CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care

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Risks of Infectious Diseases in Newborns Exposed to Alternative Perinatal Practices

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The purpose of this report is to educate providers about the risk of infectious diseases associated with emerging alternative peripartum and neonatal practices. This report will provide information pediatricians may use to counsel families before birth and to appropriately evaluate and treat neonates who have been exposed to these practices.

BACKGROUND AND STATEMENT OF PROBLEM

An increasing number of alternative peripartum and neonatal practices have emerged in delivery settings. Pediatric providers may be asked about these practices during prenatal counseling, or they may encounter situations in which these practices have already occurred. Being familiar with the risks and benefits associated with these alternative practices allows the pediatric practitioner to provide balanced education and counseling to families and perform appropriate evaluation and treatment when indicated.

The purpose of this report is to educate pediatric providers about emerging alternative peripartum and neonatal practices, provide information which providers may use for counseling of expectant parents, and highlight the necessity of risk assessment for infections. Alternative birth practices discussed in this report include water immersion for labor and delivery, vaginal seeding, umbilical cord nonseverance, placentophagy (placental consumption), nonmedical deferral of birth hepatitis B vaccination, deferral of ocular prophylaxis, and delayed bathing. Discussion of these practices should not serve as an endorsement by the American Academy of Pediatrics (AAP) (unless endorsement has been given in other AAP policies).

WATER IMMERSION FOR LABOR AND DELIVERY

Water immersion birth refers to giving birth in warm water with the goal of creating a gradual transition from the in utero environment

abstract

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while decreasing stress and increasing comfort for the pregnant individual. Most birthing centers have birthing tubs, and there is increasing interest for birthing hospitals to have tubs, primarily for laboring. Planned water births may also occur within the home, with midwives in attendance. At this time, no data are available on the number of water births that occur in the United States.

Several clinical trials assessed both maternal and neonatal outcomes associated with water immersion during labor and delivery. Most recently, these studies have been reviewed in a meta-analysis.[1] Immersion during the first stage of labor has been shown to decrease the use of regional anesthesia, but had no impact on mode of delivery, although overall cesarean rates were low for all groups in the studies. During the second stage of labor, water immersion did not show any benefits, nor any differences in outcomes, for the pregnant individual. The trial data were limited in evaluating for infectious outcomes in the immediate neonatal period, with only 2 low-quality trial data for the second stage of labor. The time period used for infection assessment was not long enough to capture potential sepsis events that could be caused by waterborne pathogens such as *Legionella* species, which may require a longer incubation period than the 7 days defined for early-onset sepsis.

A joint recommendation from the AAP and the American College of Obstetricians and Gynecologists (ACOG)[2] in 2014 acknowledged the maternal benefits of water immersion during the first stage of labor but cautioned against the use for the second stage of labor or during delivery because of insufficient current evidence of benefit and rare but serious neonatal complications. These recommendations were reiterated in a statement from the ACOG in 2016.[3] That statement also advised that birthing centers using water immersion develop procedures for cleaning the tubs, for safe monitoring of mothers and fetuses during water-immersion labor, and for timely and safe removal of persons from the tub should immediate intervention be needed.

Although no increase in adverse outcomes has been noted in clinical trials involving water immersion during labor, there have been case reports and case series of complications in newborn infants. Complications have included hypothermia, drowning or near-drowning, respiratory distress, and infections. The primary infectious risk to the newborn infant is exposure to waterborne organisms.[4] Waterborne infections can occur when there is a high bacteria load in the water supply (such as from temperature dysregulation of the water from recirculating pumps or prefilling the tub days before delivery) or aerosolization of the water (through jetted tubs). There are several reports of infections and deaths from *Pseudomonas* species[5–7] and *Legionella* species.[8–13] Overall incidence of neonatal infection is unknown given the lack of a reporting structure to determine the frequency of water immersion births and their outcomes. Future trials should endeavor to capture neonatal outcomes (culture-positive and -negative sepsis, deaths) from water immersion births.

Caregivers and parents should recognize that neonatal sepsis events may still be linked to the water birth, even if the infant was initially well. For an infant who develops respiratory distress or symptoms of possible sepsis in the first 4 weeks after an immersion birth, assessment and treatment of neonatal sepsis may need to encompass evaluation and antibiotic coverage for water-borne organisms such as *Pseudomonas* and *Legionella*. This is particularly important in cases of culture-negative sepsis with pneumonia that are poorly responsive to empirical first line antibiotics, raising concern for *Legionella*.

Families should be cautioned against water birth during and past the second stage of labor, in the absence of any current evidence to support maternal or neonatal benefit, and with reports of serious and fatal infectious outcomes in infants. Midwives and obstetricians offering this option must ensure that appropriate infection-control strategies (including rigorous cleaning and disinfection) are in place to reduce risk of infection.

