

NICU Goals and Objectives 3rd & 4th Year Residents

Faculty:

Dianne Albrecht, MD
Brian Barkemeyer, MD
Marlene Buis, MD
Sheila Gottschalk, MD
Jocelyn Leung, MD
Staci Olister, MD
Duna Penn, MD
Dana Rivera, MD
Claudia Schuth, MD
Neva Seago, MD
Malektaj Yazdani, MD
Judy Zatarain, MD

Introduction:

Despite an increasing emphasis on the house officer's ability to manage disease that does not require intensive care, participation in the care of severely ill infants remains a critical part of well-rounded training. The following is meant to be used as a guideline representative of areas which, at the conclusion of residency, the house officer should be familiar with and be able to manage to the point where subspecialty intensive care becomes necessary.

Some of this material will not be taught on the neonatal service, but may be incorporated into areas of the training program, e.g. clinics, subspecialty rotations, grand rounds and lectures. House officers should be aware of the variety of subjects they are responsible for and keep track of those areas to which they have not been exposed. These areas will need to be covered by self-study.

Goals:

At the conclusion of the Third or Fourth year of residency, a house officer should be able to:

- A. Recognize, stabilize and initiate management of an infant needing transfer to a secondary or tertiary facility with a hospital-based neonatal subspecialist.
- B. Recognize and manage diseases of the newborn that do not require tertiary level or subspecialty care.
- C. Understand how to directly manage or coordinate the care of neonates discharged back to the community with chronic diseases that began in the newborn period.
- D. Understand how to utilize information derived from the maternal history, gestation, labor and delivery to anticipate and aid in the management of the infant.
- E. Appreciate the critical reasoning and decision-making processes involved in issues of newborn management.

Competency Tools: Multiple choice quiz, a review of a topic or literature, daily interactions/rounds/questions and documentation of procedures.

Learning Objectives and Curriculum Content:

Toward these goals, the following specific goals and objectives are set forth to be used as a guideline for house officers during the neonatology rotation.

- A. GOAL – Perinatal Prevention
Understand the pediatrician's role in reducing morbidity in high risk pregnancies and complications of childbirth.

OBJECTIVES:

- a. Discuss how the pediatrician can advocate for strategies to reduce fetal and neonatal mortality in his/her own community.
- b. Describe general principles about:
 1. Basic vital statistics that apply to newborns (neonatal and perinatal mortality, etc.)
 2. Perinatal services available in one's region
 3. Tests commonly used by obstetricians to measure fetal well-being
 4. Prenatal visit in the pediatrician's office
 5. Neonatal transport systems
 6. Effective intervention programs for teens and other high risk mothers
- c. For each of the following prenatal and perinatal complications in the list below:
 1. Describe the pediatrician's role in assessment and management to minimize the risk to the fetus and/or newborn.
 2. Recognize potential adverse outcomes for the fetus/neonate.

List of complications:

- a. Maternal infections/exposure to infection during pregnancy
- b. Fetal exposure to harmful substances (alcohol, tobacco, street drugs, medications, environmental toxins)
- c. Maternal insulin-dependent diabetes and pregnancy-induced glucose intolerance
- d. Multiple gestation
- e. Placental abnormalities (placenta previa, abruption, abnormal size, function)
- f. Pre-eclampsia, eclampsia
- g. Chorioamnionitis
- h. Polyhydramnios
- i. Oligohydramnios
- j. Premature labor, premature ruptured membranes
- k. Complication of anesthesia and common delivery practices (e.g. cesarean vacuum, forceps assisted, epidural, induction of labor)
- l. Fetal distress during delivery
- m. Postpartum maternal fever/infection

- B. GOAL – Resuscitation and Stabilization
Understand how to resuscitate and stabilize a critically ill neonate.

OBJECTIVES:

- a. Formulate a differential diagnosis for serious symptoms presenting during transfer to the NICU or in the NICU

- b. Describe steps in resuscitation and stabilization, including equipment needed.
- c. Demonstrate efficient and effective resuscitation in mock codes and under stress of actual codes.

