

NAME OF ROTATION: Neonatal Intensive Care I

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LOCATION: Dekalb Medical Center
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TRAINING LEVEL: PGY-1

LENGTH OF ROTATION: 1 month

COURSE DESCRIPTION:

Competency in the management of newborns with special conditions and effective and compassionate communication with the families remains an integral portion of the general pediatric curriculum. The primary goal of the NICU rotation is to enable the pediatric resident to develop a comprehensive understanding and appreciation for the care of the normal newborn, at risk term newborn, and preterm infant. This will be achieved in the special care nurseries by teaming the resident with the supervising neonatologist in direct patient care. The busy clinical service of the NICU will provide multiple opportunities and varied presentations of newborns at risk that require extended life support. The major emphasis will be centered on the resident's ability and skills to identify the at risk newborn, obtain appropriate laboratory and x-ray studies, treat the symptomatic newborn, stabilize newborns requiring mechanical ventilation for transport, and provide effective newborn resuscitation. The resident will also provide education and support to the families in an empathetic and caring manner.

GOAL, OBJECTIVES, AND CORE COMPETENCIES:

GOAL 1: Gain experience with high-risk pregnancies and complicated labor and deliveries.

Objective 1.1: The resident will develop a comprehensive understanding for the basic vital statistics pertinent to perinatal health care outcomes.

Objective 1.2: The resident will be able to utilize and interpret the commonly used tests used to measure fetal developmental status and well being.

Objective 1.3: The resident will be able to provide antenatal diagnosis and antenatal counseling in a clear and empathetic fashion to families and refer them to appropriate support services within the community as needed.

Objective 1.4: The resident demonstrates an understanding of fetal and neonatal effects of common obstetrical conditions including:

1. Maternal infections
2. Endocrine conditions in the mother such as diabetes mellitus, hyperthyroidism, etc.
3. Toxin or illicit drug exposure
4. Immunologic disorders in the mother such as HIV, SLE, etc.
5. Multiple gestation
6. Amniotic fluid abnormalities
7. Placental and membrane abnormalities
8. Toxemias
9. Prematurity
10. Complications of labor and delivery as a result of anesthesia

GOAL 2: Develop expertise in newborn resuscitation and stabilization.

Objective 2.1: The resident will demonstrate an understanding of the physiology of neonatal transition and asphyxia.

Objective 2.2: The resident will demonstrate an understanding for the principles and mechanics of resuscitation including:

1. Appropriate use of required equipment (e.g. bag and mask, umbilical catheters, suctioning equipment)
2. Endotracheal intubation
3. Chest compressions
4. Medications

Objective 2.3: The resident will understand and be able discuss appropriate identification and management of unexpected anomalies encountered in the delivery room.

Objective 2.4: The resident will understand and be able to discuss the various components of neonatal transport such as:

1. Principles of stabilization
2. Elements of a transport system such as environmental control, mechanical ventilation, methods of maintaining fluid and metabolic stability monitoring.

Objective 2.5: The resident will demonstrate an understanding for the indications for transport to a higher level of care.

GOAL 3: Develop expertise with procedures and techniques for neonatal diagnosis and management.

Objective 3.1: The resident will be able to perform and interpret the results of the following diagnostic procedures:

1. Arterial puncture and catheterization
2. Lumbar puncture
3. Bladder catheterization
4. Suprapubic aspiration
5. Gastric suction lavage
6. Airway suction
7. Gastric tube placement
8. Intravenous line placement
9. Umbilical artery catheterization
10. Umbilical venous catheterization
11. Thermal control
12. Chest tube insertion
13. Conscious sedation
14. Cardioversion/defibrillation
15. Exchange transfusion
16. Inguinal hernia reduction
17. Enteral/parenteral medication administration
18. Nasal CPAP
19. Oxygen delivery
20. Surfactant administration
21. Mechanical ventilation
22. Ventricular fluid removal via reservoir tap
23. SC/ID treatment of IV infiltration
24. Alternative methods of support (e.g. ECMO, high frequency, and partial liquid ventilation)

Objective 3.2: The resident is expected to learn diagnostic and monitoring techniques and their indications, clinical usefulness, limitations, and interpretation for the following:

1. Electrocardiogram
2. Pulmonary function test
3. Physiologic monitoring
4. Oxygen saturation
5. X-rays
6. Cranial ultrasound
7. Newborn hearing
8. Hyperoxia test
9. Gestational age assessment
10. APGAR scoring
11. Abstinence scoring