VAGINAL SEEDING

Infants born by vaginal birth are exposed to maternal vaginal bacteria, which are one of the contributing influences on the subsequent development of the infant's microbiome. This process is altered by cesarean delivery, which allows the flora from the birth parent to predominate. Vaginal seeding is the practice of inoculating an infant born by cesarean section with a sampling of fluid from the vagina of the birth parent. The process involves inoculating a cotton gauze or swab with vaginal fluids from the mother and transferring the gauze or swab to the mouth, nose, and/or skin of a newborn infant. A small pilot study has suggested that the difference typically seen between the microbiome of infants born by cesarean sections and those born by vaginal birth may be minimized through the exposure to vaginal bacteria through the vaginal seeding procedure.[14]

Epidemiologic studies have shown a link between a cesarean section birth and increased risk of development of allergies, asthma, and obesity. With emerging evidence regarding the importance of the microbiome in the developing immune system, concern has arisen that these associations could be related to an altered microbiome acquired at birth based on mode of delivery.[15,16] Nonvaginal delivery has been associated with alterations in the infant's microbiome, although these differences do not persist into later infancy.[17–19]

Other factors beyond the mode of delivery may influence initial colonization of an infant's skin and gastrointestinal tract. These include gestational age, duration of hospitalization, and antibiotic exposure (antenatal, intrapartum, and neonatal). Bacteria may be transferred from the birth parent to the infant through skin-to-skin contact and breastfeeding.* Breastfeeding provides significant influence on the infant microbiome, regardless of mode of delivery. Panneraj et al found 28% of the bacteria of the infant's microbiome are derived from human milk and 10% from the areolar skin of the birth parent.[20] Infants who are breastfed achieve a stool profile high in *Bifidobacterium* species earlier than those who are formula fed. There is currently no evidence that the transient alterations of the infant's gastrointestinal microbiome after cesarean delivery will result in long-term changes in the incidence of childhood and adult conditions attributed to cesarean deliveries.

Vaginal seeding may facilitate transmission of pathogens normally acquired by vertical transmission. Several risk-reduction strategies have had considerable effects on minimizing neonatal exposure to group B *Streptococcus* (GBS) (intrapartum penicillin prophylaxis), herpes simplex virus (HSV) (cesarean section to avoid contact with maternal active genital lesions), HIV (prenatal and intrapartum antiretroviral therapy, as well as postnatal prophylaxis), hepatitis B virus (HBV) (hepatitis B immune globulin [HBIG] and hepatitis B vaccination of the infant), and syphilis (prenatal treatment with therapeutic monitoring). The effects of these strategies to mitigate infectious risks in the infant undergoing vaginal seeding are unknown.

The practice of vaginal seeding is not recommended outside of a research setting. When counseling families who are considering vaginal seeding despite this recommendation, the need to minimize exposure to pathogens should be addressed as reasons to avoid this practice. If a mother has any known infections such as HSV with active lesions, GBS colonization, or HIV, providers should make strong recommendations against the procedure. For example, mothers with known GBS colonization should not undergo this procedure because it may introduce a large infacilities that promote breastfeeding oculum of the bacteria directly to the infant after birth. No data on safety and efficacy are available regarding intrapartum penicillin prophylaxis with the practice of vaginal seeding, or timing needed to provide adequate prophylaxis to the mother before obtaining the vaginal fluid for seeding. Families should be counseled regarding the risk of exposure to pathogens that may occur despite negative screening because of possible false-negative results or acquisition of the pathogen after the screening was completed. These concerns are compounded by the increased risk of infections in preterm infants, and vaginal seeding should not be considered in this population. In concordance with this AAP clinical report, the ACOG published a committee opinion on vaginal seeding, stating that the practice of vaginal seeding is not recommended outside of a research study because of current lack of evidence of benefit and risk of infectious exposure.[21]

When vaginal seeding has occurred, either as part of a trial or if disclosed to the health care provider, and the mother and infant remain asymptomatic, current evidence does not support evaluation for infection. If an infant born by cesarean section has undergone vaginal seeding and either the mother becomes febrile or the infant subsequently develops signs and symptoms of possible sepsis, such as tachypnea, temperature instability, lethargy, or poor feeding, it is important to perform a sepsis evaluation of the infant, with the additional interpretation of risks to include those that would occur if the infant had been delivered vaginally. This is of particular importance for HSV, in which delivery by cesarean with intact membranes would be expected to minimize HSV exposure and persons with HSV infection may shed virus without outward signs of genital lesions. Neonatal symptoms in the first days after delivery would raise concern for causes of early-onset sepsis, such as GBS and *Escherichia coli.* Development of

*Infants are fed human milk in many ways including pumping, donor milk, breastfeeding, and chestfeeding. Chestfeeding has become the accepted terminology if the lactating parent refers to their lactating organ as their chest. The term chestfeeding is often used for transgender and nonbinary parents to describe how they feed their infants. It can refer to human milk feeding directly from the nipple or attaching a feeding tube to the nipple if lactation is not possible. Given that breastfeeding is still the most frequently used term within clinical settings, breastfeeding will be used throughout this document.

symptoms beyond 48 hours of age should heighten concern for HSV.