C. GOAL – Common Signs and Symptoms

Understand how to evaluate and manage common signs and symptoms of disease in high risk newborns.

OBJECTIVES:

For each of the signs and symptoms in the list below:

- a. Perform an appropriate assessment (history, physical examination, initial diagnostic studies)
- b. Formulate a differential diagnosis with appropriate prioritization
- c. Describe indications for admission or referral to Levels I, II and III nurseries.
- d. Describe stabilization procedures to prepare for transfer or referral and general transfer procedures.
- e. Formulate and carry out a plan for continuing assessment and management.

List of signs and symptoms (NICU)

1. General: Intrauterine growth failure, large for gestational age, hypothermia, hyperthermia, prematurity (various gestational ages), feeding problems, poor post-natal weight gain, lethargy, irritability, jitteriness, history of maternal infection or exposure.
2. Cardiorespiratory: Respiratory distress (flaring, grunting, tachypnea), cyanosis, apnea, bradycardia, heart murmur, hypotension, hypovolemia, dehydration, poor pulses, shock
3. Dermatologic: Common skin rashes/conditions, birthmarks, hyper- and hypopigmented lesions, discharge and/or inflammation of the umbilicus, proper skin care for extreme prematures
4. GI/Surgical: Gastric retention or reflux, vomiting, bloody stools, distended abdomen, hepatosplenomegaly, abdominal mass, failure to pass stool, diarrhea
5. Genetic/Metabolic: Metabolic derangements (glucose, calcium, acid-base, urea, amino acids, etc.), apparent congenital defect or dysmorphic syndrome, hyper/hypokalemia, hyper/hyponatremia
6. Hematologic: Jaundice in a premature or seriously ill neonate, petechiae, anemia, polycythemia, abnormal bleeding, thrombocytopenia, neutropenia
7. Musculoskeletal: Birth trauma related fractures and soft tissue injuries, dislocations birth defects and deformities
8. Neurologic: Hypotonia, seizures, early signs of neurologic impairment, microcephaly, macrocephaly, spina bifida, birth trauma related nerve damage
9. Parental Stress and Dysfunctions: Poor attachment, postpartum depression, anxiety disorders, teen parent, substance abuse, child abuse and neglect
10. Renal/Urologic: Edema, decreased urine output, abnormal genitalia, renal mass, hematuria, urinary retention

D. GOAL – Common Conditions

Understand how to manage, under the supervision of a neonatologist, common diagnosis in infants in a Level II or III nursery.

OBJECTIVES:

For the following common diagnosis in the list below:

- a. Describe the pathophysiologic basis of the disease
- b. Describe initial assessment plans
- c. Discuss key principles of the NICU management plan
- d. Explain when to use consultants

