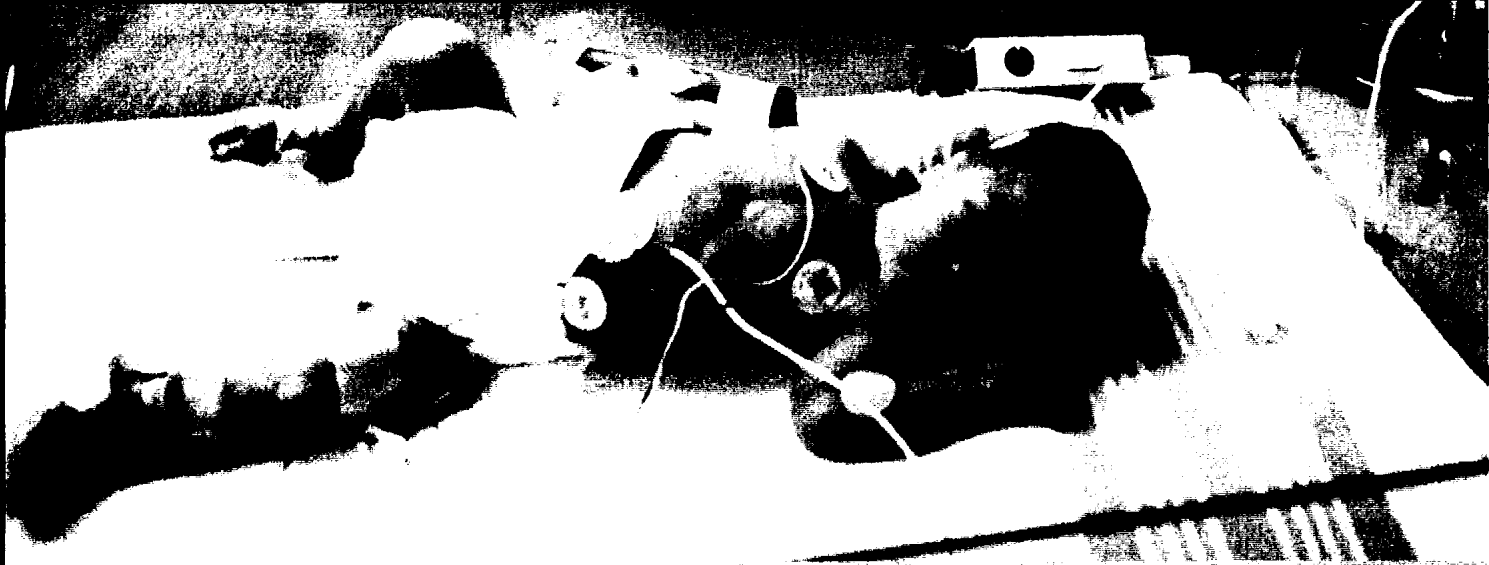


Innovations in Neonatal Case Management:



by Jo Carter, RN, BSN, CCM, Herb Koffler, MD, MS, and Alvin McLean, Jr., PhD

Nearly 4 million infants are delivered annually in the United States. Approximately 7% of these newborns require admissions to a special care unit for an annual cost of \$5.6 billion. Given the costly nature of the care for these critically ill infants, it is certainly understandable why payer organizations have made multiple attempts to manage these cases more cost-effectively.

Historically, payers have reported that these infants are very challenging to manage for a number of reasons:

- Neonatal intensive care is a highly technical and rapidly changing area of medicine.
- Patterns of care are inconsistent among intensive care units.
- Denying or rationing care to a critically ill infant can create a tremendous amount of negative publicity.
- The clinical status of a critically ill newborn can vacillate so rapidly between levels of care that it is difficult to negotiate a reasonable and reliable per-diem rate.

