Discharge criteria for the term newborn

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The birthing process represents a traumatic eviction from the warm, quiet womb with a constant supply of food to the cold, bright world with nothing to eat. Tremendous physiologic strains are suddenly placed on the newborn infant. In a time frame of a few days, the neonate must transition successfully to extrauterine life, and the family must be prepared for the care of their newborn at home. As defined by the American College of Obstetricians (ACOG) and the American Academy of Pediatrics (AAP) in the joint publication “Guidelines for Perinatal Care,” the purpose of postpartum care is “to identify maternal and neonatal complications, and to provide professional assistance during the time when the mother is likely to need support and care” [1]. The length of postpartum hospitalization, however, has decreased dramatically over the last several decades [2], which makes it increasingly difficult to achieve these goals. This article reviews the physiologic and social issues that face the newborn and mother, discusses the specific issues created by early discharge, and provides suggested criteria for the timing of discharge of the well term neonate.

Neonatal transition to extrauterine life

The process of transforming from a fetus to a neonate is neither simple nor quick. Physiologically, it is a dynamic period in which many congenital disorders may present and in which disruption of the transition process can manifest as serious neonatal disease. Ideally, the newborn should not be discharged until transition is complete. Recognizing and anticipating problems of transition and the proper timing of discharge can be determined only from an understanding of normal transitional events.
Cardiopulmonary events

Transitional circulation

The hallmark of fetal circulation is high pulmonary vascular resistance (PVR) with low pulmonary blood flow. These circumstances promote right-to-left shunting through the ductus arteriosus and the foramen ovale, with most of the cardiac output bypassing the lungs. After the umbilical cord is cut, the placenta no longer provides oxygen to the neonatal blood supply, and the PVR must fall dramatically to allow blood flow to the infant’s lungs. The mechanical act of ventilation, a fall in the partial pressure of carbon dioxide ($\text{PCO}_2$), and an increase in the partial pressure of oxygen ($\text{PO}_2$) are all important immediate postnatal stimulators for the normal decline in PVR [3–7]. Exposure to light and changes in circulating vasoactive agents also seem to mediate this process. The largest decrease in PVR occurs during the first 12 to 24 hours of life and is related to the production of vasodilators, such as prostacyclin and nitric oxide [8,9]. Further reduction in PVR occurs over days to months and involves the remodeling of the pulmonary vascular musculature [10].

Alterations in the normal decline of PVR result in the disorder known as persistent pulmonary hypertension of the newborn, in which postnatal elevations in PVR result in the continuation of fetal-type circulation with right-to-left shunting and resulting cyanosis. Hypoxia, acidosis, hypercarbia, and inflammatory mediators are believed to precipitate pulmonary vasoconstriction and lead to persistent pulmonary hypertension of the newborn in the presence of parenchymal lung disease. Diseases such as meconium aspiration syndrome, respiratory distress syndrome, and pneumonia fall into this category [11–13]. Because of a different mechanism, chronic intrauterine hypoxia also can lead to persistent pulmonary hypertension of the newborn after birth, secondary to the development of an abnormal pulmonary vascular bed, with thickened, abnormal muscularization of the pulmonary vessels [14]. In addition to abnormal muscularization, neonates with hypoplastic lungs, such as those with congenital diaphragmatic hernia, have an associated hypoplasia of the pulmonary vascular bed that is believed to contribute to their elevated PVR [15].

Fetal lung fluid

Driven by lung inflation and a large increase in pulmonary blood flow, absorption of fetal lung fluid occurs in the first hours after birth. Lung fluid is absorbed via the pulmonary vascular bed and, to a lesser extent, through the pulmonary lymphatic vessels. The common condition known as transient tachypnea of the newborn is believed to occur when the normal absorption of fetal lung fluid is disrupted [16]. This disorder of transition is most common after elective cesarean section and may be caused by a lack of catecholamine surge and absence of physical compression of the thorax that occurs during labor and vaginal delivery [17].
Breathing pattern

In utero, fetal breathing is intermittent. After delivery, this irregular pattern must become substantially more continuous to avoid apnea and hypoventilation. The driving forces responsible for this postnatal adaptation in the respiratory pattern are unclear, and a mildly irregular breathing pattern in the first week of life may be considered normal [18]. Pauses in breathing that are prolonged (>20 seconds), associated with bradycardia, or accompanied by cyanosis should be considered pathologic and prompt investigation for an underlying cause, such as sepsis, electrolyte imbalance, intracranial bleeding, maternal drug use (including magnesium sulfate administration), and congenital neurologic disorders.