Objective 3.3: The resident will develop a comprehensive understanding and appreciation of laboratory procedures, specimen collection, handling, and interpretation of:

1. Blood culture
2. Conjunctiva specimen
3. Nasopharyngeal secretions
4. Rectal swab/stool
5. CSF
6. Skin lesions
7. Abscess fluid
8. Tracheal aspirate
9. Urine culture and analysis
10. CBC
11. Blood gases
12. Newborn metabolic screening
13. TORCH titers
14. RBC antigen/antibody testing
15. Neonatal drug screening
16. Pharmaco-kinetic assays
17. Scalp and cord blood sampling

Objective 3.4: The resident will be able to describe the key indications, limitations, normal and frequently encountered abnormal findings, and common complications for the fetus/infants for the following techniques and procedures used by obstetricians and perinatologist:

1. Fetal ultrasound for size and anatomy
2. Fetal heart rate monitors
3. Scalp and cord blood sampling
4. Extracorporeal membrane oxygenation/nitric oxide therapy
5. Amniocentesis
6. Cordocentesis
7. Intrauterine transfusion
8. Chorionic villus sampling

GOAL 4: Appropriately identify, manage, and treat neonatal disease.

Objective 4.1: The resident will be able to correctly identify and discuss the clinical findings, diagnostic evaluation, differential diagnosis, and treatment options of various conditions which present to a tertiary or sub-specialty level unit such as:

1. General conditions including IUGR/SGA/LGA, hypothermia, hyperthermia, feeding problems, poor post-natal weight gain, lethargy, irritability, jitteriness, history of maternal infection or exposure.
2. Infectious diseases including congenital viral infections (e.g. HIV, CMV, rubella, HSV, toxoplasmosis, syphilis), Hepatitis, bacterial and fungal sepsis, pylenephritis.
3. ENT abnormalities such as Pierre Robin sequence, choanal atresia, tracheoesophageal fistula
4. Respiratory disorders including RDS, aspiration syndrome, PPHN, infectious pneumonia, pneumothorax, BPD, atelectasis, apnea of prematurity, TEF, congenital diaphragmatic hernia, pulmonary hypoplasia.
5. Cardiac disorders including cyanotic and acyanotic CHD, coarctation of the aorta, developmental heart disease (e.g. PDA, PFO), CHF, cardiogenic shock, tachyarrhythmias, bradyarrhythmias, cardiomyopathy, pericardial tamponade.
6. Alimentary disorders including NEC, meconium ileus, peritonitis, esophageal atresia, intestinal obstruction, gastroesophageal reflux, hyperbilirubenemia.
7. Fluid/metabolic derangements such as hypo and hypo calcemia, hypoglycemia, acid base disorders, dehydration.

8. Hematologic disorders including anemia of prematurity, twin/twin transfusion, thrombocytopenia, neutropenia, DIC, erythroblastosis fetalis, jaundice in the premature or seriously ill neonate.
9. Musculoskeletal disorders including birth trauma related fractures and soft tissue injuries, dislocations, birth defects, deformities.
10. Neurologic disorders such as hypoxic ischemia, intraventricular hemorrhage, periventricular leucomalacia, neural tube defects, hydrocephalus, neonatal seizures, neonatal narcotic withdrawal, retinopathy of prematurity, subarachnoid hemorrhage, early signs of neurological impairment, macrocephaly, spina bifida, birth trauma related damage, hearing loss in high risk newborns, central apnea.
11. Renal/urogenital disorders including acute renal failure, acute tubular necrosis, multicystic/dysplastic/polycystic kidneys, ambiguous genitalia.
12. Dermatological disorders such as hemangiomas, bathing suit nevus, dermatitis.
13. Chromosomal disorders such as trisomy 21, 13, 18, 45XO, VACTERL syndrome.
14. Endocrine disorders including congenital hypothyroidism, congenital adrenal hypoplasia, and symptoms as a result of gestational diabetes of pregnancy.
15. Parental stress and dysfunction including poor attachment postpartum depression, anxiety disorders, teen parent, substance abuse, child abuse and neglect.

Objective 4.2: The resident will be able to appropriately develop a treatment plan for common neonatal problems associated with mild/moderate illnesses such as:

1. Moderate perinatal asphyxia
2. Preterm >34 weeks gestation
3. Prolonged rupture of membranes or additional risk of sepsis
4. Multiple gestation
5. > 34 weeks gestation
6. Non-hemolytic and mild hemolytic jaundice
7. Polycythemia
8. Respiratory distress requiring <40% FiO₂
9. Infant of diabetic mother
10. Uncomplicated trisomy 21
11. Infant with non-acute isolated anomaly
12. Gastroesophageal reflux

Objective 4.3: The resident will develop expertise in the nutritional management of neonates with common problem situations including prematurity, IUGR, BPD, short bowel, renal disease, CHF.