TABLE 1.
MATERNAL/FETAL RISK FACTORS

Alcohol use during pregnancy	History of uterine rupture	Pregnancy-induced hypertension (≤ 34 weeks)
Bacterial vaginosis	Hydrops fetalis	Premature membrane rupture
Cancer (any malignancies, melanomas, cervical, breast)	Infection—significant, maternal	Previous preterm birth (≤ 37 weeks, etiology preterm labor or premature membrane rupture)
Cardiac disease	Isoimmunization in utero—Rh or other incompatibilities	Preterm labor (≤ 37 week) treated with antenatal steroids
Cervical incompetence with cerclage	Macrosomia	Renal/kidney problems
Diabetes—poorly controlled gestational or pregestational	Mother younger than 16	Seizure disorders
Drug abuse	Mother older than 40 with any other complicating factors	Smoking during pregnancy
Fetal anomalies	Multiple birth history	Unstable medical condition (eg, systemic lupus, gastrointestinal disease, autoimmune diseases)
Fetal arrhythmias	Multiple gestation—twins or more	Uterine anomalies
Fewer than 41 weeks completed gestation	Oligohydramnios	
Genetic or chromosomal abnormalities (eg, Trisomy 21)	Organ transplant	
Hepatitis	Perinatologist management	
	Polyhydramnios	

Hence, many traditional managed care strategies have not proven fruitful in managing babies within the neonatal intensive care unit (NICU). These factors, coupled with the fact that few neonatal case managers are available, make this area of medicine one of the most challenging diagnostic categories with which payer organizations must deal.

The purpose of this article is to present an approach to managing this costly and complex population. Although 7% of all births may result in an admission to a special care unit, the most difficult and expensive group to manage is the 2% (high-risk neonates) who remain in the NICU more than 10 days. This article will focus on strategies that can be used to manage this high-risk group and also have applicability to lower-risk neonates.

A New Approach

The management process featured herein contains three key aspects:

- **Data**—using structured data collection tools at standard intervals in each case and the data resulting from these tools and other sources of information to predict and manage each case
- **Clinical expertise**—employing a team of clinical experts to interpret the data, interact with the patient's family and providers, and coordinate the care

through an integrated delivery system

- **Integrated management process**—implementing a consistent, repeatable, and coordinated approach to the management of all high-risk neonates so that improvements in care management can be applied across cases of similar severity

Data and Data Collection Tools

Standardized data collection tools are used to compile vital information. These tools have been developed to predict resources, categorize patients by severity, define and implement a management plan, and track infants' progress at specific intervals. The timing of data collection is consistent from one infant to another to allow the users to gain efficiency with the tool with each use. These tools follow standardized measures accepted by the industry to collect the data needed by all team members.

Among the key data collection tools are:

High-risk maternity screening. Initial data collection begins, whenever possible, by using a tool to screen each mother and collect data predictive of high-risk gestation or delivery. Table 1 is one component of the tool used to identify mothers who are at high risk for delivering a critically ill infant.

Neonatal comprehensive objective re-

view and evaluation (CORE). After a critically ill infant is born, a comprehensive assessment is essential to delineate the nature and extent of the demographic, physiologic, and psychosocial factors that may affect the infant's recovery and long-term outcome. Table 2 outlines the type of data collected in this tool.

Discharge planning. One of the greatest areas of impact for a care manager in neonatal management is coordinating and facilitating discharge planning. Ensuring that family members are trained, their home is set up properly, the car seat is purchased, the community pediatrician is identified and oriented to the critical care needs of the infant, and the appropriate follow-up clinic and specialist appointments have been made can make a difference as great as a 7-day reduction in length of stay, as well as reduce an awesome burden for an overwhelmed family. Table 3 provides an example of discharge guidelines.

Outcome achievement criteria. Neonatal care outcomes can be measured in a variety of ways, including the number of days in the NICU, hospital readmissions, complications, etc. This process measures outcomes in terms of integration into the home setting and stability within that setting for a minimum of 30 days. This type of outcome monitoring enables users to measure a tangible, clinical, and functional result that can be

audited by both payer and family. This approach also allows the entire continuum of care to be considered rather than just one component or delivery site of care. Table 4 summarizes these criteria.