Thermal regulation

After delivery, the neonate experiences enormous heat loss. Some degree of cold stress may be a stimulant for the initiation of nonshivering thermogenesis and other transitional processes not related to heat production. Upon parturition, a norepinephrine-mediated response ensues, which causes peripheral vasoconstriction to conserve heat and the initiation of heat production via nonshivering thermogenesis in the brown adipose tissue [19]. The surge in thyroid hormone seen after birth also may be permissive in this process [20]. Small-for-gestational-age and premature neonates often lack brown fat and are particularly vulnerable to impaired thermal regulation in the first days of life. Inability to maintain normal core temperature (36.5°C–37°C) also can represent a pathologic condition, such as sepsis, or a central nervous system disorder and should be investigated when appropriate.

Glucose homeostasis

The fetal supply of glucose comes solely from the mother, and there is a direct relationship between maternal and fetal glucose levels. Upon delivery, there is an abrupt cessation of glucose, and the newborn must maintain blood glucose levels independently. The catecholamine surge after birth, along with an increase in glucagon levels, stimulates hepatic glycogenolysis and gluconeogenesis [21]. Particularly in breastfed babies, dietary carbohydrate intake is low for several days and the neonate depends on these pathways to maintain normoglycemia. Additional mechanisms for compensation in healthy infants with low glucose intake include changes in cerebral blood flow to increase glucose delivery to the brain [22] and the use of alternative fuels, such as ketone bodies [23]. Ketone body production appears as a normal part of adaptation in term babies during the first 3 postnatal days. There is also evidence that breastfeeding activates ketogenesis because of low energy content of breast milk in the first days of life [24].

One problem in determining normoglycemia is the lack of consensus regarding the definition of hypoglycemia. In 1988, Koh et al [25] reported signifi-
cant variation in the definition of hypoglycemia among textbooks, medical centers, and physicians within centers. In the 1980s, two reports of serial plasma values of glucose were published in an attempt to define hypoglycemia. Srinivasan et al [26] measured values in 344 term, appropriate-for-gestational-age infants. Heck and Erenberg [27] measured values in 114 term infants but included large-for-gestational-age and small-for-gestational-age infants. There was also a higher percentage of breastfed infants in the study by Heck and Erenberg. Both studies reported plasma glucose values and suggested definitions of hypoglycemia (Table 1).

Separate complicating factors are the means and methods used to screen for hypoglycemia. Whole blood glucose values used in bedside techniques are 12% to 15% lower than plasma values [28]. Falsely low values also may result from erythrocyte use of glucose if there is a delay in specimen processing. The source of the blood sample is also a factor, with glucose values from arterial blood being greater than capillary samples, which are, in turn, higher than venous samples [29]. Isopropyl alcohol used to prepare skin for blood drawing can cause falsely high readings if the skin is not allowed to dry completely [30]. Bedside glucometers also are designed for hyperglycemia, and results may not be as accurate at low levels.

Problems with attaining euglycemia in the immediate postnatal period can reflect maternal or neonatal metabolic conditions. Maternal diabetes causes transient hyperinsulinemia in the neonate with resultant hypoglycemia. Maternal administration of dextrose-containing intravenous fluids [31], β-sympathomimetic tocolytics [32], or oral hypoglycemics [33] can cause neonatal hypoglycemia. Small-for-gestational-age infants may be hypoglycemic from low levels of glycogen stores [34]. Perinatally stressed newborns also may have depleted hepatic glycogen stores secondary to prolonged catecholamine exposure. Septic and polycythemic infants also may be hypoglycemic, although the mechanism in these instances is unclear. In evaluating the newborn during the immediate postnatal period, any hypoglycemia that is persistent should not be considered simply an alteration of transition and should prompt an investigation for inborn errors of metabolism and endocrine disorders.

