleviate nare breakdown 			
Recognizes respiratory symptoms of compromise that necessitate calling a physician or AHP	<ul style="list-style-type: none"> • Understands vital signs that are outside defined limits • Understands the need to notify the physician or AHP when nasal secretions are bloody or not within defined limits 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Neonatal Opioid Withdrawal, Assessment for

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure consistent, accurate scoring for neonatal opioid withdrawal syndrome

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Neonatal Opioid Withdrawal Syndrome
- _____ Casper T, Arbour M. Evidence-based nurse-driven interventions for the care of newborns with neonatal abstinence syndrome. *Adv Neonatal Care*. 2014;14(6):376-380.
- _____ Maguire D. Care of the infant with neonatal abstinence syndrome: strength of the evidence. *J Perinat Neonatal Nurs*. 2014;28(3):204-211.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Assesses infant for signs of withdrawal	<ul style="list-style-type: none"> • Recognizes infant at risk for withdrawal • Positive maternal or infant toxicology screen • Presence of withdrawal symptoms <ul style="list-style-type: none"> – Neurologic excitability – Gastrointestinal dysfunction – Autonomic signs 			
Scores withdrawal signs using tool	<ul style="list-style-type: none"> • Demonstrates ability to score withdrawal signs with at least 90% reliability 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Recognizes need for appropriate intervention for withdrawal symptoms	<ul style="list-style-type: none"> • Implements nonpharmacologic interventions once risk for withdrawal is identified, including: <ul style="list-style-type: none"> – Nonnutritive sucking – Rocking – Holding – Skin-to-skin care – Decreased environmental stimuli – Swaddling • Reports increasing signs of withdrawal • Implements pharmacologic treatment as ordered • Continues to evaluate signs of withdrawal after implementation of pharmacologic treatment at appropriate intervals 			
Provides parental and family education	<ul style="list-style-type: none"> • Symptoms of withdrawal • Nonpharmacologic management • Indications and dosing of medications to treat withdrawal, as appropriate 			

*Performance ratings: S = satisfactory; US = unsatisfactory.

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Ostomy Care

Departments Affected: Level II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To safely care for neonates with an ostomy

Required: Didactic instruction Pretest Posttest Module N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Ostomy Care

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Describes location and function of the ostomy, type of stoma, and expected output	<ul style="list-style-type: none"> • Describes <ul style="list-style-type: none"> – Colostomy – Ileostomy – Urostomy or vesicostomy – Mucous fistula 			
Performs a systemic assessment related to the ostomy	<ul style="list-style-type: none"> • Performs and documents: <ul style="list-style-type: none"> – Skin assessment – Gastrointestinal assessment – Nutritional assessment – Hydration status every shift and as needed 			
Demonstrates care of the stoma and surrounding skin and is able to change the appliance	<ul style="list-style-type: none"> • Empties pouch of stool, urine, and air • Removes old appliance, inspects for leakage, and discards old appliance • Cleans and assesses skin and stoma to maintain skin integrity • Applies appropriate skin prep and protective skin barrier • Assesses, measures, and applies proper fit of appliance • Implements odor control measures as indicated • Records output • Reports abnormal findings to provider 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates care of a mucous fistula per ostomy policy and procedure	<ul style="list-style-type: none"> • Removes appliance or gauze • Cleans and assesses skin and fistula • Applies appliance, if indicated, or Vaseline-coated gauze 			
Teaches infants and families about the ostomy according to teaching protocols, checklist, and infant care guidelines	<ul style="list-style-type: none"> • Assesses readiness to learn and learning barriers • Determines teaching schedule with family • Distributes teaching handouts to family before teaching sessions • Assesses family's knowledge and confidence in ostomy care • Identifies the need for an ostomy nurse consult 			
Documentation	<ul style="list-style-type: none"> • Documents care, interventions, and family teaching 			
* Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Perioperative Care in the Neonatal Patient

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure safe, appropriate care of the perioperative infant