Using standardized data collection tools at routine intervals can improve the consistency and efficiency of the information that team members use to manage a high-risk neonate. The data collected serve several purposes, including predicting clinical outcomes and costs, aligning all provider sources, enhancing communication among all parties, and documenting the value of care management in the process.

Clinical Expertise Application

The nucleus of the clinical team includes a neonatal nurse case manager, board-certified practicing neonatologist, and director of clinical services (DCS). If dictated by the infant's condition, a pediatric subspecialist and additional team members with administrative and management skills also are incorporated.

In this system, neonatal case managers conduct an initial on-site evaluation of each infant using the CORE (see Table 2) within 24 hours of notification. These case managers are familiar with the structure of an NICU, standard NICU terminology, laboratory values, and care pathways, allowing communication and information to be translated accurately and efficiently both at the infant's treatment location and with the management team. These nurses also have case management experience. This unique combination of clinical care and case management experience allows the nurses to anticipate the needs and complications of both the infant and family. The combined information from the CORE and the nurse's clinical observation then is discussed with the team's neonatologist and DCS.

At this point, the team's neonatologist contacts the attending neonatologist, a somewhat unique strategy in case management. In most situations today, an attending neonatologist, if called at all, usually is interrogated by a health plan's medical director, who often is unfamiliar with the jargon or necessary care for these critically ill infants. Spe-

TABLE 2. NEONATAL COMPREHENSIVE OBJECTIVE REVIEW AND EVALUATION TOOL (CORE)

1. Identification/Demographic Information

Parental

Referral and neonatal management team

Primary, secondary insurance

Provider

Physician

2. Patient Status

Maternal pregnancy history

Maternal risk factors

Infant status at birth

Primary diagnostic category

Apgar score

Perinatal and initial treatment history

Critical laboratory test results

Birth defects (congenital anomalies)

Patient status at assessment

Nutritional status

Oxygen requirements

Critical laboratory test results

Current medications

Neonatal diagnostic tests/procedures/
operations

3. Social/Familial Status

4. General Clinical Problems, Risks, and Issues

Neurologic system

Encephalopathies

Grade I/II intraventricular hemorrhage

Grade III intraventricular hemorrhage

Grade IV intraventricular hemorrhage

Periventricular leukomalacia

Hydrocephalus

Seizures

Other

Cardiovascular

Congestive heart failure

Patent ductus arteriosus

Other

Respiratory

Respiratory distress syndrome

Apnea/bradycardia of prematurity

Chronic lung disease/bronchopulmonary
dysplasia

Need for RSV immunization

Rehospitalization because of RSV

Pulmonary interstitial emphysema

Need for mechanical ventilation

Need for intubation without ventilation

Need for CPAP without ventilation

Pneumonia

Meconium aspiration

Pneumothorax

Persistent pulmonary hypertension

Pulmonary hemorrhage

Other

Gastrointestinal

Gastroesophageal reflux

Bowel obstruction

Difficulty initiating feeding

Proven necrotizing enterocolitis

Short bowel syndrome

Inguinal hernia

Other

Infectious disorders

Early onset infection

Encephalitis

Meningitis

Sepsis

Fungal infection

Nonfungal infection

Other

Other

Retinopathy of prematurity

Retinopathy of prematurity requiring
cryotherapy

Jaundice

Hypoglycemia

Oligohydramnios affecting newborn

Neonatal neutropenia

Hyponatremia

Disseminated intravascular coagulopathy

Familial/pyschosocial

Suboptimal compliance with
recommendations

Difficulty understanding prognosis

Familial financial problems

Family support lacking

Foster care placement

Guardianship/custodial issues

Housing lacking or inappropriate

Limited education of caregiver

Parental language barrier

Risk-taking behavior

Support group difficulties

Tuberculosis in family

Other

cialist-to-specialist communication establishes credibility and trust with the provider(s) and the delivery system in which the infant is receiving care. In this way, a collaborative approach to the trajectory of care can be negotiated. This collegial interchange stimulates discussions regarding timing of the newborn's transition through the different levels of care in the NICU and of the most effective, efficient, and up-to-date care available. The information gained from the discussion then is reviewed with the team and integrated with clinical experience before a practical management plan is developed.

