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A guide to providing wide-ranging care to newborns

Here's how to refine your care, which includes an assessment of neonatal feedings, the evaluation of jaundice and fever, and the prevention of SIDS.

PRACTICE RECOMMENDATIONS

› Include a full work-up and empiric antibiotics in the initial management of all febrile infants ≤ 28 days of age. **A**

› Recommend that newborns breastfeed exclusively (in the absence of contraindications) for 6 months and continue some breastfeeding until the baby is at least 12 to 24 months of age. **A**

› Screen all newborns for jaundice before discharge by 1) clinical assessment or 2) testing for total serum bilirubin (TSB) or transcutaneous bilirubin (TcB); measurement of TcB provides a reasonable estimate of the TSB level in healthy newborns at levels < 15 mg/dL. **B**

Strength of recommendation (SOR)

- A** Good-quality patient-oriented evidence
- B** Inconsistent or limited-quality patient-oriented evidence
- C** Consensus, usual practice, opinion, disease-oriented evidence, case series

Caring for a newborn can be a source of joy for family physicians (FPs). In this article, we examine care provided in the first month of life, including a thorough physical examination, safe hospital discharge procedures, assessment of neonatal feeding, evaluation of jaundice and fever, and prevention of sudden infant death syndrome (SIDS). In addition, we describe how FPs can support women of child-bearing age between pregnancies, with the goal of reducing the risk of adverse outcomes in future pregnancies. (See “Your role in risk assessment and interventions during the interconception period” on page E8.)

Ensuring a thorough exam, making use of a discharge checklist

Before parents leave the hospital with their newborn, it is essential that they receive written and verbal counseling on important issues in neonatal care. A discharge checklist can help make sure all topics have been covered.¹ A hearing screen and pulse oximetry before discharge are required for all newborns in most states, in addition to important preventive counseling for parents. **TABLE 1**² and **TABLE 2**² summarize important newborn physical exam findings and common skin conditions. Parents should be given additional written information regarding prevention of SIDS and proper use of car seats.

Hospital physicians should assess maternal medical and psychosocial readiness for discharge. Through shared decision-making with the newborn's parents, physicians should create a plan for outpatient follow-up. Assessment through a physician home visit can provide safe and effective care similar to what is provided at a visit to an office medical practice.³⁻⁷ A follow-up appointment should be made 2 to 5 days before discharge, preferably connecting the newborn to a medical home where comprehensive health care services are offered.^{1,5,6,8}

TABLE 1

Critical aspects of the neonatal physical exam²

Body part	Examination and comment
Skull	Assess for shape Palpate fontanelles Examine the scalp for lesions, such as cephalohematoma (risk factor for jaundice)
Eyes	Assess for shape, appearance of conjunctivae and sclerae, and spacing between eyes Test red reflex (if abnormal, refer urgently to Ophthalmology)
Ears	Assess size, shape, and position (abnormal position by assessment can be a sign of a genetic defect) Evaluate hearing (all newborns)
Nose	Assess patency of nose
Mouth	Assess palate for clefts Check length of frenulum (short frenulum can cause difficulty breastfeeding)
Neck	Look for full range of motion (to rule out torticollis) Palpate for masses (can represent cystic hygroma or thyroglossal duct cyst) Evaluate clavicles to ensure no fracture, particularly if shoulder dystocia was present at delivery
Heart	Auscultate for normal S1 and split S2 sounds (keep in mind that benign murmurs are common) Screen for congenital heart disease with pulse oximetry. This is recommended for all newborns at 24 hours of life
Lungs	Observe for signs of respiratory distress (nasal flaring, grunting, retractions) Auscultate breath sounds; they should be equal
Skin	Assess for skin findings (many are common in newborns: nevus simplex, hemangioma, erythema toxicum, milia; most are benign) Evaluate for jaundice before discharge and at office follow-up visits
Abdomen	Listen for bowel sounds Palpate for masses and umbilical hernia. (Hernias are common in newborns and infants; most resolve without intervention by 3 years of age)
Genitourinary systems	Females: Prominent labia and a small amount of blood or white discharge (due to withdrawal of maternal estrogen) may be observed Males: Both testes should be palpable in the scrotum or be able to be milked down into the scrotum. (Swelling in one testicle is often a hydrocele, which can transilluminate and usually is reabsorbed in the first year or 2 of life) Palpate inguinal canal for hernia (all newborns)
Anus	Examine for patency and sacral dimples
Extremities	Evaluate for appearance and correct number of digits (supernumerary digits are usually benign but can be removed for cosmetic concerns) Evaluate the hips for dysplasia (Barlow and Ortolani maneuvers) Request further imaging routinely for females born breech
Central nervous system	Assess reflexes and tone

Age, gestational age, risk factors for hyperbilirubinemia, and the timing and level of bilirubin testing should be considered when establishing a follow-up interval. Most new-

borns who are discharged before 72 hours of age should have a follow-up visit in 2 days; a newborn who has a recognized risk factor for a health problem should be seen sooner.