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<th>Age</th>
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Table 1
Proposed definitions of hypoglycemia

Hematologic adaptations

The fetus lives in an hypoxemic environment with an arterial oxygen tension of approximately 35 mm Hg. This stimulates the production of erythropoietin and is reflected in the high red blood cell mass in the neonate, with an average hemoglobin level of approximately 16.8 g/dL [35]. Depending on the position of the baby relative to the placenta and the timing of cord clamping at delivery, the baby may receive a placental transfusion [36]. This process further increases the hematocrit and enhances the potential for polycythemia and hyperbilirubinemia during the transition period. Other causes for polycythemia include twin-twin transfusion, maternal diabetes, intrauterine growth restriction, maternal-fetal transfusion, fetal hypoxia, and chromosomal abnormalities. The infant is usually plethoric and may have signs or symptoms of hyperviscosity syndrome, such as respiratory distress, hypoglycemia, oliguria, abnormal cry, and even seizures. Any hematocrit of more than 65%, particularly in a symptomatic infant, should be repeated with a central venous or arterial specimen, because capillary specimens often give falsely high readings.

Neonatal anemia also may be seen in the transition period. Causes include placental hemorrhage (eg, abruptio placentae, placenta previa), neonatal bleeding after birth trauma (subgaleal, intracranial, intra-abdominal), fetal-maternal transfusion, twin-twin transfusion, and hemolytic disease [8]. Often the cause can be ascertained based on the presence of hypovolemia with acute blood loss, pallor without hypovolemia with more chronic processes, and the presence of early jaundice with hemolytic disease.

The clotting system of the newborn is essentially intact except for a deficiency in vitamin K-dependent clotting factors. Vitamin K production depends on bacterial colonization of the gut, which takes several days to establish in the neonate [37]. The risk is the development of hemorrhagic disease of the newborn, which is exceedingly rare in the United States because of the administration of prophylactic vitamin K shortly after birth.

White blood cells also undergo changes in the first days of life. There is a normal rise in the neutrophil count in the first 24 hours of life, with the ratio of immature to mature cells remaining less than 0.2 [38]. Any type of intrapartum stress can raise the absolute neutrophil count and the immature-to-mature-cell ratio, which makes the white blood cell count difficult to interpret when used as a screening device for neonatal infection. The presence of neutropenia is much more likely to represent a newborn pathologic condition in this situation.

Renal adaptations

The passage of urine in utero contributes to the amniotic fluid. The placenta, not the fetal kidney, is responsible for fluid and electrolyte homeostasis. After birth, renal blood flow and glomerular filtration increase. Standardized for body surface area, this increase continues into the third year of life [39].
Most infants (97%) pass urine in the first 24 hours of life, with essentially 100% voiding in the first 48 hours of life [40]. The possibility of either renal or urinary tract pathology should be considered with a delay in urine passage after 24 hours.

**Gastrointestinal adaptations**

In the transition from intrauterine to extrauterine life, the neonate must transition from an intravenous continuous feeder supplied by the maternal/placenta unit to an intermittent enteral feeder that depends on its own sucking, swallowing, and digestive capabilities. Coordination of sucking and swallowing is almost always established during the first day of life [41]. Initial feedings stimulate the release of digestive hormones [42] and an increase in gut motility, which leads to the passage of stool. Nearly all infants pass stool in the first 48 hours of life [40]. Delay in stool passage should prompt an investigation for anatomic or functional gastrointestinal obstruction.

**Maternal transition**

The initial days after birth are also a time of dynamic physiologic and psychosocial change for the mother. Coping with these changes has a direct impact on the framework of the developing mother-baby relationship. Maternal medical issues, including postoperative recovery from a cesarean section, can disrupt this bonding and learning period. Being a primigravid or first-time breastfeeding mother also makes the transition to caregiver more difficult.