The next step in establishing the plan of care is to compare the information compiled by the team with an extensive data set that can be analyzed to project risks or complications, additional specialists or services required, resource utilization, and length of stay. Comparing clinical findings with data-based findings adds further credibility to the ongoing physician-to-physician exchange. The DCS holds the primary responsibility for coordinating this integration of both clinical and financial data. The result serves as the basis for predicting the costs necessary to achieve a specified outcome and assuming financial and clinical responsibility

to achieve that outcome. The desirable outcome for these high-risk neonates is demonstrated medical stability and subsequent discharge to a residential setting for at least 30 days.

The entire plan of care is underscored by the understanding that discharge planning starts at the time of admission. An appropriate, timely discharge is enhanced by a discharge planning tool and facilitated primarily by a skillful and experienced neonatal case manager.

Implementation of an Integrated Management Process

An integrated management process has been developed that can be applied systematically to all high-risk neonates. Figure 1 features a diagram of this consistently reproducible process, which can be summarized as follows:

Step 1. High-risk maternity screening and consultation. The most cost-effective care management of a high-risk neonate is prevention. Hence, this program starts by working collaboratively with the customer's maternity management program. A significant impact, clinically and financially, can be made on the trajectory of care for an infant during the first few hours after birth, depending on the specifics of the deliv-

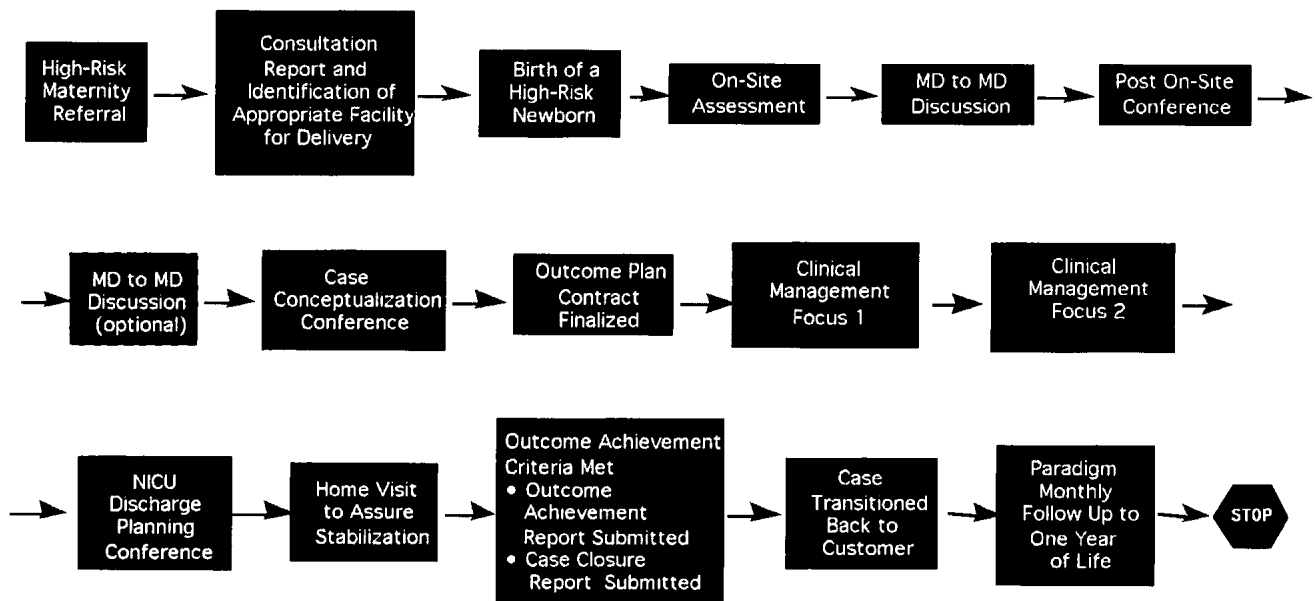
ery. Consequently, the objective at this phase of care simply is to consult with the customer on how they are working with the high-risk mother and help the customer and patient identify the most appropriate hospital for delivery (ie, one capable of managing a high-risk neonate).