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TABLE 2

Common neonatal skin findings²

Finding	Description	Location and typical course
Cutis marmorata telangiectatica congenita	Mottling of skin caused by vascular dilation	Usually lower extremities Resolves with warmth
Erythema toxicum neonatorum	Papules with an erythematous base that often evolve into vesicles	Face and trunk Usually resolves in 5-7 days; can recur
Hemangioma	Vascular tumor caused by increased growth of endothelial cells on blood vessels	Nonspecific location Often shrinks over time
Miliaria	Erythematous papules and pustules that develop secondary to obstruction of sweat glands	Face, neck, and trunk Self-limiting; avoiding over-heating and tight clothing can help resolution
Milia	White-yellow papules	Face and nose Can persist for months
Mongolian spots	Blue-gray macules ≤10 cm in diameter	Buttocks and legs Usually resolves within the first few years of life, but can take years
Neonatal acne	Open or closed comedones	Face and upper body Resolves within a few months
Nevus simplex (stork bite)	Pink-red capillary dilation	Face, nape of neck, upper eyelid Usually fades over time
Transient neonatal pustular melanosis	2- to 5-mm pustules with a hyperpigmented nonerythematous base; can leave a hyperpigmented macule with scale	Face, neck, back Macules can persist for months

Newborns in the “low-risk zone” (ie, no recognized risk factors) should be seen based on age at discharge or need for breastfeeding support.⁹

Tracking baby’s weight, ensuring proper feeding

A newborn who is discharged at 24 hours of life, or sooner, should be seen in the office within 2 days of discharge to 1) ensure that he (she) is getting proper nutrition and 2) monitor his weight^{1,3,5} (TABLE 3¹⁰⁻¹³). All newborns should be seen again at 2 weeks of life, with additional visits more frequently if there are concerns about nutrition.¹

Recording an accurate weight is critical; the newborn should be weighed completely undressed and without a diaper. Healthy newborns can safely lose up to 10% of birth weight within the first week of life; they should be back to their birth weight by ap-

proximately 2 weeks of life.^{10,11} A healthy newborn loses approximately 0.5 to 1 oz a day;¹¹ greater than 10% loss of birth weight should trigger a thorough medical work-up and feeding assessment.

■ **Breastfeeding.** For breastfeeding mothers, physicians should recommend on-demand feeding or a feeding at least every 2 or 3 hours. Adequate intake in breastfed infants can be intimidating for new parents to monitor, but they can use a written chart or any of several available smartphone applications to document length and timing of feeds and frequency of urination and bowel movements. By the fifth day of life, a newborn should be having at least 6 voids and 3 or 4 stools a day.¹⁰⁻¹²

In addition, physicians can counsel parents on what to look for—in the mother and the newborn—to confirm that breastfeeding is successful, with adequate nutritional intake (TABLE 3¹⁰⁻¹³). Physicians should rec-

TABLE 3

Assessment of newborn feeding and weight gain in breastfed infants¹⁰⁻¹³

Questions about the mother	Questions about the newborn
Has she experienced engorgement?	Does he (she) feed at least 8 to 12 times daily?
Do the breasts feel softer after feedings?	Does he complete feedings in 15 to 45 minutes?
Are there risk factors for delayed lactogenesis (cesarean section, maternal obesity, large gestational age, prolonged second stage of labor, flat or inverted nipples)?	Does he self-detach from the breast after most feedings?
Does latch occur without difficulty, pain, or pinching?	Does he sleep between most feedings?
Is there an audible swallow with feedings?	Has he lost more than 8%-10% of birth weight?
Are there signs of milk ejection reflex (breast tingling, uterine cramping, dry mouth)?	Has he returned to birth weight by Day 14 of life?
	Does he produce 6 voids and 3 or 4 stools per day by the fifth day of life?