Objective 4.4: The resident will develop expertise with common therapeutic agents used to treat various disorders of the newborn period including:

1. Antibiotics
2. Antifungals
3. Antivirals
4. Volume expanders
5. Xanthenes
6. Surfactant
7. Albuterol
8. PGE,
9. Adenosine
10. Indomethacin
11. Pavulon

GOAL 5: The resident will demonstrate an understanding of the primary care components of neonatology including immunizations for preterm and high risk infants, surveillance of somatic growth, nutritional status, developmental status, and potential sensorineural residua of high risk birth, metabolic screening.

GOAL 6: Develop expertise in appropriate documentation of the neonatal clinical course.

Objective 6.1: The resident will be able to effectively document all medical record entries in a clear, legible, and concise manner in all areas of the medical records including:

1. Delivery room note
2. resuscitation note
3. Initial history/physical examination
4. Daily progress note
5. Acute change of status note
6. Arrest management note
7. Off service note
8. Discharge summary

Objective 6.2: The resident will be able to appropriately request for consultations, diagnostic imaging, and clinical flow charts.

GOAL 7: Understand how to function effectively as part of an interdisciplinary team member in the NICU.

Objective 7.1: The resident will develop competence as an interdisciplinary member in patient care as the primary physician participating in interdisciplinary rounds and conferences and understand and respect the unique areas of expertise of the various members of the team.

Objective 7.2: The resident will learn how to communicate effectively with fellows, residents, attendings, consultants, nurses, lactation consultants, nutritionists, pharmacists, respiratory therapists, social workers, discharge coordinators, referring physicians, and ancillary support.

Objective 7.3: The resident will be able to communicate in an empathetic and caring manner with critically ill patients and highly stressed families and treat them as integral members of the interdisciplinary team.

Objective 7.4: The resident will work closely with 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.

GOAL 8: Develop excellent skills in communication with primary physicians, allied health professionals, and families of neonates.

Objective 9.1: The resident will fully understand and be able to discuss the role of the primary care physician in initial stabilization.

Objective 9.2: The resident will demonstrate an awareness and appreciation for the community health care resources and the appropriate method of referral.

Objective 9.3: The resident will develop proficiency in communication with and counseling of families of sick neonates and serve as an effective case manager for these patients.

Objective 9.4: The resident will demonstrate sensitivity and skills in dealing with death and dying in the NICU setting.

Objective 9.5: The resident will provide counseling and support for the breastfeeding premature and critically ill infant including maintenance of mother's milk supply when the infant cannot suckle.

GOAL 9: Acquire knowledge and understanding of perinatal/neonatal ethical issues.

Objective 9.1: The resident will be able to discuss the various aspects of medical futility, withdrawal of support, and the withholding of support.

Objective 9.2: The resident will demonstrate an understanding for the appropriateness and policy for “do not resuscitate” orders.

Objective 9.3: The resident will be able to discuss the various approaches for resolving medical and parental conflicts.

Objective 9.4: The resident will be able to discuss the role of the hospital ethics committees.

Objective 9.5: The resident will understand and be able to discuss the rights of parents regarding informed consent.

Objective 9.6: The resident will understand and be able to discuss the obligations for rendering emergency care in the absence of consent.

GOAL 10: The acquisition of knowledge of costs of care of high risk infants, available funding mechanisms for families, and understand the role of the physician in limiting costs.

GOAL 11: Acquire knowledge and skills of after discharge care of high risk infants.

Objective 11.1: The resident will understand and be able to discuss common care issues following neonatal intensive care.

Objective 11.2: The resident will understand and be able to discuss with the families the importance of the primary care physician and appropriate and timely follow up.

Objective 11.3: The resident will be able to discuss with families the available resources and programs for follow up care including financial assistance, support groups, and medical advice.

COMPETENCIES:

Competency 1: Patient Care. Provide family centered patient care that is developmentally and age appropriate, compassionate, and effective for the treatment of health problems and the promotion of health.

1.1: Gather essential and accurate information using the following clinical skills: medical interviewing, physical examination, diagnostic studies and developmental assessments.