Step 2. On-site assessment. The official referral does not occur until the high-risk baby is born. At that time, a comprehensive on-site assessment is completed using the CORE. The data from this tool are entered into a system to be used in prediction, outcome plan development, and management of the critically ill newborn.

Step 3. Physician to physician communication. Using information from the CORE, the management team's neonatologist communicates with the attending neonatologist to discuss the infant's trajectory of care, taking into consideration project lengths of stay at each level of care within the NICU, specific clinical problems and risks that are anticipated in case management, and the overall plan of care to achieve an efficient, effective, and safe discharge home.

Step 4. Case conceptualization. Equipped with the data from the

FIGURE 1. PARADIGM NEONATAL MANAGEMENT PROCESS OVERVIEW



CORE, the case manager's observations, the neonatologist's information, and clinical impressions gleaned from the attending physician, the DCS leads the team in conceptualizing the case, developing a budget to manage the case, and comparing all this information to similar cases in an external database of traditionally managed cases.

Step 5. Finalization of the outcome plan. After further data are obtained regarding questions or issues generated during step 4, a set outcome plan and a price to achieve that outcome are finalized and presented to the customer.

Step 6. Clinical management focus. Once the outcome plan is in process, the team meets on a monthly basis (at minimum) to review key components of the case, including the status of clinical problems and risks, the provider's relationship and alignment, the family's understanding regarding their child's projected needs and their preparation to meet those needs, and the budget status. From this, the team is able to identify the focus of clinical management before the next reporting period.

Step 7. Discharge planning. As previously indicated, discharge planning begins the day of admission; however, a specific tool has been developed that can enhance this process and ensure that all the details are addressed to facilitate a timely discharge. The discharge criteria (Table 3) are reviewed at each clinical teleconference, or the team may choose to have a separate discharge planning conference.

Step 8. Outcome achievement. The outcome achievement criteria (Table 4) also are reviewed at each clinical management teleconference, and, once the criteria are met, a report is prepared to document the supporting evidence for achievement of the outcome plan. This report is presented to the customer for their concurrence and audit, and then the case closure process begins.

Summary

The intent of this article is to provide one company's perspective on the challenging and complex care management of the high-risk neonate. The strategies

TABLE 3. NICU PATIENT DISCHARGE CRITERIA

- Infant medically stable with no acute illness or physiologically stable with chronic illness before discharge
- Infant maintaining body temperature in open crib while appropriately clothed at appropriate room temperature for at least 24 hours
- Infant feeding orally and demonstrating satiety or has proven to have adequate intake with progressive weight gain
- Infant free of apnea/bradycardia episodes requiring intervention within 5 days before discharge or either off methylxanthine therapy or on a stable methylxanthine regimen to be continued after discharge
- PredischARGE assessment of home or residential placement completed
- Written plan approved for home health, including whom to contact if ill, primary care physicians, all required supplies and medications (and their availability before discharge), specific responsibilities of nurse and parents, and follow-up plan
- Parents or primary caretakers demonstrated their ability care for the infant, including medication administration, use of equipment, and provision of any other special care that may be required, and are trained in infant CPR
- Summary of hospital course, discharge follow-up plan, medications, appointments, and treatments given to parents at time of discharge; copy to the primary physician assuming care of the infant
- Equipment and/or home health services necessary for discharge ordered or in place
- Appropriate car seat available and parents know how to use it
- Functional smoke detector(s) in the home
- Immunization and neonatal screening completed per discharge planning guidelines

TABLE 4. OUTCOME ACHIEVEMENT CRITERIA

- Successful nipple feeding (or some cases, of home gavage feeding, as appropriate)
- Successful weaning from oxygen and/or ventilatory support or successful establishment of a long-term ventilatory support program
- Successful weight gain

presented herein should enable and encourage case managers to implement an integrated management process for the frail neonatal population. □

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