Newborn Care in Family Practice

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Official guidelines regarding the training of family practice residents in newborn medicine have been meager and general. Guidelines have traditionally focused on defining the requisite duration rather than the content of nursery rotations. A competency-based curriculum in newborn medicine is needed that defines requisite knowledge, skills, and attitudes; defines the appropriate role for the family physician in managing newborn problems; reflects the actual newborn experience of family physicians; is incorporated into residency training on a daily basis; and can be utilized in documenting resident competency in newborn health care. This paper describes the development, content, and daily implementation of a newborn curriculum that addresses these issues.

Newborn care occupies between 2 and 3 percent of those family practices that include obstetrical care[1]; however, the existing guidelines for newborn medicine training in family practice residencies are meager and nonspecific.[2,3] The Residency Review Committee and the Residency Assistance Program both recommend a minimum of four months of pediatric training that should include "neonatal care" and "neonatology."[4,5] General objectives for family practice curricula have been proposed,[6] but there have been no specific curricula proposed for training family practice residents in newborn medicine.

In a poll of 196 family practice residency programs, Rabinowitz and Hervada[2] determined that an average of 1.2 months were devoted to newborn medicine. Only 37 percent of these residencies provided evidence of written pediatric goals and objectives.[2] The traditional teaching model in family medicine assumes that residents will be exposed to everything they need to learn either while on a given rotation or in their model practice. However, the brief time spent in the nursery and the relatively random exposure to newborn problems make this an untenable assumption and suggest that significant gaps will exist in resident education.[3,7]

A competency-based core curriculum in newborn medicine for family practice residents is needed to make best use of the limited time spent on nursery rotations and the learning opportunities

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in the resident's model practice. Such a curriculum should ideally describe the knowledge, skills, and attitudes needed by a family physician taking care of newborns; reflect the actual newborn experience of family physicians; delineate the level of expertise and role expected of the family physician in handling each specific condition; be incorporated into residency training on a daily basis; and be utilized in documenting and ensuring resident competency in newborn health care.[3,7]

This paper presents a newborn medicine curriculum for family practice residents that addresses these issues, the process by which it was developed, and its day-to-day use in residency training.

Methods

The following resources were utilized to develop the newborn care curriculum: (1) the Family Medicine Information System (FMIS), (2) an advisory panel of family physicians, (3) family practice faculty, and (4) a neonatologist responsible for teaching family practice residents. The FMIS is a selectively automated medical information system that utilizes a paper record and centralized digital computer to store and analyze medical, family, and billing data for 12 Colorado family practices. The system has previously been described in detail.[1,8,9] A recent study has used FMIS data to describe the pediatric content of family practice,[1] and frequency data were used in newborn care curriculum development as described below.

An advisory panel of 36 Colorado family physicians were polled by means of a structured questionnaire regarding their handling of specific newborn problems in their practices and their beliefs regarding the educational needs of family practice residents. The family physicians were selected on the basis of their interest in family practice education, geographic distribution, and professional reputation. The panel included equal numbers of full-time faculty and urban and rural family physicians, all with at least three years of practice experience (range, 3 to 32 years). All of the physicians completed the questionnaire.

The resources listed above were used to define those conditions and situations that warranted inclusion in the curriculum, by virtue of being common or serious or emergent; the level of expertise needed by the family physician to manage each condition or situation; and the knowledge, skills, and attitudes required to handle these situations.

Core Newborn Diagnoses

Two groups of core conditions were identified:

1. Common newborn conditions included all those conditions likely to be encountered each year by the family physician according to the FMIS data. Some additional common conditions that did not appear in the FMIS (because of undercoding or lack of appropriate ICHPPC codes) were added only when there was agreement by the physician panel, the family practice faculty, and the neonatologist.

2. Less common conditions were added to the curriculum when they were likely to present to the family physician at least once in ten years of practice (based on FMIS) and were judged by the panel, faculty, and neonatologist to be serious or requiring immediate action. A condition was judged serious when it involved a high degree of morbidity, a significant mortality risk, or a high cost for acute or long-term care. Emergency conditions were included when the urgent and serious nature of their presentation made it imperative that the family physician be able to diagnose and initiate treatment quickly.