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Perioperative Care
- _____ The Joint Commission 2018 National Patient Safety Goals. https://www.jointcommission.org/assets/1/6/2018_HAP_NPSG_goals_final.pdf
- _____ Bucher BT, Pacetti AS, Lovvorn HN, Carter BR. Neonatal surgery. In: Gardner SL, Carter BS, Enzman-Hines M, Hernandez JA. *Merenstein & Gardner's Handbook of Neonatal Intensive Care*. St. Louis, MO: Elsevier; 2016:786–819.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Verbalize priority goals for the perioperative infant	<ul style="list-style-type: none"> • Priority goals <ul style="list-style-type: none"> – Infection prevention – Pain management – Achievement of age-appropriate health status – Provision of family-centered care 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Discuss preparation of the operative neonate	<ul style="list-style-type: none"> • Completes preoperative checklist per hospital policy • Preparation for in-NICU surgery <ul style="list-style-type: none"> – Clears area, uses signage as per hospital policy – Maintains sterile field and surrounding area – Monitors infant temperature and vital signs using electronic monitoring during surgery as per hospital policy • Preparation for operating room surgery <ul style="list-style-type: none"> – Calls for increase in room temperature as necessary – Prepares infant safely for transport to the operating room 			
Verbalizes or demonstrates ability to stabilize infant with need for surgical intervention	<ul style="list-style-type: none"> • Performs physical assessment with focus on defect or need for surgery • Ensures gastric decompression is effective as indicated • Ensures fluid is infusing with patent intravenous line • Places urinary catheter as indicated • Administers medications as ordered • Performs specific interventions as needed for defects such as <ul style="list-style-type: none"> – Gastroschisis – Myelomeningocele 			
Demonstrates postoperative monitoring	<ul style="list-style-type: none"> • Performs vital signs every 15 min for 1 hr, every 30 min for 1 hr, and hourly until stable • Notifies physician or allied health professional of changes in vital signs • Provides pain assessment and management during recovery phase and postoperatively • Ensures developmental support in postoperative phase 			
Performs or verbalizes appropriate documentation	<ul style="list-style-type: none"> • Completes documentation per hospital or unit protocol 			

*Performance ratings: S = satisfactory; US = unsatisfactory.

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Peritoneal Dialysis

Departments Affected: Level III and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To provide care for neonates requiring manual exchanges with a peritoneal dialysis catheter

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Peritoneal Dialysis
- _____ Cadnapaphornchai MA, Schoenbein MB, Woloschuk R, Soranno DE, Hernandez JA. Neonatal nephrology. In: Gardner SL, Carter BS, Hines ME, Hernandez JA, eds. *Merenstein & Gardner's Handbook of Neonatal Intensive Care*. 8th ed. St. Louis, MO: Elsevier; 2016:689-726.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Prepares the neonate for peritoneal dialysis catheter placement	<ul style="list-style-type: none"> • Provides preoperative or preprocedure care as indicated • Ensures bladder is drained and stomach decompressed before placement 			
Initiates exchange cycles as ordered	<ul style="list-style-type: none"> • Performs hand hygiene using combined method • Warms dialysate with regulated warming device • Uses mask, sterile field, and sterile gloves to aseptically prepare and connect tubing • Performs flush as ordered • Performs exchange with attention to fill volume, fill time, dwell time, and drain time • Documents volume in and out, net per hour, net per course, and general intake and output 			
Performs tubing change without contamination	<ul style="list-style-type: none"> • Performs hand hygiene using combined method • Uses mask, sterile field, and sterile gloves to aseptically prepare and change tubing 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Performs acute and chronic site care	<ul style="list-style-type: none"> • Assesses exit site for drainage or leakage and signs of infection • Performs acute site care until site healed per procedure • Performs chronic site care daily after healed per procedure and specific order • Immobilizes catheter to reduce trauma and contamination 			
Monitors for complications and takes appropriate action	<ul style="list-style-type: none"> • Assesses for potential complications and reports • Troubleshoots and reports if instilled volume exceeds drained volume or if difficulty retrieving fluid occurs • Reports if dialysate turns cloudy or fibrin is present • Troubleshoots when difficulty occurs with inflow • Identifies and reports when potential contamination occurs and anticipates actions, including possible replacement of transfer set 			
Monitors tolerance of peritoneal dialysis exchanges	<ul style="list-style-type: none"> • Monitors labs as ordered • Monitors weight, routinely measured after draining • Monitors fluid balance and signs of fluid overload or dehydration • Monitors for respiratory compromise 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Physical Exam