1.2: Make informed diagnostic and therapeutic decisions based on patient information, current scientific evidence and clinical judgment, using clinical problem-solving skills, recognizing the limits of one's knowledge and expertise, gathering appropriate information and using colleagues and consultants appropriately.

1.3: Develop and carry out patient care plans, using principles of evidence-based decision-making and appropriate prioritization, and taking into account the needs, beliefs and resources of patient and family.

1.4: Effectively use common therapies within the scope of general pediatric practice, including a variety of prescription and non-prescription medications, intravenous fluids, and inhalation treatments, as well as special diets and nutritional supplements. Be familiar with therapies commonly used by subspecialists and other professionals who care for children.

1.5: Prescribe and perform competently all medical procedures considered essential for the scope of general pediatric practice; be familiar with those procedures commonly used by subspecialists and other professionals who care for children.

1.6: Counsel patients and families in a supportive manner so they can understand their illness or injury and its treatment, share in decision-making, make informed consent and participate actively in the care plan.

1.7: Provide effective preventive health care and anticipatory guidance to patients and families.

Competency 2: Medical Knowledge. Understand the scope of established and evolving biomedical, clinical, epidemiological and social-behavioral knowledge needed by a pediatrician; demonstrate the ability to acquire, critically interpret and apply this knowledge in patient care.

2.1: Demonstrate that you know or can efficiently access the knowledge base needed for effective patient care.

2.2: Critically evaluate current medical information and scientific evidence and modify your knowledge base accordingly.

2.3: Recognize the limits of one's knowledge and expertise by seeking information needed to answer clinical questions and using consultants and referrals appropriately. Use this process to guide life-long learning plans.

2.4: Apply current medical information and scientific evidence effectively to patient care (e.g., use an open-minded, analytical approach, sound clinical judgment, and appropriate attention to priorities).

Competency 3: Communication Skills. Demonstrate interpersonal and communication skills that result in information exchange and partnering with patients, their families and professional associates.

3.1: Communicate effectively in a developmentally appropriate manner with patients and families to create and sustain a therapeutic relationship across the broad range of socioeconomic and cultural backgrounds.

3.2: Communicate effectively with physicians, other health professionals, and health-related agencies to create and sustain information exchange and teamwork for patient care.

3.3: Develop effective approaches for teaching students, colleagues, other professionals and lay groups.

3.4: Work effectively as a member or leader of a health care team, and collaborate productively with professional organizations.

3.5: Serve as a consultant on pediatric matters to other physicians and health professionals.

3.6: Maintain comprehensive, timely and legible medical records.

Competency 4: Practice-based Learning and Improvement. Demonstrate knowledge, skills and attitudes needed for continuous self-assessment, using scientific methods and evidence to investigate, evaluate, and improve one's patient care practice.

4.1: Use scientific methods and evidence to investigate, evaluate and improve one's own patient care practice; continually strive to integrate best evidence into one's daily practice of medicine.

4.2: Systematically assess the health care needs of one's practice population, and use this information to direct population-based problem-solving, with special attention to preventable morbidity and risk.

4.3: Demonstrate willingness and capability to be a life-long learner by pursuing answers to clinical questions, using journal articles, texts, information resources, patients, colleagues and formal teaching conferences.

4.4: Be prepared to alter one's practice of medicine over time in response to new discoveries and advances in epidemiology and clinical care.

4.5: Seek and incorporate feedback and self-assessment into a plan for professional growth and practice improvement (e.g., use evaluations provided by patients, peers, superiors and subordinates to improve patient care).

Competency 5: Professionalism. Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to diversity.

5.1: Demonstrate commitment, responsibility, and accountability for patient care, including continuity of care.

5.2: Be honest and use integrity in your professional duties.

5.3: Consistently use compassion and empathy in one's role as a physician.

5.4: Maintain professional boundaries in one's dealings with patients, family, staff, and professional colleagues.

5.5: Place the needs of patients and society over your own self-interest.

5.6: Demonstrate sensitivity and responsiveness to patients' and colleagues' gender, age, culture, disabilities, ethnicity, and sexual orientation.

5.7: Meet high standards of legal and ethical behavior.

5.8: Develop a healthy lifestyle, fostering behaviors that help balance personal goals and professional responsibilities. Recognize and respond to personal stress and fatigue that might interfere with professional duties.

Competency 6: Systems-Based Practice. Understand how to practice quality health care and advocate for patients within the context of the health care system.

6.1: Know how types of medical practice and delivery systems differ from one another with respect to how they control health care costs, allocate resources, and assure quality.

6.2: Practice cost-effective health care and resource allocation that does not compromise quality of care.