**Breastfeeding**

In the first days after birth, the mother must transition from providing placental feeding to becoming a breast milk supplier. A tremendous increase in prolactin and oxytocin after parturition stimulates milk production [43]. Nursing itself further stimulates this process with a change in the composition of the milk from colostrum to mature breast milk by 5 days postpartum. Breastfeeding success is enhanced with teaching and support during this critical transition period. Measures such as rooming-in, no separation after birth, early nursing, frequent on-demand feedings, and exclusive breastfeeding all enhance the chances for success [44]. In these times of decreased hospital staffing and shorter hospital stays, it is increasingly important to provide the family-centered environment needed to support successful breastfeeding.

**Maternal education**

Ideally, teaching the mother and family to care for their newborn should be an ongoing process that begins before birth. After a vaginal delivery, the time for teaching is particularly limited. In addition to general care issues such as bathing, umbilical cord care, and taking a temperature, knowledge of infant
safety and signs of neonatal illness also must be taught. Providing information on safety issues, such as “back to sleep” and proper car seat use, is vital. Several disorders of the newborn, such as jaundice, infection, and heart disease, may present after 48 hours of life, when many families already have been discharged, which makes education on the recognition of these problems potentially lifesaving.

Early discharge

History

The trend toward shorter postpartum hospitalization has been an ongoing process since the 1960s [2]. The initial driving force for early discharge evolved from the desire to make the childbirth process less “medical” and more in the control of the mother and family [45]. As medicine entered the 1980s, however, economic issues became the stimulus for the continued downward trend in length of stay. The introduction of managed care and capitated payment created a system in which hospitals could be more profitable if they discharged patients earlier [46]. With this system, early discharge translated into huge savings for hospitals, because childbirth is the most common reason for hospitalization in the United States. Based on figures from the Centers for Disease Control and Prevention, the average length of postpartum stay for a vaginal delivery dropped from 3.9 days in 1970 to 2.1 days in 1992 (Fig. 1) [2]. The downward trend continued during the 1990s to a point at which many infants were discharged at or before 24 hours of life after a vaginal delivery. The question of early discharge received national attention—both in the lay and medical community—with reports of adverse outcomes and general dissatisfaction expressed by consumers and providers [47–50]. The outcry culminated in the Newborns’ and Mothers’ Health Protection Act, which went into effect on

January 1, 1998. This legislation guaranteed payment for at least a 48-hour postpartum stay after a vaginal birth and a 96-hour stay after a cesarean section.

Benefits of early discharge

In light of the negativism toward early discharge, there are several benefits to early discharge that should not be discounted in an appropriate situation. “Demedicalizing” the transition period after birth and placing the mother and infant in a home environment in a timely manner can promote a more positive experience for the family. A more comfortable, relaxed environment promotes breastfeeding success and ongoing maternal-infant bonding during this critical period of change. When combined with a home nursing visit and early medical follow-up, early discharge may be a more desirable and safe option, particularly for educated families with prior experience in child rearing. Although economics never should be the primary concern, selective early discharge in appropriate situations has the added benefit of reducing the cost of health care.

Discharge dilemmas

The following situations can be problematic for any newborn but are often exacerbated when babies are discharged before 48 hours of life.

Missed newborn screening

Mandatory newborn screening to detect metabolic diseases was first introduced in Massachusetts and Oregon in the early 1960s [51]. Although screening varies by state with respect to the disorders that are tested, all 50 states have newborn screening programs. Some disorders are detectable at birth, whereas others require the accumulation of a byproduct secondary to the metabolic defect. The timing of the sample is critical for preventing false negative results. In one study by McCabe et al [52], the authors determined that 48 to 72 hours was the best time to screen for phenylketonuria. This has led all states to require a repeat newborn screen as an outpatient if the newborn is discharged at less than 24 hours of life. Clearly, this reliance on patients, health care providers, and adequate follow-up may result in a failure to have a test repeated, and potentially treatable diseases may be missed [53]. Even for infants not discharged early, it is imperative for families to be educated about the importance of newborn screening, and the primary physician designated on the specimen also should be the physician who sees the baby after discharge. With a significant proportion of missed cases caused by inadequate follow-up of an abnormal screen result, strict attention and sound procedures to ensure postdischarge follow-up are vital.