List of Common Diagnosis in the NICU

1. *Pulmonary Disorders*: Surfactant deficiency syndrome, transient tachypnea, meconium aspiration, amniotic fluid aspiration, persistent pulmonary hypertension of the newborn, pneumonia, pneumothorax, bronchopulmonary dysplasia, atelectasis, apnea of prematurity
 2. *Cardiac Conditions*: Congenital heart disease, cyanotic and acyanotic (including common disorders: PDA, VSD, AV canal, tetralogy, transposition, etc.), congestive heart failure, SVT, complete heart block
 3. *Genetic/Endocrine Disorders*: Infant of a diabetic mother, common chromosomal anomalies (Trisomy 13, 18, 21, Turner's) neonatal screening programs as they affect the premature infant, ambiguous genitalia, congenital adrenal hyperplasia, hypothyroidism, hyperthyroidism
 4. *GI/Nutrition*: Feeding plans and nutritional management of high risk neonates or those with special needs (cleft lip/palate, other facial anomalies, etc.), breast feeding support for mothers and infants with special needs (high risk premature, maternal illness, multiple birth, etc.), complications of umbilical catheterization, hepatitis, gastroesophageal reflux, meconium plug, direct hyperbilirubinemia, electrolyte/fluid imbalance unique to newborn/preterm
 5. *Hematologic Conditions*: Indications for phototherapy, exchange transfusions in the premature or ill neonate, erythroblastosis fetalis, hydrops fetalis, coagulopathy of the newborn, hemophilia, hemolytic anemia, disseminated intravascular coagulopathy, polycythemia
 6. *Infectious Disease*: Intrauterine viral infections, Group B Streptococcal infections, neonatal sepsis and meningitis, herpes simplex; infant of HIV, hepatitis, syphilis, GC, or Chlamydia; nosocomial infections in the NICU, central line infections, immunization of the premature neonate, isolation procedures for contagious diseases in mother/infant (varicella, etc.)
 7. *Neurologic Disorders*: Ischemic hypoxic encephalopathy, intraventricular hemorrhage, retinopathy of prematurity, hearing loss in high risk newborns (prevention and screening), drug withdrawal, central apnea, seizures, hydrocephalus, spina bifida
 8. *Surgery*: [Assess and participate in management under supervision of a pediatric surgeon or cardiac surgeon] Surgical emergencies such as necrotizing enterocolitis, malrotation, perforated viscus, intestinal obstruction, diaphragmatic hernia, esophageal or gut atresia, gastroschisis, omphalocele, Pierre Robin syndrome, hypoplastic left heart, duct-dependent congenital heart lesions; other common surgeries: inguinal hernia repair, reservoir/VP shunt placement, G-tube, tracheostomy; pre-op and post-op care
- E. **GOAL – Management and Decision Making**
Develop a logical and effective approach to the assessment and daily management of seriously ill neonates and their families, under the guidance of a neonatologist, using decision making and problem solving skills.

OBJECTIVES:

- a. Apply principles of decision making and problem solving to care in the NICU
- b. Develop a comprehensive problem list with appropriate and accurate prioritization for action
- c. Seek information as needed and apply this knowledge appropriately using evidence-based problem solving
- d. Recognize the limits of one's own knowledge, skill level, and tolerance of stress; know when to ask for help, how to contact consultants, and where to find basic information

- F. GOAL – Teamwork and Consultation
Understand how to function effectively as part of an interdisciplinary team in the NICU

OBJECTIVES:

- a. Manage infants in a Level II or III nursery under the supervision of a qualified neonatologist
- b. Communicate and work effectively with fellows, residents, attendings, consultants, nurses, nurse specialists/clinicians, lactation consultants, nutritionists, pharmacists, respiratory therapists, social workers, discharge coordinators, referring physicians and ancillary staff
- c. Communicate effectively with the families of critically ill infants
- d. Discuss the role of the primary care physician in the long term management of infants admitted to the NICU; facilitate this through appropriate oral and written communications with that provider
- e. Discuss the role of managed care case manager; work with these individuals to optimize health care outcome

- G. GOAL – Patient Support and Advocacy
Understand how to provide comprehensive and supportive care to the NICU infant and his family

OBJECTIVES:

- a. Demonstrate awareness of the unique problems involved in the care of neonates with multiple problems or chronic illness, and serve effectively as an advocate and case manager for such patients
- b. Work with or act as the discharge coordinator to develop discharge plans which facilitate the family's transition to home care, including adequate follow-up and appropriate use of community services
- c. Demonstrate sensitivity and skills in dealing with death and dying in the NICU setting
- d. Consistently listen carefully to concerns of families and provide appropriate information and support
- e. Collaborate with parents to develop plans, accepting their wishes in a non-autocratic and culturally sensitive manner
- f. Provide counseling and support for breast feeding of premature and critically ill infants, including maintenance of mother's milk supply when the infant cannot suckle
- g. Provide responsible communication with the neonate's primary care physician during the hospital stay and in discharge planning
- h. Identify problems and risk factors in the infant or family, even outside the scope of this admission, and make appropriate interventions and/or referrals