6.3: Advocate for patients in one's practice by helping them with system complexities and identifying resources to meet their needs.

6.4: Work with health care managers and providers to assess, coordinate, and improve patient care, consistently advocating for high quality.

6.5: Advocate for the promotion of health and the prevention of disease and injury in populations.

6.6: Acknowledge medical errors and develop practice systems to prevent them.

PROCEDURES:

Technical and therapeutic procedures. Describe the following procedures, including how they work and when they should be used; competently perform those commonly used by the pediatrician in practice.

- Arterial puncture
- Breast pump use
- Chest tube placement
- Endotracheal intubation
- Exchange transfusion: newborn
- Gastric tube placement (OG/NG)
- Lumbar puncture
- Medication delivery: endotracheal
- Pulse oximeter: placement
- Suctioning: nares

- Suctioning: oral pharynx
- Suctioning: trachea (newborn)
- Umbilical artery and vein catheter placement
- Ventilation: bag-valve-mask
- Ventilation support: initiation

Diagnostic and screening procedures. Describe the following tests or procedures, including how they work and when they should be used; competently perform those commonly used by the pediatrician in practice.

- ECG: emergency interpretation
- Hearing screening
- Monitoring interpretation: cardiac
- Monitoring interpretation: pulse oximetry
- Monitoring interpretation: respiratory
- Monitoring interpretation: Capnometry/end-tidal CO₂
- Radiologic interpretation: abdominal ultrasound
- Radiologic interpretation: abdominal X-ray
- Radiologic interpretation: chest X-ray
- Radiologic interpretation: cranial US
- Radiologic interpretation: CT of head
- Radiologic interpretation: extremity X-ray
- Radiologic interpretation: GI contrast study

Source. Kittredge, D., Baldwin, C. D., Bar-on, M. E., Beach, P. S., Trimm, R. F. (Eds.). (2004). APA Educational Guidelines for Pediatric Residency. Ambulatory Pediatric Association Website. Available online: www.ambpeds.org/egweb. [Accessed 07/27/2009]. Project to develop this website was funded by the Josiah Macy, Jr. Foundation 2002-2005.

SCHEDULE:

Residents will attend weekly assigned continuity clinic. Residents are required to attend all Grand Rounds, weekly didactic lectures, resident meetings, and participate in the regularly scheduled calls.

DIDACTIC SESSIONS:

Major clinical problems will be covered in a one on one discussion with visual materials as needed. X-ray slides will be utilized to cover most respiratory presentations, air leak complications, congenital heart problems, and bowel obstruction presentations. Neonatal Resuscitation Program of the AAP/AHA is given as didactic and hands on course with testing and certification during intern orientation. NICU didactics will occur twice per week and determined by the attending. The following list details many of the topics to be covered during the NICU experience.

1. High risk antenatal factors
2. High risk intra partum factors
3. Resuscitation
4. Initial presentation etiologies and therapies for respiratory distress
5. Respiratory and neurological depression
6. Hypotension
7. Inadequate perfusion
8. Heart murmurs
9. Cyanosis
10. Anemia
11. Erythroblastosis
12. Jaundice
13. Bleeding
14. External anomalies and known anomalies with prenatal ultrasounds
15. Stabilization of the newborn in distress with oxygen, CPCP, ventilator, IVFs and antibiotics
16. Treatment of initial hypoglycemia and reoccurring hypoglycemia in the well and sick newborn
17. Sepsis risk factors
18. GBS prophylaxis
19. Sepsis work up and antibiotic therapy decisions
20. OG/PO/breast feeding issues
21. Phototherapy
22. Bilirubin monitoring
23. Exchange transfusion guidelines
24. Special problems of the growing premie baby
25. Monitoring feeding intolerance
26. NEC
27. Discharge planning and coordination for continuing care by the primary care physician

EVALUATIONS:

The preceptor and resident will complete evaluation forms on the six core competencies via electronic evaluation form.

REFERENCES:

- Neonatal-Perinatal Medicine, Fanoroff
- Maternal-Fetal Medicine, Creasy
- Pediatric and Neonatal Tests and Procedures, Taeusch
- Infections and Disease of the Fetus and Newborn, Remington
- Neonatal Decision Making, Korones
- Current Therapy in Neonatal Perinatal Medicine, Nelson
- Effective Care of the Newborn, Sinclair
- Neurology of the Newborn, Volpe
- Perinatal Clinics, W.B. Saunders Publishers
- World Medical Reviews in Perinatology