ommend against providing a pacifier to breastfeeding infants during the first several weeks of life—or until breastfeeding is well established (usually at 3 or 4 weeks of age). The World Health Organization (WHO) recommends against providing bottles, pacifiers, and artificial nipples to breastfeeding newborns.¹⁴ Liquids other than colostrum or breast milk should *not* be given unless there is a documented medical need, such as inadequate weight gain or feeding difficulty.¹⁵ If the newborn experiences early latch difficulties, supplementation with expressed breast milk is preferable to supplementation with formula. Assistance from a trained lactation consultant is a key element in the support of the breastfeeding dyad.^{11,12,16}

Breastfeeding optimizes development of the newborn's immune system, thus bolstering disease prevention; it also assists with maternal postpartum weight loss and psychological well-being. Exclusively or primarily formula-fed newborns are at increased risk of gastrointestinal, ear, and respiratory infections throughout infancy and childhood; type 1 diabetes mellitus; asthma; childhood and adult obesity; and leukemia.^{17,18} Mothers who feed their newborn primarily formula increase their own risk of obesity, type 2 diabetes mellitus, ovarian and breast cancer, and depression.¹⁷⁻²²

Infant feeding is a personal and family choice but, in the absence of medical contraindications—such as maternal human immunodeficiency virus infection and galac-

tosemia—exclusive breastfeeding should be recommended.^{17,18} FPs are well suited to support the mother-infant breastfeeding dyad in the neonatal period, based on expert recommendations. Specifically, the American Academy of Family Physicians (AAFP) and American Academy of Pediatrics (AAP) recommend that all infants be exclusively breastfed for the first 6 months of life and continue some breastfeeding through the first year or longer.^{17,18} WHO recommends breastfeeding until 24 months of age—longer if mother and infant want to, unless breastfeeding is contraindicated.^{14,17,18}

Physicians should provide up-to-date information to parents regarding the risks and benefits of feeding choices. Support for breastfeeding mothers postnatally has been shown to be helpful in lengthening the time of exclusive breastfeeding.¹² Certain medications pass through breast milk, and updated guides to medication cautions can be found at the National Institutes of Health's LACT-MED Web site (<https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm>).¹³ In many cases, when a maternal medication is incompatible with breastfeeding, the family physician can consider substituting another appropriate medication that is compatible.

Physician recommendation and support improves the rate of breastfeeding, but many mother-infant dyads require additional support to maintain breastfeeding for the recommended duration; such support can take the form of a certified lactation consultant or

➤ Adequate intake in breastfed infants can be intimidating for new parents to monitor, but they can use a written chart or any of several available smartphone applications.

Your role in risk assessment and interventions during the interconception period

Interconception care is the care of women of childbearing age between pregnancies (from the end of a pregnancy to conception of the next). It includes medical and psychological interventions to modify their risk factors to improve future birth outcomes. In 2006, the Centers for Disease Control and Prevention Work Group and Select Panel on Preconception Care recommended risk assessment and intervention in the interconception period, especially for women who have experienced previous adverse outcomes of pregnancy.¹

After the birth of a child, many women who had been receiving regular prenatal care stop seeing providers for their health care or return to a pattern of fragmented care.²⁻⁴ They often revert to behaviors, such as smoking and substance abuse, that put future pregnancies at risk.^{2,4,5} In addition, the maternal and family focus often shifts from caring for the woman to caring for the newborn, ignoring the health care needs of the mother.^{2,4,5}

The IMPLICIT (Interventions to Minimize Preterm and Low birth weight Infants through Continuous Improvement Techniques) Network is a perinatal quality collaborative of family medicine residency programs and community health centers that uses continuous quality improvement processes to improve the health of women and decrease preterm birth and infant mortality.^{6,7} The IMPLICIT interconception care model targets 4 risk factors that not only meet the model's requirements, but have a solid base of evidence⁵⁻⁸ by which to mitigate those risk factors and thus improve birth outcomes:

- tobacco use
- depression risk
- use of contraception to prolong interpregnancy interval
- use of a multivitamin with folic acid.