Family Physician's Role

The family physician's role in handling each condition was determined by consensus of the panel, faculty, and neonatologist. For each core newborn diagnosis, the appropriate role was chosen from among the following alternatives adapted from Geyman[7] and Poole et al[3] and from categories recommended by the Society of Teachers of Family Medicine[10]: *Definitive role*—The family physician is capable of managing the condition or situation in a definitive manner, requiring

consultative assistance only for the occasional atypical or more serious case; *Partial role*—The family physician is capable of initiating appropriate diagnostic and therapeutic measures and then seeking appropriate consultation from a pediatrician or neonatologist; and *Limited role*—The family physician is capable of recognizing the problem, arranging for transport, if needed, and making an appropriate referral to a neonatologist.

Skills and Attitudes

Skills and attitudes required by the family physician in providing newborn care were also determined by consensus of the panel, faculty, and neonatologist. Many skills and attitudes that are important to family practice have been described elsewhere.[6] Only those pertaining specifically to newborn care are included in the curriculum.

Results

Core Diagnoses

Forty conditions and situations were included in the core curriculum (Table 1). According to the FMIS data, these diagnoses account for 98 percent of all newborn care in family practice.[1] The recommended role for the family physician in managing these diagnoses is also presented in Table 1. For some diagnoses the family physician's role will change with the severity of the problem. These diagnoses are listed under two different physician roles with an explanation of the physician's level of involvement within each.

Definitive Role

A definitive role is suggested for seven common conditions. These seven diagnoses account for 93 percent of newborn care according to the FMIS.[1] Conditions in this category can be managed in a

Table 1. Core Newborn Diagnoses

- Definitive Role
  - Well-newborn care, term infant
  - Peripartum management of meconium-stained fluid
  - Resuscitation and stabilization
  - Physiologic hyperbilirubinemia
  - Ambulatory management of the former premature or sick infant after recovery and discharge
  - Well, small for gestational age infant
  - Well, large for gestational age infant
- Partial Role
  - Well, preterm infant, greater than 34 weeks' gestation
  - The large for gestational age infant with problems
  - The small for gestational age infant with problems
  - The infant of a diabetic mother
  - Nonphysiologic hyperbilirubinemia
  - Asphyxiated infant
  - Polycythemia
  - Anemia
  - Hypoglycemia
  - Hypocalcemia
  - Respiratory disease (fraction of inspired oxygen [FiO_2] < 0.4)
    - Hyaline membrane disease
    - Transient tachypnea
    - Pneumonia
    - Meconium aspiration
  - Rule out sepsis
  - Multiple gestation
  - Congenital hip dysplasia
  - Cleft palate
  - Club foot
  - Psychosocial problems
  - Drug-addicted mother/newborn withdrawal
  - Birth trauma
- Limited Role in Medical Management
  - Sepsis, meningitis
  - Prematurity less than 34 weeks' gestation
  - Congenital heart disease
  - Persistent unexplained cyanosis
  - Hydrocephalus
  - Apnea
  - Seizures
  - Intracranial hemorrhage
  - Intestinal obstruction
  - Necrotizing enterocolitis
  - Birth defects or major anomalies
  - Respiratory disease ($FiO_2 > 0.4$)
    - Hyaline membrane disease
    - Transient tachypnea of the newborn
    - Pneumonia
    - Meconium aspiration
  - Hypospadias
  - Ambiguous genitalia
  - Other
- All other disorders