Hyperbilirubinemia

Hyperbilirubinemia is a normal part of transition, with approximately half of all babies demonstrating clinical jaundice [54]. Bilirubin-induced neurologic
dysfunction, particularly kernicterus, is seen more often when jaundice is caused by hemolytic disease, severe illness, or hepatic dysfunction [55]. Coinciding with the decrease in postpartum stay, there has been an increase in kernicterus in apparently healthy newborns [56]. Proper surveillance and management of jaundice during the postpartum hospitalization and in the days after discharge essentially should eradicate kernicterus in this group of healthy term babies.

With most babies discharged from the hospital at approximately 36 hours of age, their peak bilirubin level occurs at home. Predicting which infants will develop significant hyperbilirubinemia remains a challenge that is exacerbated by earlier discharge. Current guidelines rely on visual assessment to determine which infants require measurement of a total serum bilirubin. Estimating the total serum bilirubin level based on visual inspection is limited and often inaccurate, particularly in our multiethnic society with its wide range of skin pigmentation [54,57,58]. Discharge of a jaundiced newborn with reliance on outpatient follow-up and parental observation potentially leads to missed opportunities to prevent bilirubin-induced neurologic dysfunction, because appointments may be missed or the severity of jaundice may be misjudged by families and health care professionals. It has been suggested that universal bilirubin screening before discharge can identify accurately infants at risk for significant hyperbilirubinemia after discharge and infants in need of closer follow-up [59]. The AAP is currently examining the potential benefits of adopting this approach.

Bhutani et al [59] demonstrated the predictive value of an hour-specific total serum bilirubin performed at the time of routine metabolic screening. Based on predischarge and postdischarge total serum bilirubin levels, they developed a nomogram that classifies infants as high risk, intermediate risk, or low risk for ultimately developing significant hyperbilirubinemia (>17 mg/dL) (Fig. 2). The nomogram was most predictive for total serum bilirubin levels in the low-risk zone (less than fortieth percentile), with none of these newborns jumping to the high-risk zone (more than ninety-fifth percentile) and no subsequent measurable risk for significant hyperbilirubinemia. Infants in the intermediate-risk zone had a small but clinically significant chance to jump to the high-risk zone, with 6.4% changing zones. Universal bilirubin screening could be a simple tool for providing more rational and targeted follow-up. The use of transcutaneous bilirubin measurements may make universal screening more feasible. Taken together with an assessment of the demographic risk factors of each infant, the hour-specific total serum bilirubin level can provide the physician with a more concrete assessment of risk and subsequent need for further follow-up, including the implementation of AAP recommendations for treatment.

**Breastfeeding issues**

Breastfeeding is beneficial for the mother and infant. Breast milk is immunogenic, and it offers the nursing baby protection from disease [60–63]. It is more easily digested than cow’s milk, and infants are never allergic to their mother’s milk [64]. For the mother, breastfeeding stimulates oxytocin release and promotes uterine involution, less postpartum bleeding [65], and a faster re-
turn to prepregnancy weight [66]. Nursing mothers also have a decreased risk of breast [67] and ovarian cancer [68]. Breastfeeding is convenient and economic, with the mother providing a continuous supply of free nourishment for her baby. Although difficult to measure, there are clearly psychosocial benefits from the intimate interaction between mother and baby that occur during nursing. With all these benefits to the mother-baby dyad and to society as a whole, providing substantial resources toward the promotion of breastfeeding seems prudent.

After a vaginal delivery, abundant milk production is not often present until after discharge. Breastfeeding problems, such as improper latching on, poor milk supply, and painful cracked nipples, often present at home and can lead to an early cessation of nursing [69]. Medical problems, such as hyperbilirubinemia [70] and hypernatremic dehydration [71], are more common in breastfed infants, and they often present after discharge. Particularly in light of early discharge practices, predischarge maternal education and the availability of good follow-up services are vital for successful and safe breastfeeding.

A supportive environment in the hospital during the initiation of breastfeeding is important for success, particularly for the first-time breastfeeding mother. To promote breastfeeding globally, the United Nations Children’s Fund and
the World Health Organization introduced “the Baby-Friendly hospital initiative” in 1991 [72]. The program advocates early initiation of breastfeeding, no bottles or supplementation, rooming-in, and no pacifiers. The program also promotes in-hospital education and postdischarge services and support. A cornerstone to the initiative is a hospital environment and policy conducive to breastfeeding and a supportive staff well trained in lactation.