During newborn and well-child visits, screening for maternal health in these 4 key areas and providing point-of-care interventions can markedly improve maternal and perinatal health outcomes. Although the IMPLICIT Network continues to engage in the study of this model of addressing maternal health during newborn and infant visits, initial evidence demonstrates that these interventions exert positive effects on modifiable risk factors.^{6,8,9}

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counselor, doula, or peer counselor.²³⁻²⁵ Although structured breastfeeding education in the antenatal period has been demonstrated to be effective in improving breastfeeding initiation and duration, recent research shows

that support groups and assistance from the professionals previously mentioned also improve the breastfeeding rate.²⁶⁻²⁸

The AAFP recommends that FPs' offices adopt specific, evidence-based practices that

can have an impact on breastfeeding initiation and duration. Such practices include phone and in-person breastfeeding support from nursing staff and removing any formula advertisements from the office.¹⁷

■ Formula feeding. When parents choose formula feeding, most infants tolerate cow's milk-based formula.²⁹ For healthy term infants, differences between brands of formula are generally insignificant. Soy-protein formulas are of value only if lactose intolerance is strongly suspected, such as after prolonged episodes of loose stools. Even then, intolerance is usually transient and cow's milk-based formula can be tried again in 2 to 4 weeks.

Physicians should recommend 20 kcal/oz of iron-fortified formula for infants who are fed formula—except in special circumstances, such as premature newborns, who may require a more calorie-dense formula. Parents should pay special attention to the manufacturer's instructions for mixing formula with water because overdilution can cause hyponatremia. Typical volume for newborns should be at least 15 to 30 mL/feed for the first few days; newborns should not go more than 4 hours between feedings. Within the first week, newborns will start taking 60 to 90 mL/feed and increase that gradually to approximately 120 mL/feed by the end of the first month of life. On average, infants need a little more than 100 kcal/kg of body weight a day; for a 3.5-kg infant, that is at least 500 mL of formula over the course of a day.^{17,22}

Because formula does not contain fluoride, physicians should recommend that parents mix formula that is provided as a powder with fluoridated water. Low-iron formula offers no advantage; feeding with it will cause iron-deficiency anemia in most infants.

When tongue-tie interferes with feeding

Tongue-tie—or ankyloglossia, an atypically short or thick lingual frenulum—is present in 3% to 16% of all births. The condition can make breastfeeding difficult; result in poor neonatal weight gain; and cause sore nipples in 25% to 44% of cases.³⁰ Once tongue-tie is noted, the physician should talk to the mother about the history of feeding success,

including whether her nipples are sore and whether the newborn is having difficulty feeding (ie, transferring milk). The Hazelbaker Assessment Tool for Lingual Frenulum Function and the simpler Bristol Tongue Assessment Tool can be used to assess the severity of tongue-tie.³⁰⁻³⁵

When tongue-tie interferes with feeding, a physician who is not trained in treatment can refer the mother and infant to a specialist in the community. Frenotomy has been used for many years as a treatment for tongue-tie; improvement in nipple pain and the mother-reported breastfeeding score have been reported postoperatively in several studies.³⁰⁻³³

Ensure proper vitamin D intake through supplementation

Newborns should consume 400 IU/d of supplemental vitamin D to prevent deficiency and its clinical manifestation, rickets, or other associated abnormalities of calcium metabolism. Deficiency of vitamin D has also been linked to a number of other conditions, including developmental delay and, possibly, type 1 diabetes mellitus in childhood and cardiovascular disease later in life.³⁶

In the first months of life, few infants who are solely formula-fed will consume a full liter daily; for them, supplementation of vitamin D for at least one month should be prescribed.³⁵ For breastfed infants, high-dosage maternal vitamin D supplementation may be effective, precluding infant oral vitamin D supplementation³⁶; however, neither the AAFP nor the AAP has issued guidance promoting maternal supplementation in lieu of direct oral infant supplementation.³⁷

Jaundice prevention—and recognition

An elevated bilirubin level is seen in most newborns in the first days of life because of increased production and decreased clearance of bilirubin—a condition known as *physiologic jaundice*. Conditions that aggravate physiologic hyperbilirubinemia include inborn errors of metabolism, ABO blood-group incompatibility, hemoglobin variants, and inflammatory states such as sepsis. It is important to distinguish physiologic jaun-



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➤
The total serum bilirubin level should be tested in every newborn who has clinical jaundice in the first 24 hours of life.

dice from *exaggerated physiologic* and *pathologic* forms of hyperbilirubinemia; the latter is a medical emergency. Before we get to that, a word about prevention.