Table 2. Well-Newborn Care

Anticipatory Guidance	Common Minor Problems, continued
Feeding techniques	Mongolian spot
Breast-feeding	Diaper dermatitides
Bottle-feeding	Sucking blisters
Fluid and calorie requirements	Caput succedaneum
Bathing	Molding
Umbilical cord care	Cephalohematoma
Circumcision care	Breast swelling
Sleep patterns	Fractured clavicle
Crying	Supernumerary nipples
Stool patterns	Subcutaneous fat necrosis
Diapering	Aplasia cutis
Pacifiers	Hemangiomata
Equipment needed at home	Vaginal bleeding
Facilitation of bonding	Natal teeth
Father's role	Epstein's pearls
Temperament	Subconjunctival hemorrhage
Time for parents	Umbilical hernia
	Umbilical granuloma
Common Minor Problems	Regurgitation
Milia	Poor feeding
Miliaria	Colic
Erythema toxicum	Constipation
Infant acne	Hydrocele
Common nevi	Undescended testes
Sebaceous gland hyperplasia	Clinodactyly and other minor anomalies

level 1 nursery (low risk). Well-newborn care is a very broad rubric, and the anticipatory guidance issues and minor problems included under this heading are listed in Table 2. Well-newborn care alone represents 88 percent of newborn care in family practice.[1]

Partial Role

There are several conditions for which family physicians could provide definitive care in a nursery with level II (medium risk) capability. However, these conditions occur infrequently in family practice, and their recommended treatment changes over time. It is therefore suggested that family practice residents be trained to handle these conditions in a definitive way. Later, as practicing physicians, they should consult with a pediatrician or neonatologist for an update on therapeutics and management. For these conditions, a partial role is suggested for the practicing family physician.

Limited Role

There are several other conditions the family physician may see during a ten-year period that

were judged to be serious and likely to require immediate care. For these conditions, a limited role is suggested for the family physician. This role includes recognizing the problem, stabilizing the infant, arranging the referral, and often initiating transport. Most of these conditions will require a nursery with level III (high risk) capability and a neonatologist (or pediatrician with special training in neonatology).

For all diagnoses not included in the newborn core curriculum, the role of family physicians should also be limited. They should have the skills to identify that an abnormality exists and keep the newborn stable until appropriate referral is obtained. Requisite knowledge base, skills, and attitudes are listed in Tables 3, 4, and 5.

Table 3. Knowledge Base for Newborn Care

- Fetal and neonatal physiology
- Effects of labor and delivery on baby
- Adaptations to extrauterine life: respiratory, cardiovascular, metabolic, temperature
- Newborn requirements: water, calories, electrolytes, protein, fat, and physical environment
- Contents of formula and breast milk
- Normal ranges of laboratory values
- Gestational age signs
- Maternal-newborn bonding and attachment
- Answers to common anticipatory guidance issues
- Newborn pharmacology and doses
- Pathophysiology, diagnosis, treatment, and appropriate role in management of core diagnoses
- Conditions that place the newborn at high risk (maternal, labor and delivery, fetal)

Discussion

The FMIS data reveal that newborn care in five Colorado family practice residencies closely resembles that in private family practice.[1] Thus it appears that the residency practice offers a reasonable opportunity to learn well-newborn care and possibly other common newborn conditions. The requisite skills, knowledge, and less common newborn conditions are probably best taught in newborn nurseries. The ideal nursery setting is one that is supportive of family practice, provides care for well, low-risk, and medium-risk newborns (levels I and II), permits residents to perform neonatal resuscitations and to stabilize sick newborns, has a pediatrician or neonatologist committed to teaching, and offers ample opportunities to practice core skills.

Tables 1 through 5 can be combined into a one-page handout (a core newborn medicine curriculum) and given to family practice residents and pediatric and family practice faculty. The core curriculum handout may be used in several ways: (1) to direct the residents' reading and other self-directed educational activities, (2) to direct the teacher of neonatology in choosing topics for discussion and management roles appropriate for family physicians, (3) to aid faculty in selection of didactic conferences, (4) to aid the residents in ensuring coverage and mastery of core materials, and (5) to select and evaluate the best training sites and teachers.

The approach presented here focuses on defining core content, identifying the best setting for training, and documenting learning activities. This type of approach is more likely to ensure competency than are approaches that focus on defining the duration of rotations. Nevertheless, it has been the impression of the family practice and neonatology faculty at the University of Colorado School of Medicine that two months are required to ensure competence in the newborn core curriculum. Resident feedback corroborates this. Residents have emphasized the importance of a second month to fill in gaps, refine skills, and develop confidence.