Departments Affected: _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure that a complete physical examination of the neonate is performed

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Guidelines for Nursing Care
- _____ Competency: Admission to the NICU
- _____ Benjamin K, Furdon SA. Physical assessment. In: Verklan MT, Walden M, eds. *Core Curriculum for Neonatal Intensive Care Nursing*. 5th ed. St. Louis, MO: Saunders/Elsevier; 2015:110-145.
- _____ Gardner SL, Hernandez JA. Initial nursery care. In: Gardner SL, Carter BS, Hines ME, Hernandez JA, eds. *Merenstein & Gardner's Handbook of Neonatal Intensive Care*. 8th ed. St. Louis, MO: Elsevier; 2016:71-104.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Reviews the perinatal history to determine significant factors that may affect neonatal health	<ul style="list-style-type: none"> • Identifies antepartum and intrapartum risk factors • Identifies neonatal risk factors occurring in the delivery room and during transition 			
Describes elements of a physical exam	<ul style="list-style-type: none"> • Describes elements of a physical exam: observation, auscultation, palpation, inspection, percussion, and use of transillumination • Demonstrates use of these techniques during a physical assessment 			
Demonstrates the ability to perform a gestational age assessment	<ul style="list-style-type: none"> • Completes neurologic and maturational assessment • Reports abnormal assessments • Documents assessment 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates the ability to perform a neonatal growth assessment	<ul style="list-style-type: none"> • Completes neonatal growth assessment to identify infants as small for gestational age, appropriate for gestational age, or large for gestational age • Reports abnormal assessments • Identifies abnormalities necessitating immediate or long-term follow-up 			
Demonstrates the ability to perform initial and ongoing systematic assessments	<ul style="list-style-type: none"> • Reviews the perinatal history for clues to potential pathology • Elicits the basics of physical assessment • Performs a complete head-to-toe physical assessment using physical exam principles 			
Provides for family and caregiver education	<ul style="list-style-type: none"> • Explains the physical assessment to the family or caregiver • Assesses for knowledge deficits and barriers to learning 			
<i>*Performance ratings: S = satisfactory; US = unsatisfactory.</i>				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: PICC Insertion

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure a safe, competent, and standardized process for the insertion of peripherally inserted central catheters

Required: Didactic instruction Pretest Posttest Observation N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Infection Prevention
- _____ Procedure: Infusion Therapy
- _____ Procedure: Peripherally Inserted Central Catheters, Insertion of
- _____ Wyckoff MM, Sharpe EL. *Peripherally Inserted Central Catheters: Guideline for Practice*. 3rd ed. Chicago, IL: National Association of Neonatal Nurses; 2015.
- _____ McCay AS, Elliott EC, Walden M. PICC placement in the neonate. *N Engl J Med*. 2014;370:e17. doi:10.1056/NEJMvcm1101914. <https://www.nejm.org/doi/full/10.1056/NEJMvcm1101914>