■ **Prevention.** Because poor caloric intake and dehydration are associated with hyperbilirubinemia, physicians should advise breastfeeding mothers to feed their newborn at least 8 to 12 times daily during the first week of life. However, routine supplementation of liquids other than breast milk should be discouraged in newborns who are not dehydrated.³⁸

All pregnant women should be tested for ABO and Rh (D) blood types and undergo serum screening for isoimmune antibodies. Randomized trials have demonstrated that the incidence of significant hyperbilirubinemia can be reduced if, for Rh-negative mothers and those who did not undergo prenatal blood-group testing, infant cord blood is tested for 1) ABO and Rh (D) types and 2) direct antibody (Coombs' test).^{38,39}

■ **Screening and assessment.** It is recommended that all newborns be screened for jaundice before discharge by 1) assessment of clinical risk factors or 2) testing of transcutaneous bilirubin (TcB) or total serum bilirubin (TSB). Furthermore, because evidence shows that treating clinical jaundice can improve outcomes and rehospitalization, TSB should be measured in every newborn who has clinical jaundice in the first 24 hours of life. Measurement of TcB or TSB should also be performed on all infants in whom there appears to be clinical jaundice that is excessive for age.^{38,39}

During routine clinical care, TcB measurement provides a reasonable estimate of the TSB level in healthy newborns at levels less than 15 mg/dL,⁴⁰ although TcB testing might not be available in the outpatient office. An AAP management algorithm can help determine when a newborn should be seen for outpatient follow-up based on risk of hyperbilirubinemia; higher-risk newborns should be reevaluated in 24 hours.⁹ Outpatient visual assessment of jaundice for cephalocaudal progression—in a well-lit room, with a fully undressed newborn—correlates well with TSB test results. However, visual assessment should *not* be used alone to screen

for hyperbilirubinemia; recent studies have demonstrated that such assessment lacks clinical reliability.⁴⁰

■ **Laboratory assessment.** All bilirubin levels should be interpreted based on the newborn's age in hours. The need for phototherapy should be based on the zone (low, low-intermediate, high-intermediate, or high, as categorized in the AAP nomogram³⁸ in which the TSB level falls. **TABLE 4**³⁸⁻⁴⁰ provides recommendations for laboratory studies based on risk factors. Standard curves for risk stratification have been developed by the AAP.^{37,38}

■ **Treatment.** Decisions to initiate treatment should be based on the AAP algorithm.³⁸ When initiating phototherapy, precautions include ensuring adequate fluid intake, patching eyes, and monitoring temperature. Phototherapy can generally be stopped when the TSB level falls by 5 mg/dL or below 14 mg/dL. Home phototherapy, using a fiberoptic blanket, for uncomplicated jaundice (in carefully selected newborns with reliable parents) allows continued breastfeeding and bonding with the family, and can significantly decrease the rate of rehospitalization for infants older than 34 weeks.⁴¹

■ **Breastfeeding is often associated** with a higher bilirubin level than is seen in infants fed formula exclusively; increasing the frequency of feeding usually reduces the bilirubin level. So-called breast-milk jaundice is a delayed, but common, form of jaundice that is usually diagnosed in the second week of life and peaks by the end of the second week, resolving gradually over one to 4 months. If evaluation reveals no pathologic source, breastfeeding can generally be continued. Temporary discontinuation of breastfeeding to consider a diagnosis of breast-milk jaundice or other reasons for an elevated bilirubin level increases the risk of breastfeeding failure and is usually unnecessary.^{12,37,39}

Fever—a full work-up, thorough history are key

Concern about serious bacterial illness (SBI) makes the evaluation of fever critical for those who care for newborns. Many studies have attempted to identify which newborns

TABLE 4

Findings that should trigger laboratory evaluation of jaundice in the term or late-preterm newborn³⁸⁻⁴⁰

Clinical or laboratory finding	Laboratory evaluation
Jaundice in the first 24 hours of life	TcB or TSB assay, or both
Newborn receiving phototherapy or with a rapidly rising bilirubin level (ie, crossing percentiles on the curve of the hyperbilirubinemia calculator)	Blood type, Coombs' test, complete blood count and peripheral smear Consider G6PD assay and reticulocyte count Repeat TSB assay in 4-24 hours
TSB level approaching exchange transfusion level or unresponsiveness to phototherapy, or both	Reticulocyte count, G6PD, and albumin
Elevated direct (conjugated) bilirubin	Urinalysis and urine culture Consider evaluation for sepsis
Jaundice at or beyond the third week of life	TSB and direct bilirubin assays If direct bilirubin level is elevated, initiate work-up for cholestasis Thyroid and galactosemia screens