- H. GOAL – Medical Ethics and Legal Issues
Become familiar with ethical and medical-legal considerations in the care of critically ill newborns

OBJECTIVES:

- a. Discuss concepts of futility, withdrawal and withholding of care
- b. Describe hospital policy on “Do Not Resuscitate” orders
- c. Identify situations warranting consultation with the hospital ethics committee
- d. Complete a death certificate appropriately

- I. GOAL – Financial Issues and Cost Control
Understand key aspects of cost control in the NICU setting

OBJECTIVES:

- a. Demonstrate awareness of costs and cost control in NICU care
- b. Be sensitive to the burden of costs on families and refer for social services as indicated
- c. Use consultants and other resources appropriately during NICU stay and discharge planning

- J. GOAL – Medical Records
Understand how to maintain accurate, timely and legally appropriate medical records in the critical care setting of the NICU

OBJECTIVES:

- a. Ensure that initial history and physical examination records include appropriate history (e.g., family, obstetrical records, referring provider); exam appropriate for the infant’s condition; record of procedures in delivery room and since admission; problem list, assessment and plan
- b. Maintain daily timed notes, with updates as necessary, clearly documenting the patient’s progress, and details of the on-going evaluation and plan
- c. Ensure discharge summary is timely and concise, with clear documentation of discharge plans and follow-up appointments

Skills Acquisition:

1. Understand how to use and interpret laboratory and imaging studies unique to the NICU setting
 - a. Order and interpret laboratory and imaging studies appropriate for NICU patients with additional understanding of the differences in normal values with gestational age
 - b. Explain indications, limitations and gestational age norms for the following which may have specific application to neonatal care:
 1. Serologic and other studies for transplacental infection
 2. Direct Coomb’s tests
 3. Neonatal drug screening
 4. Cranial ultrasound
 5. Abdominal x-rays for placement of umbilical catheter
 6. Chest x-rays for endotracheal tube placement, heart size and vascularity

2. Understand the application of physiologic monitoring and special technology applied to the care of the fetus and newborn
 - a. For each of the following, which are commonly used by pediatricians, discuss indications and limitations:
 1. Physiologic monitoring of temperature, pulse, respiration and blood pressure
 2. Phototherapy
 3. Pulse oximetry
 4. Umbilical arterial and venous catheterization
 - b. For each of the following techniques and procedures used by obstetricians and perinatal specialists, describe key indications, limitations, normal and frequently encountered abnormal findings and common complications for the fetus/infant:
 1. Fetal ultrasound for size and anatomy
 2. Fetal heart rate monitors
 3. Scalp and cord blood sampling
 4. Surfactant therapy
 5. Extracorporeal membrane oxygenation/nitric oxide therapy
 6. Amniocentesis
 7. Chorionic villus sampling
 8. Exchange transfusion
 9. Central hyperalimentation
 - c. Discuss in general terms, home medical equipment and services needed for oxygen dependent and technology dependent graduates of the NICU (oxygen, apnea monitor, home hyperalimentation, etc.)

Reading Materials:

1. Neonatal articles provided by the neonatology division
2. Gomella TL, Cunningham M, Ezal FG, et al, Neonatology, 5th edition, Appleton & Lange, 2003

Rotation Requirements:

1. Residents will spend two months as a PL-3.
2. Cross coverage for the NICU will be determined by the chief residents for Children's Hospital. There is no cross coverage needed for the NICU at University Hospital.
3. Residents are expected to follow their patients, including preroounding, writing notes and performing necessary procedures.
4. Upper level residents are expected to, in addition to patient care, teach and assist junior residents and medical students in the management of patients and the performance of procedures.
5. Residents are expected to participate in both work and teaching rounds with faculty and fellows.
6. Residents are expected to attend deliveries and resuscitate neonates under the supervision of attending neonatologists.