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Conduct a preprocedure verification	<ul style="list-style-type: none"> • Verifies provider order for peripherally inserted central catheter (PICC) insertion • Verifies signed informed consent 			
Assesses and selects an appropriate site for PICC insertion	<ul style="list-style-type: none"> • Verbalizes the most common sites for insertion • Verbalizes the commonly preferred approach for insertion • Assesses veins for size, path, shape, and refill • Describes imaging devices that can facilitate visualization of veins 			
Accurately obtains catheter measurement	<ul style="list-style-type: none"> • Identifies upper extremity landmarks • Identifies lower extremity landmarks • Identifies external jugular vein landmarks 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Provides safe and appropriate pain management according to hospital policy	<ul style="list-style-type: none"> • Identifies appropriate pain management and comfort measures for insertion • Implements pain management measures • Waits the recommended time for peak effectiveness of measures 			
Developmentally positions the infant for insertion	<ul style="list-style-type: none"> • Determines the level of developmental support needed for the procedure • Developmentally positions the infant for easy access to the identified insertion site 			
Provides a thermoneutral environment	<ul style="list-style-type: none"> • Incorporates measures to maintain a thermoneutral environment 			
Incorporates infection prevention and control measures according to hospital policy	<ul style="list-style-type: none"> • Cleanses work surface with approved disinfectant and allows to dry • Performs appropriate hand hygiene before the procedure • Dons appropriate personal protective equipment • Doffs personal protective equipment after the procedure • Performs appropriate hand hygiene after the procedure 			
Obtains necessary supplies for PICC insertion	<ul style="list-style-type: none"> • Ensures that appropriate monitoring equipment and alarm limits are set according to hospital policy • Obtains necessary supplies and equipment for PICC insertion 			
Prepares and maintains a sterile field during insertion according to hospital policy	<ul style="list-style-type: none"> • Sets up procedural tray using sterile technique • Uses a standardized insertion checklist 			
Executes Universal Protocol according to hospital policy	<ul style="list-style-type: none"> • Verifies the infant's identity using at least two identifiers • Ensures documentation of the Universal Protocol 			
Successfully cannulates and advances PICC to the central circulation	<ul style="list-style-type: none"> • Follows manufacturer's recommendations for altering catheter length • Maintains the introducer at the appropriate angle for insertion • Threads the catheter incrementally to premeasured length • Performs appropriate techniques if the catheter cannot be advanced • Identifies catheter tip placement on radiograph • Demonstrates stabilization of the catheter dressing 			
Documents PICC attempt or insertion	<ul style="list-style-type: none"> • Documents the procedure and placement according to hospital policy 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Provides family and caregiver education	<ul style="list-style-type: none"> • Assesses for knowledge deficits and barriers to learning • Educates regarding measures to prevent central line-associated bloodstream infections, including the importance of hand hygiene • Documents family and caregiver education 			
<i>*Performance ratings: S = satisfactory; US = unsatisfactory.</i>				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Postmortem Care

Departments Affected: _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To understand and complete postmortem care of neonates

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Palliative Care
- _____ Gardner SL, Carter BS. Grief and perinatal loss. In: Gardner SL, Carter BS, Enzman-Hines M, Hernandez JA, eds. *Merenstein & Gardner's Handbook of Neonatal Intensive Care*. 8th ed. St. Louis, MO: Mosby Elsevier; 2015:865-902.
- _____ Gardner SL, Voos K, Hills P. Families in crisis: theoretical and practical considerations. In: Gardner SL, Carter BS, Enzman-Hines M, Hernandez JA, eds. *Merenstein & Gardner's Handbook of Neonatal Intensive Care*. 8th ed. St. Louis, MO: Mosby Elsevier; 2016:821-864.
- _____ Swaney, JR, English N, Carter BS. Ethics, values, and palliative care in neonatal intensive care. In: Gardner SL, Carter BS, Enzman-Hines M, Hernandez JA, eds. *Merenstein & Gardner's Handbook of Neonatal Intensive Care*. 8th ed. St. Louis, MO: Mosby Elsevier; 2016:924-945.
- _____ American Heart Association; American Academy of Pediatrics. *Textbook of Neonatal Resuscitation*. 7th ed. Elk Grove Village, IL: The Academy; 2016.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates knowledge of postmortem care for neonates	<ul style="list-style-type: none"> • Verbalizes an understanding of neonatal postmortem care • Locates forms to be completed • Verbalizes an understanding of the cultural needs of families 			
Provides support to families	<ul style="list-style-type: none"> • Verbalizes or demonstrates: <ul style="list-style-type: none"> – Resources and information available to the family – Explaining the process to the family – Providing families with a bereavement packet and any remembrances (e.g., lock of hair, footprints, photographs) – Encouraging religious and cultural practices – Ensuring support personnel are present as needed (e.g., social worker, chaplain) 			
Arranges for disposition of neonates to the morgue	<ul style="list-style-type: none"> • Verbalizes or demonstrates: <ul style="list-style-type: none"> – Procedure for disposition – Preparation of the body per hospital policy and cultural practices of family as appropriate 			
Documentation	<ul style="list-style-type: none"> • Documents postmortem care, family interventions, and disposition of body 			
<i>*Performance ratings: S = satisfactory; US = unsatisfactory.</i>				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Respiratory Management