G6PD, glucose-6-phosphate dehydrogenase; TcB, transcutaneous bilirubin; TSB, total serum bilirubin.

might be able to be cared for safely as outpatients to prevent unnecessary testing and antibiotics.^{5,42} Regrettably, SBI in infants remains difficult to predict, and protocols that have been developed may miss as many as 1 of every 10 newborns who has SBI.⁴³ Initial management of all infants 28 days old or younger with fever must therefore include a full work-up, including lumbar puncture and empiric antibiotics.⁴⁴

■ Evaluation. When an infant younger than 28 days has a fever, the physician should first verify that the temperature was taken rectally and how it was documented. In an infant who has a history of prematurity, it is crucial to correct for chronological age when deciding on proper evaluation.

Additional important findings in the history include a significant change in behavior, associated symptoms, and exposure to sick contacts. The maternal and birth history, including prolonged rupture of membranes, colonization with group B *Streptococcus*, administration of antibiotics at delivery, and genital herpes simplex virus (HSV) infection may suggest a cause for fever.⁴⁵

The evaluation of fever might include the white blood cell (WBC) count, blood culture, measurement of markers of inflammation, urine studies, lumbar puncture, stool

culture, and chest radiograph. Traditionally, the WBC count has been utilized as a standard marker for sepsis, although it has a low sensitivity and specificity for SBI, especially in newborns.⁴⁶ Blood cultures should be obtained routinely in the newborn with fever, and before antibiotics are administered in older infants.

Procalcitonin (PCT; a calcitonin precursor) and the inflammatory marker C-reactive protein (CRP) have been shown, in several large studies, to have relatively high sensitivity and specificity for SBI; measurement of these constituents may enhance detection of serious illness.⁴⁶⁻⁴⁹ In a large study of 2047 febrile infants older than 30 months, the PCT level was determined to be more accurate than the CRP level, the WBC count, and the absolute neutrophil count in predicting SBI.^{48,49} PCT shows the most promise for preventing a full fever work-up and empiric antibiotics. It has not yet been widely translated into practice, however, because of a lack of clear guidance on how to combine PCT levels with other laboratory markers and clinical decision-making.⁴⁸⁻⁵⁰

Urinalysis (UA) should be obtained for all newborns who present with fever. Traditionally, it was recommended that urine should be cultured for all newborns with fever; how-

TABLE 5

How to approach these well-known problems in the newborn²

Head, ears, eyes, nose, and throat (HEENT) findings

Thrush

Pearly white pseudomembranes on oral mucosa

Causes: Transmission from vaginal mucosa during delivery; contaminated fomites (nipples, both breast and bottle; toys, teething rings)

Treatment: Disinfect fomites (boil bottle nipples, toys); oral nystatin, 200,000-500,000 units every 4-6 hours until clear for 48 hours

Nasolacrimal duct obstruction

Symptoms usually delayed until days or weeks after birth

Treatment: Nasolacrimal massage 3 times a day and cleansing of eyelids with warm water; topical antibiotic (sulfacetamide or gentamicin drops) for secondary conjunctivitis

Strabismus

Misalignment of the eyes

Screening: Corneal light reflex and cover test

Treatment: Ophthalmology referral for persistent deviation persisting for more than several weeks or any deviation in patients >4 months of age

Hearing loss

Screening is recommended after delivery and when there is: a family history of hearing loss; a congenital infection; craniofacial abnormalities; birth weight <1500 g; hyperbilirubinemia requiring exchange transfusion; severe neonatal depression; bacterial meningitis

Screening: Oto-acoustic emissions testing or auditory brainstem response

Treatment: Treatment by 6 months can greatly improve language development; infants who do not pass testing should have an audiologic evaluation by 3 months of age (or by 6 weeks if cytomegalovirus is potentially the cause)

Teething

Painful gums secondary to eruption of teeth with irritability, drooling; fever and other systemic effects are not caused by teething

Treatment: Chewing on a soft cloth or teething ring hastens eruption; topical or systemic analgesics

Skin problems

Diaper dermatitis

Erythematous, scaly eruptions that may advance to papulovesicular lesions or erosions; may be patchy or confluent; crural folds are often spared