Once discharged from the hospital, early personal contact with a health care professional (eg, physician, nurse, or lactation consultant) can be vital to breastfeeding success. An infant who was apparently breastfeeding well in the hospital can begin to have problems after discharge as the milk supply increases. Problems during this vital period can lead to decreased nutrition, decreased maternal milk production, and, ultimately, early cessation of nursing [73]. With an early visit in the first 24 to 72 hours after discharge, many problems of breastfeeding can be remedied and potential health problems, such as dehydration and hyperbilirubinemia, can be avoided.

**Congenital anomalies**

Congenital malformations may not always be apparent at birth. They may present at various times during the transitional period, with some presenting after discharge. All discharge guidelines require adequate feeding intake and passage of stool and urine, identifying most malformations of the gastrointestinal and urogenital systems. Of particular concern, however, are cardiac anomalies that may present during the first weeks of life after discharge.

The complete transition of the cardiovascular system after birth takes several weeks. Several cardiac anomalies can present after many newborns are at home, which makes recognition and timely treatment a challenge [74]. Disorders that depend on ductal patency for systemic blood flow, such as the hypoplastic left heart syndrome and ductal-dependent coarctation of the aorta, may not show cardiovascular collapse until ductal closure occurs [75,76]. In infants with tetralogy of Fallot and pulmonary artery stenosis or atresia, pulmonary blood flow also may be ductal-dependent, with cyanosis becoming apparent only after ductal closure. When there is a ventricular septal defect, as with tetralogy of Fallot, these disorders of decreased pulmonary blood flow may take even longer to detect. Babies with transposition of the great arteries often present in the first 24 hours of life with cyanosis, but the presence of an accompanying ventricular septal defect can create adequate mixing between the two sides of the heart so that the baby’s condition may go undetected before discharge.

Recently, it has been suggested that pulse oximetry measurement of oxygen saturation before discharge may be an effective screening tool to detect cyanotic congenital heart disease [77]. Although this may be a promising, low-cost, noninvasive tool, its use in screening a large neonatal population requires further study. Careful observation and examination while the baby is hospitalized, parental education with respect to signs of illness, and frequent close follow-up of any abnormal findings, such as murmurs, are the best means for timely identification of cardiac anomalies.
Healthy newborn at risk for sepsis

The confusion over the treatment of possible sepsis in the apparently healthy term newborn is dramatically illustrated by a group of 687 infants from the Paidos health management services’ database who were treated for suspected sepsis [78]. All the infants were in room air and on enteral feeds within 1 day of birth and had negative blood culture results. Data collected from the Paidos database showed a wide variation in length of antibiotic treatment, with 19% of newborns being treated for 4 to 6 days, which appears too long if sepsis has been ruled out for an infant and too short if one truly believes that an infant is infected. The management of the apparently healthy term newborn who is at risk for sepsis remains controversial and lacks consistency.

The leading cause of early neonatal sepsis is group B streptococcus (GBS), which has a mortality rate of approximately 15% [79,80]. In the mid-1990s, the ACOG, the AAP, and the Centers for Disease Control and Prevention issued recommendations for preventing neonatal GBS disease that involved screening of mothers for GBS at 35 to 37 weeks’ gestation, intrapartum antibiotic prophylaxis (IAP) of mothers who tested positive during labor, and subsequent management of newborns born to GBS-positive mothers [81]. The initial guidelines suggested the use of either a risk-based or culture-based screening approach to IAP. The guidelines were revised in 2002 [82], and they recommended universal GBS screening of all mothers, abandoning the option of the risk-based approach. These recommendations on the management of an infant born to a GBS-positive mother directly affect the timing of discharge.