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure safe, competent care for infants in respiratory distress

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Chest Tube Management
- _____ Procedure: Noninvasive Ventilation, Nursing Care
- _____ Policy: Oxygen Administration for the Neonate
- _____ Procedure: Suctioning: Oral, Nasal, or Pharyngeal
- _____ Procedure: Suctioning the Mechanically Ventilated Infant
- _____ American Heart Association; American Academy of Pediatrics. *Textbook of Neonatal Resuscitation*. 7th ed. Elk Grove Village, IL: The Academy; 2016.
- _____ Fraser D. Respiratory distress. In: Verklan MT, Walden M, eds. *Core Curriculum for Neonatal Intensive Care Nursing*. 5th ed. St. Louis, MO: Saunders/Elsevier; 2015:447-477.
- _____ Fraser D, Diehl-Jones W. Assisted ventilation. In: Verklan MT, Walden M, eds. *Core Curriculum for Neonatal Intensive Care Nursing*. 5th ed. St. Louis, MO: Saunders/Elsevier; 2015:487-511.
- _____ Gardner SL, Enzman-Hines M, Dickey LA, Nyp M. Respiratory diseases. In: Gardner SL, Carter BS, Enzman-Hines M, Hernandez JA, eds. *Merenstein & Gardner's Handbook of Neonatal Intensive Care*. 8th ed. St. Louis, MO: Mosby; 2016:565-643.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Independent

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
All Registered Nurses				
Performs an age-specific respiratory assessment	<ul style="list-style-type: none"> • Auscultates and documents lung sounds and differentiates between normal and abnormal breath sounds • Identifies age-specific signs of respiratory distress such as nasal flaring, skin color change, retractions, stridor, grunting, and increased work of breathing 			
Demonstrates knowledge of common neonatal respiratory diseases and the standard treatment plan	<ul style="list-style-type: none"> • Describes pathophysiology • Implements isolation protocols as required • Identifies common medications prescribed and their dosages and side effects 			
Documents and administers appropriate oxygen delivery	<ul style="list-style-type: none"> • Possesses the ability to set up and explain the indications for nasal cannula, hood, and continuous positive airway pressure • Demonstrates proper fit and use of bag-mask ventilation equipment and T-piece resuscitator 			
Monitors oxygenation and ventilation with appropriate equipment	<ul style="list-style-type: none"> • Understands the rationale and normal parameters for the infant's gestational age and diagnosis • Sets alarms and troubleshoots equipment 			
Recognizes signs and symptoms of hypoxia, hypoventilation, and obstruction	<ul style="list-style-type: none"> • Identifies risk factors for hypoxia, hypoventilation, and obstruction • Implements interventions to correct problems 			
Identifies infants at risk for pulmonary complications	<ul style="list-style-type: none"> • Implements preventive nursing interventions such as positioning, intake, and output 			
Identifies normal and abnormal venous and arterial blood gases	<ul style="list-style-type: none"> • Demonstrates handling of blood gas specimens • Interprets blood gas results • Identifies needed interventions 			
Safely demonstrates suctioning of tracheostomy and nasopharyngeal or oropharyngeal airways	<ul style="list-style-type: none"> • Identifies appropriate equipment as needed, indications for suctioning, and infant preparation technique and measures the length of catheter insertion • Assesses and documents effects of interventions 			
Teaches family members signs and symptoms of respiratory distress, appropriate interventions, and adjunct equipment use	<ul style="list-style-type: none"> • Discusses age-appropriate symptoms • Explains functions of equipment used, such as pulse oximetry and the endotracheal tube • Appropriately documents teaching 			
Identifies common medications administered and associated method and side effects	<ul style="list-style-type: none"> • Accesses pertinent drug information from unit sources 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Possesses knowledge of oxygen for neonates	<ul style="list-style-type: none"> • Demonstrates adjusting fraction of inspired oxygen on the oxygen blender • Demonstrates ability to respond to hypoxic and hyperoxic episodes 			
Identifies potential skin integrity problems associated with supplemental oxygen equipment	<ul style="list-style-type: none"> • Uses proper skin care products to prevent skin breakdown 			
Demonstrates knowledge of the T-piece resuscitation module in the delivery room	<ul style="list-style-type: none"> • Demonstrates setup of T-piece resuscitator • Demonstrates use of T-piece resuscitator to provide continuous positive airway pressure and positive-pressure ventilation via face mask and endotracheal tube 			
Recognizes clinical indications for intubation	<ul style="list-style-type: none"> • Identifies neurologic, cardiac, and respiratory indicators for intubation • Describes modes of ventilation volume and pressure, high-frequency ventilation, and continuous positive airway pressure 			
Possesses the ability to assist with intubation	<ul style="list-style-type: none"> • Locates necessary equipment • Identifies potential medications to be used for the procedure • Identifies potential complications resulting from the procedure 			
Possesses the ability to assist with extubation and provide postextubation care	<ul style="list-style-type: none"> • Describes indications for extubation • Prepares for postextubation positioning and medications • Assesses the need for reintubation 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Sedation