Cause: Reaction to overhydration of skin, friction, or prolonged contact with urine, feces, or chemicals

Treatment: Frequent diaper changes; exposure to air; bland, protective topical ointment (petrolatum, zinc oxide) after each diaper change; advanced cases may require 1% hydrocortisone ointment

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ever, more recent data show that the initial urinalysis is much more sensitive than once thought. In a study, UA was positive (defined as pyuria or a positive leukocyte esterase test, or both) in all but 1 of 203 infants who had bacteremic UTI (sensitivity, 99.5%).⁵¹

Stool culture is necessary in newborns only when they present with blood or mucus in diarrhea. Lumbar puncture should be performed in all febrile newborns and all

newborns for whom empiric antibiotics have been prescribed.^{43,44} A chest radiograph may be useful in diagnosis when a newborn has any other sign of pulmonary disease: respiratory rate >50/min, retractions, wheezing, grunting, stridor, nasal flaring, cough, and positive findings on lung examination.^{43,44}

■ **Treatment.** Management for all newborns who have a rectal temperature $\geq 38^\circ\text{C}$ includes admission to the hospital and em-

TABLE 5

How to approach these well-known problems in the newborn² (continued)

Skin problems (continued)	
Candida albicans superinfection	Pronounced erythema with sharp margins, satellite lesions, and involvement of genitocrural folds <i>Treatment:</i> Topical antifungal; treat associated thrush
Milia	Superficial 1-2 mm inclusion cysts; common on face and gingiva <i>Treatment:</i> None required
Miliaria	Clear or erythematous papulovesicles in response to heat or overdressing, especially in flexural areas <i>Treatment:</i> Resolves with cooling
Seborrheic dermatitis	Greasy yellow scaling of scalp or dry scaling of inguinal regions; may extend to other body parts <i>Treatment:</i> Usually clears spontaneously; may require 1% hydrocortisone cream; mild antiseborrheic shampoo can help with scalp lesions; mineral oil with gentle brushing after 10 minutes can treat thick scalp crusts
Atopic dermatitis	Intensely pruritic, dry, scaly, erythematous patches; lesions may weep; typically involves face, neck, hands, abdomen, and extensor surfaces of extremities; frequent subsequent development of allergic rhinitis and asthma <i>Evaluation:</i> Consider evaluation for food and other allergens <i>Treatment:</i> Mainstay is avoidance of irritants (temperature and humidity extremes, foods, chemicals) and frequent application of lubricants (apply to damp skin after bathing); severe disease usually requires topical steroids; acute lesions may require antihistamines (diphenhydramine, hydroxyzine)
Heart murmur	
Pathologic or organic murmur	Any diastolic murmur; consider when a systolic murmur has one or more of the following: grade III or louder, persistent through much of systole, presence of a thrill, single second heart sound or gallop <i>Other warning signs:</i> Congestive heart failure, cyanosis, tachycardia <i>Evaluation:</i> Chest radiograph, electrocardiogram; consider arterial blood gas analysis or cardiology consultation—or both

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piric antibiotics; guidance is based primarily on expert consensus. Common pathogens for SBI include group B *Strep*, *Escherichia coli*, *Enterococcus* spp., and *Listeria monocytogenes*.^{43,44} Empiric antibiotics, including ampicillin (to cover *L monocytogenes*) and cefotaxime or gentamicin should be started immediately after sending for blood, urine, and cerebrospinal fluid (CSF) cultures.⁴³⁻⁴⁵

All infants who are ill-appearing or have vesicles, seizures, or a maternal history of genital HSV infection should also be started on empiric acyclovir. Vesicles should be cultured and CSF should be sent for HSV DNA polymerase chain reaction before acyclovir is administered.⁴³⁻⁴⁵

Sudden infant death syndrome: Steps to take to minimize risk

SIDS is defined as the sudden death of a child younger than 1 year that remains unexplained after a thorough case investigation and comprehensive review of the clinical history. The risk of SIDS in the United States is less than 1 for every 1000 live births; incidence peaks between 2 and 4 months of age.⁵² In the United States, SIDS and other sleep-related infant deaths, such as strangulation in bed or accidental suffocation, account for more than 4000 deaths a year.⁵³ The incidence of SIDS declined markedly after the “Back to Sleep” campaign was launched in 2003, but has leveled off since 2005.⁵³⁻⁵⁵

CONTINUED

➤ The procalcitonin level was determined to be more accurate than the C-reactive protein level, the white blood cell count, and the absolute neutrophil count in predicting serious bacterial illness.