Initial management guidelines recommended 48 hours of observation in term newborns delivered to a GBS-positive mother who received adequate IAP (≥4 hours before delivery). In a study of the impact that IAP had on the clinical presentation of sepsis, researchers determined that the clinical onset was not delayed and it occurred in more than 90% of infants in the first 24 hours of life. Discharge at 24 hours of life in a term (≥38 weeks) newborn whose GBS-positive mother received adequate IAP is allowable. For infants whose GBS-positive mothers received inadequate IAP, the guidelines have not changed, and they suggest a limited evaluation and at least 48 hours of observation. Also impacting time of discharge is the recommendation that all infants born to mothers who are given intrapartum antibiotics for suspected chorioamnionitis should receive an evaluation for sepsis and empiric antibiotic therapy regardless of the clinical condition of the baby. One last issue that creates some confusion for persons who care for newborns is the recommendation that GBS-positive women who undergo planned cesarean section in the absence of labor or rupture of membranes do not require IAP and thus this situation does not represent inadequate IAP.

The drug-exposed newborn

Along with possible medical problems, myriad psychosocial issues complicate the management of infants born to mothers with a history of substance abuse. Medical issues include recognition of neonatal abstinence syndrome and proper
screening for infectious diseases (eg, HIV, hepatitis B, hepatitis C, syphilis, gonorrhea, and chlamydia). In infants with a history of maternal opiate use, the baby should be observed for at least 48 hours for signs of withdrawal [83]. The timing of discharge, however, often depends on family, social, and treatment issues surrounding the mother. Involvement of social workers and, when appropriate, child protective agencies is key in helping a physician assess the home environment and whether it is safe to discharge the infant. A non-judgmental, supportive atmosphere may help to ensure future compliance with pediatric follow-up and any maternal rehabilitation that may be required.

Guidelines for discharge

History

The management of newborns in the hospital was first addressed by the AAP in the 1940s. The Committee on Fetus and Newborn published a manual, followed by the first edition of “Standards and Recommendations for Hospital Care of Newborn Infants” in 1948 [84]. Although initial editions of this publication addressed general care, social, and follow-up issues, the timing of discharge was not mentioned specifically until the sixth edition in 1977 [85]. This edition suggested a 72- to 96-hour length of stay. In 1983, the AAP and the ACOG jointly published the first edition of “Guidelines for Perinatal Care,” in which the intent of the postpartum hospitalization was clearly defined as a period in which the baby and mother could be observed for medical complications and the family could be prepared for their role as caregivers [86]. A 1995 policy statement by the AAP laid out specific minimum criteria for discharge [87], and it stressed that meeting these criteria is not likely to occur in less than 48 hours. Another key point to the policy statement was the requirement that a follow-up visit occur within 48 hours of any infant discharged early (<48 hours) and that the visit be reimbursed separately from the hospital stay.

Minimum criteria for discharge

The discharge criteria laid out in the 1995 AAP policy statement have been incorporated into the latest editions of “Guidelines for Perinatal Care” [1] and include the following recommendations.

- The antepartum, intrapartum, and postpartum courses for the mother and the neonate are uncomplicated.
- Delivery was vaginal.
- The neonate is a single birth at 38 to 42 weeks’ gestation, and birth weight is appropriate for gestational age according to appropriate intrauterine growth curves.
The neonate’s vital signs are documented to be normal and stable for the 12 hours before discharge, including a respiratory rate of fewer than 60 breaths/min, a heart rate of 100 to 160 beats/min, and an axillary temperature of 36.1°C to 37°C (97°F–98.6°F) in an open crib with appropriate clothing.