Residents appreciate having the limits of their domain defined. It is reassuring for residents to know that a relatively manageable list of diagnoses and skills represents 98 percent of the newborn care they will face as a family physician. Knowing their role as family physicians is both reassuring and time saving.

There has been insufficient time to adequately assess the effectiveness of the curriculum in improving the competency of the family practice res-

Table 4. Assessment and Treatment Skills in Newborn Care

- Assessment Skills
  - Prenatal
    - Fetal maturity
    - Interpret fetal heart monitoring
    - Interpret nonstress tests
    - Interpret oxytocin challenge test
    - Interpret estriol concentrations
    - Identify pregnancies at high risk for the infant
    - Appropriate use of fetal ultrasound
    - Scalp pH (perform and interpret)
  - Neonatal
    - Thorough physical examination, including complete neurological examination
    - Gestational age
    - Apgar
    - Draw venous blood
    - Lumbar puncture
    - Interpret laboratory values (eg, complete blood count, hematocrit, blood chemistries, Kleihauer-Betke test, Coombs' test)
    - Maternal-infant bonding
    - Routine screening (interpretation and management, eg, phenylketonuria/hypothyroidism)
- Treatment Skills
  - Resuscitation appropriate to Apgar and clinical status
  - Maintenance of temperature
  - Administration of oxygen, including use of Ambu bag
  - Endotracheal intubation
  - Cardiac massage
  - Administration of resuscitation medications
  - Umbilical artery line placement, umbilical vein line placement
  - Stabilization of ill newborn
  - Preparations for transport of ill newborn
  - Fluid and electrolyte management
  - Feeding routines appropriate to gestational age and problems
  - Management of core diagnoses for which family physician takes a definitive or partial role
  - Referral and consultative skills
  - Phototherapy
  - Routine preventive care
    - Temperature maintenance
    - Gonococcal prophylaxis
    - Vitamin K
    - Initial cord care
  - Circumcision
  - Management of family with a premature infant, a child with a congenital defect, or an infant loss

idency graduates at the University of Colorado School of Medicine. The process by which the curriculum was developed confers considerable validity and has met widespread acceptance, support, and satisfaction among residents and neonatology and family practice faculty. The most positive fea-

Table 5. Attitudes Necessary for Newborn Care

Newborns have special needs that are quite different from other age groups: calories, water, electrolytes, drug dosages, and procedures
Newborns are more vulnerable than other age groups to changes in temperature, fasting, infection, water restriction, lack of nurturance
These needs and vulnerabilities also change with gestational age
Newborns have fewer signs and symptoms, and they are more nonspecific than other age groups; therefore, the family physician must be more alert
Newborns are people worthy of consideration of feelings and comfort
Parents can be extremely attached to the fetus and the newborn; loss of the newborn or the unborn is loss of a family member
The safest way to transport a high-risk infant is well before delivery, inside the uterus

tures have been an appreciation by residents for clear definition of what they are expected to learn and their expected role as a family physician, by family practice faculty for guidance in choosing topics for discussion while on rounds with residents in the nursery, by both residents and faculty for a form on which the resident can document cases seen and skills mastered, and by neonatology faculty for a clear definition of what they need to teach.

The major deterrent to this approach is the incorporation of a new system into the already busy lives of both residents and faculty. This impediment, however, can be overcome if one person is responsible for providing the newborn curriculum sheet to all residents as they begin their nursery rotation and reminding the attending faculty to refer to these sheets. In addition, all communications with neonatologists or pediatricians can contain references to the newborn curriculum to encourage its use.

The specific core diagnoses and skills included in the newborn curriculum for family practice residents will vary among different regions of the country. The curriculum here can serve as a starting point for other programs.

There is a need for future research to refine further the core newborn curriculum, to document its usefulness in improving competency of graduates, and to apply this approach to other areas of family practice.

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