➤
Management for all newborns who have rectal temperature $\geq 38^{\circ}\text{C}$ includes admission to the hospital and empiric antibiotics.

TABLE 5

How to approach these well-known problems in the newborn² (continued)

Gastrointestinal disorders

Constipation

Intestinal dysfunction that makes it difficult or painful to evacuate the bowels

Causes: Commonly, anal fissures, undernutrition, dehydration, excessive milk intake, lack of bulk; less common in breastfed babies; rarely, caused by iron-fortified cereals

Treatment: In early infancy, increase the volume of fluid or add sugars; later, add juices (prune, apple) and other fruits, cereals, and vegetables; severe disease may require brief use of Milk of Magnesia (1-2 tsp), docusate sodium, and glycerin suppositories; persistent constipation requires that organic disease be ruled out

Gastroesophageal reflux disease (GERD)

Vomiting noted in 95% of babies by 6 weeks of age, resolving in 60% by 2 years of age; important to distinguish “spitting up” from true GERD—the latter may be associated with growth delay, esophagitis, occult blood-positive stool, chronic cough, wheezing

Diagnosis: Mild cases confirmed by history and therapeutic trial. If severe, test with esophageal pH probe and barium fluoroscopic esophagography; perform endoscopy if esophagitis is suspected. Consider cow’s milk allergy in the differential diagnosis

Treatment: Position prone for newborns; thickened feedings with cereal; acid suppression medication if esophagitis is present

Anemia

Improved nutrition has reduced the incidence, but infants remain at significant risk

Additional risk factors: Low socioeconomic status, consumption of cow’s milk before 6 months of age, non-iron-fortified formula, low birth weight, prematurity

Effects: Fatigue, apathy, impairment of growth, and decreased resistance to infection

Causes: Most often, iron deficiency, also, sickle-cell disease, thalassemia, lead toxicity

Treatment: If anemia is microcytic, begin trial of iron (as elemental iron, 3-6 mg/kg/d; if not microcytic or if unresponsive to iron, consider other causes (family history, environment)

Sleep disturbance (ie, infant’s sleeping pattern disrupts parents’ sleep)

Many 6-month-olds no longer require nighttime feeding

Screening: Sudden change in sleeping pattern should prompt a search for new stressors, whether physical (eg, infection, esophageal reflux) or emotional (eg, new surroundings, new household members)

Treatment: Establish realistic parental expectations (ie, consider natural sleeping patterns of the infant); allow the infant awakening at night so that she (he) can learn to fall asleep by herself (eg, keep bedtime rituals simple and put the infant in bed awake; do not respond to infant’s first cry; keep interactions during the night brief and simple; provide a security object for older infants); slowly change undesirable sleeping patterns (eg, move bedtime up 1 hour and awaken infant earlier in the morning); reduce daytime napping

Numerous risk factors for SIDS have been identified, including maternal factors (young maternal age, maternal smoking during pregnancy, late or no prenatal care) and infant and environmental factors (prematurity, low birth weight, male gender, prone sleeping position, sleeping on a soft surface or with bedding accessories, bed-sharing (ie, sleeping in the parents’ bed), and overheating. In many cases, the risk factors are modifiable; sleeping in the prone position is the most meaningful modifiable risk factor.

To minimize the risk for SIDS, parents should be educated on the risk factors—prenatally as well as at each infant well visit. Home monitors have *not* been proven to reduce the incidence of SIDS and are not recommended for that purpose.⁵⁴⁻⁵⁷ Although evidence is strongest for supine positioning as a preventive intervention for SIDS, other evidence-based recommendations include use of a firm sleep surface; breastfeeding; use of a pacifier; room-sharing with parents

without bed-sharing; routine immunization; avoidance of overheating; avoiding falling asleep with the infant on a chair or couch; and avoiding exposure to tobacco smoke, alcohol, and drugs of abuse.^{55,56} A recent systematic review showed that large-scale community interventions and education campaigns can play a significant role in parental and community adoption of safe sleep recommendations; however, families and communities rarely exhibit complete adherence to safe sleep practices.⁵⁷

Other concerns in the first month of life and immediately beyond

In TABLE 5,² we list additional common newborn problems not reviewed in the text of this article and summarize evidence-based treatment strategies.

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