Departments Affected: _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure safe administration of sedation

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Policy: Sedation and Analgesia
- _____ Coté CJ, Wilson S; American Academy of Pediatrics, American Academy of Pediatric Dentistry. Guidelines for monitoring and management of pediatric patients before, during, and after sedation for diagnostic and therapeutic procedures: update 2016. *Pediatrics*. 2016;138(1):e20161212.

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Basic Sedation Care				
Defines and distinguishes between levels of sedation	<ul style="list-style-type: none"> • Defines: <ul style="list-style-type: none"> – Minimal sedation – Moderate sedation – Deep sedation – Anesthesia 			
Describes the elements needed for sedation	<ul style="list-style-type: none"> • Indicates need for informed consent and sedation-qualified staff • Discusses sedation guidelines and regulation requirements 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Advanced Sedation Care				
Lists procedures necessitating moderate sedation	<ul style="list-style-type: none"> • Central lines • Computed tomography • Magnetic resonance imaging 			
Discusses agents used during moderate sedation in neonates, including dosage, contraindications, and potential side effects	<ul style="list-style-type: none"> • Fentanyl • Narcan • Ativan • Valium 			
Describes airway needs during neonatal sedation	<ul style="list-style-type: none"> • Describes use of sedation scoring to estimate respiratory care needs • Describes sedation scoring assessed before and after sedation 			
Performs the common techniques of airway management in neonatal sedation and describes situations when care should be escalated	<ul style="list-style-type: none"> • Demonstrates: <ul style="list-style-type: none"> – Setup of bag and mask – Emergency cart setup – Use of T-piece and intubation • Describes escalation scenarios 			
Applies necessary equipment and appropriately interprets monitoring equipment	<ul style="list-style-type: none"> • Intravenous equipment (pumps, fluids, syringes, flushes) • Cardiorespiratory monitor • Pulse oximetry and other hemodynamic monitoring • Explains neonatal values in relation to gestational age and diagnosis 			
Describes conditions that may alter the infant's response to sedation	<ul style="list-style-type: none"> • Abnormalities of major organ systems • Previous adverse experience with sedation, analgesia, or anesthesia • Time and nature of last oral intake 			
Demonstrates assessment, data collection, and documentation	<ul style="list-style-type: none"> • Verifies completed history and physical per sedation guidelines • Verifies nothing-by-mouth status • Confirms two forms of identification and allergy status • Verifies that the ordering provider is sedation-credentialed • Confirms that informed consent is obtained and documented • Confirms required scoring is assessed by the provider before the procedure and is documented • Demonstrates assessments before, during, and after the procedure per sedation policy for neonates • Conducts Universal Protocol just before the procedure • Identifies reversal agents • Documents sedation in the medical record 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Advanced Sedation Care (cont.)				
Describes interventions when sedation-related complications arise	<ul style="list-style-type: none"> • Supports airway, breathing, and circulation • Demonstrates use of resuscitation equipment and emergency cart • Immediately reports significant hemodynamic changes to the care provider • Administers emergency and reversal agents as necessary 			
Identifies and intervenes to meet the educational needs of families and infants	<ul style="list-style-type: none"> • Explains the process and procedure • Reviews sedation medications and potential side effects • Accesses pertinent family educational materials • Documents teaching and response 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____