- The neonate has urinated and has passed at least one stool.
- The neonate has completed at least two successful feedings, and documentation has been made that the neonate is able to coordinate sucking, swallowing, and breathing while feeding. If breastfeeding, an actual feeding should be observed by a caregiver knowledgeable in breastfeeding, and documentation of latch, milk transfer, maternal pain, maternal comments, and infant satiety should be made in the medical record.
- Physical examination reveals no abnormalities that require continued hospitalization.
- There is no evidence of excessive bleeding at the circumcision site for at least 2 hours.
- There is no evidence of significant jaundice in the first 24 hours of life (noninvasive means of detecting jaundice may be useful).
- The mother’s (or, preferably, both parents’) knowledge, ability, and confidence to provide adequate care for the neonate are documented by the fact that the following training and information has been received:
  - Condition of the neonate.
    The breastfeeding mother-neonate dyad should be assessed by trained staff regarding nursing position, latch-on, adequacy of swallowing, and woman’s knowledge of urine and stool frequency.
  - Umbilical cord, skin, and newborn genital care and temperature assessment and measurement with a thermometer should be reviewed.
  - The mother should be able to recognize signs of illness and common newborn problems, particularly jaundice.
  - Instruction in proper newborn safety (eg, proper use of a car seat and positioning for sleeping) should be provided.
- Family members or other support persons, including health care providers such as the family pediatrician or his or her designees, who are familiar with newborn care and are knowledgeable about lactation and the recognition of jaundice and dehydration are available to the mother and the neonate for the first few days after discharge.
- Laboratory data are available and have been reviewed, including:
  - Maternal syphilis, hepatitis B virus surface antigen (HbsAg), and HIV status.
  - Umbilical cord or newborn blood type and direct Coombs’ test result, as clinically indicated.
- Screening tests have been performed in accordance with state requirements. If a test was performed before 24 hours of milk feeding, a system for repeating the test during the follow-up visit must be in place in accordance with local or state policy.
• Initial hepatitis B vaccine has been administered or an appointment has been scheduled for its administration, and the importance of maintaining newborn immunization has been stressed.

• A physician-directed source of continuing medical care for the mother and the neonate has been identified. For newborns discharged before 48 hours after delivery, an appointment has been made for the neonate to be examined within 48 hours of discharge. The follow-up visit can take place in a home or clinic setting, as long as the personnel who examine the neonate are competent in newborn assessment and the results of the follow-up visit are reported to the neonate’s physician or designees on the day of the visit.

• Family, environmental, and social risk factors have been assessed. When risk factors are present, the discharge should be delayed until they are resolved or a plan to safeguard the newborn is in place. Such factors may include, but are not limited to:
  - Untreated parental substance use or positive urine toxicology test results in the mother or the newborn.
  - History of child abuse or neglect.
  - Mental illness in a parent who is in the home.
  - Lack of social support, particularly for single, first-time mothers.
  - No fixed home.
  - History of untreated domestic violence, particularly during this pregnancy.
  - Adolescent mother, particularly if other risk factors are present.


Follow-up for discharge in less than 48 hours

The “Guidelines for Perinatal Care” also state that for infants discharged at less than 48 hours after delivery, it is essential that they be examined by “experienced health care providers within 48 hours of discharge” [1]. If this visit cannot be assured, then the discharge should be delayed. The purpose of this postdischarge visit is to perform the following assessments:

• Assess the newborn’s general health, hydration, and degree of jaundice and identify any new problems.
• Review feeding pattern and technique, including observation of breastfeeding for adequacy of position, latch-on, and swallowing.
• Assess historical evidence of adequate stool and urine patterns.
• Assess quality of maternal-neonate interaction and details of newborn behavior.
• Reinforce maternal or family education in neonatal care, particularly regarding feeding and sleep position.
• Review results of laboratory tests performed at discharge.
• Perform screening tests in accordance with state regulations and other tests that are clinically indicated.
• Identify a plan for health care maintenance, including a method for obtaining emergency services, preventive care and immunizations, periodic evaluations and physical examinations, and necessary screening.


Not all states require insurance companies to pay for an early follow-up visit, which further complicates early discharges even in appropriate situations.

Summary

Guidelines in medicine never should be mistaken for strict edicts. They should provide a framework to direct the physician in his or her decision making. In determining the timing of postnatal discharge, each mother-baby pair must be evaluated in the context of the guidelines summarized in this article as proposed by the AAP and the ACOG. In addition to these guidelines, many factors must be considered, including medical risk factors in the neonate and mother, previous experience with childbearing (including breastfeeding), psychosocial and financial state of the family, the ability of the family to care for the infant, and the availability of follow-up care. Only after a multifactorial analysis is made can the length of stay for each neonate be determined. Although costs and third-party payer considerations cannot be ignored, the timing of discharge must be between the physician and the family and must be free of financial pressures. When done correctly and efficiently, the postnatal hospitalization can ensure the immediate health and well-being of the newborn during transition and prepare the family for their vital role in the future health and well-being of their baby.

References