COMPETENCY: Urinary Catheterization

Departments Affected: Level I, II, III, and IV Nurseries _____

Name of Employee: _____ Unit: _____

Position Title: _____ Date of Hire: _____

PRIORITY CODE

- Initial competency (must be completed at orientation)
- Completion within 90 days
- Completion within 6 months
- Specialty competency

Objective: To ensure a safe, competent, and standardized process for the insertion of urinary catheters

Required: Didactic instruction Pretest Posttest N/A

Required Reading (Employee: Initial item when reading has been completed.)

- _____ Procedure: Urinary Catheterization
- _____ Policy: Infection Prevention
- _____ Bailey T. Common invasive procedures. In: Verklan MT, Walden M, eds. *Core Curriculum for Neonatal Intensive Care Nursing*. 5th ed. St. Louis, MO: Elsevier/Saunders; 2015:309-311.
- _____ The Association for Professionals in Infection Control and Epidemiology (APIC). Preventing Catheter-Associated Urinary Tract Infections in Children. https://apic.org/Resource_/EliminationGuideForm/439ded66-00bf-4a86-b764-0ac9938b0468/File/APIC_CAUTI_IG_FIN_REVD0815.PDF

Self-Assessment (Employee: Check appropriate box.)

- I can perform this skill without supervision. I need supervision while performing this skill.
- I need assistance while performing this skill. I am unable to perform this skill.

VALIDATION OF DEMONSTRATED SKILL

- Simulation Case study Clinical practice

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates the ability to incorporate infection prevention and control measures	<ul style="list-style-type: none"> • Performs appropriate hand hygiene before each patient contact • Dons appropriate personal protective equipment before patient contact • Doffs personal protective equipment after patient contact • Performs appropriate hand hygiene after each patient contact 			
Demonstrates the ability to execute the newborn identification verification process according to hospital policy	<ul style="list-style-type: none"> • Verifies provider order • Verifies infant using two patient identifiers 			

Task	Required Elements	Performance Rating*	Remediation Plan	Preceptor Initials and Date
Demonstrates the ability to developmentally position the infant for the procedure	<ul style="list-style-type: none"> • Ensures infant has not voided within the last hour • Immobilizes the infant's extremities using developmental principles • Provides pain and comfort care measures 			
Demonstrates the ability to initiate and maintain a sterile field for the procedure	<ul style="list-style-type: none"> • Obtains necessary supplies for urinary catheterization • Sets up sterile field • Appropriately preps the genitalia • Appropriately inserts the catheter 			
Demonstrates the ability to appropriately collect urine specimen according to hospital policy	<ul style="list-style-type: none"> • Obtains ordered laboratory specimens using sterile technique • Identifies and labels specimen • Documents specimen collection 			
Demonstrates the ability to initiate indwelling closed drainage system	<ul style="list-style-type: none"> • Secures the catheter for female and male infants • Aseptically connects catheter to sterile closed drainage system • Gently removes antiseptic solution • Documents infant's tolerance to procedure and urinary output 			
Demonstrates the ability to safely discontinue urinary catheter	<ul style="list-style-type: none"> • Allows urine to cease flowing • Gently withdraws catheter • Documents patient's tolerance to procedure. 			
Demonstrates the ability to developmentally reposition the infant after the procedure	<ul style="list-style-type: none"> • Changes the infant's diaper • Developmentally repositions the infant 			
Provides for family and caregiver education	<ul style="list-style-type: none"> • Assesses for knowledge deficits and barriers to learning • Provides information about the benefits, management, and potential risks of urinary catheters • Educates about measures to prevent catheter-associated urinary tract infections, including the importance of hand hygiene • Documents family and caregiver education 			
*Performance ratings: S = satisfactory; US = unsatisfactory.				

Employee's Signature, Date: _____

Preceptor's Signature, Date: _____