UMBILICAL NONSEVERANCE

Umbilical nonseverance, colloquially known as lotus birth, is meant to allow the umbilical cord, and hence the placenta, to remain attached to the infant after birth. The tissues are allowed to dry (aided by preservatives and salting) until the cord detaches spontaneously; the latter usually happens within 3 to 10 days. The frequency of umbilical nonseverance among live births within the United States is unknown.

Compared with cutting the umbilical cord, nonseverance is purported by its adherents to allow a more prolonged, and hence easier, transition for the baby to separate in a "nonviolent" way (drying and breaking rather than cutting with scissors).[22,23] There has been no scientific study that measures the effects on the immediate or long-term cognitive or emotional development of infants who undergo cord cutting versus nonseverance.

Once the placenta is delivered, there is absence of circulation and, hence, the tissues become necrotic. Necrotic tissue is a source of nutrients to colonizing bacteria. After extrusion from the womb, the umbilical cord and placenta are colonized with myriad bacteria, including bacteria from the birth parent's genitourinary tract, the caregivers' hands or gloves, and the surrounding environment (including applied preservatives, salt, and cloth wrappings). Case reports have attributed infections (early-onset sepsis from coagulase-negative *Staphylococcus* species, neonatal endocarditis from *Staphylococcus lugdunensis*, and omphalitis) to retained umbilical cord, although a direct bacterial link between the systemic infection and the retained umbilical tissue was often not present.[24–27] There is currently no known evidence of late-onset sepsis resulting from a birth history that included umbilical cord nonseverance.

At this time, no formal recommendations or guidance exists from medical or clinical organizations regarding the use of this practice. Providers should appreciate that parents may regard the placenta as a spiritual entity and may not recognize that this tissue is capable of being contaminated with pathogens that would harm their infant.[22] Umbilical nonseverance has no clear evidence-based benefit to date.

Providers should conduct the routine assessment and management of an ill-appearing neonate. Any placenta and umbilical cord attached to the affected child should be immediately removed (particularly if necrotic tissue is evident). This tissue should be cultured because isolation of the same pathogens from the placental and umbilical tissue and the infant may establish pathogenesis of the illness. Given that a few case reports note the growth of coagulase-negative staphylococci, it may be prudent to include vancomycin as initial empirical coverage. Antimicrobial coverage for anaerobic bacteria may be included with the usual coverage for early-onset neonatal sepsis.

PLACENTOPHAGY

Placentophagy (otherwise known as placental consumption) is the practice of ingesting the entire placenta or portions of it. Placental consumption is observed in nonhuman mammals, presumably to avoid predators, to keep the nesting area clean, and to nourish the mother. Human placentophagy may be considered by some of its proponents as a spiritual event (celebrating the end of the pregnancy) or an opportunity to benefit from perceived medicinal properties.[23] Placental tissue is consumed raw by some or is prepared by cooking. The most popular method of preparation is to steam, dehydrate, and grind the tissue into a powder before encapsulation.

There are purported maternal benefits of placentophagy, including decreased postpartum depression, increased breast milk production, improved iron status, reduced postpartum pain, decreased uterine bleeding, and a general increase in energy. There have been no human studies regarding these benefits, outside of self-reported surveys.

Bacterial contamination of the consumed placenta may cause infection in the individual who handles and/or consumes these materials. The placenta, once extruded from the body, is colonized with maternal genito-urinary flora. Handling and preparation of the placenta for consumption may also introduce bacterial contamination. The latter may come from the individual (usually the mother) who prepares the placenta, or from companies who perform placental processing. Methods to reduce infectious contamination include heating (steaming) and/or dehydration. The optimal temperature and duration of cooking or dehydration is unclear for eradication of GBS, HIV, HBV, or hepatitis C virus, given that these are not foodborne pathogens, which would be typically tested by food safety organizations. There is no industry standard, formal certification, or regulation for placental processing, although some companies advertise their training in food safety handling.

One publication offers direct evidence that placental consumption

resulted in neonatal harm.[29] Recurrent GBS sepsis in a neonate was attributed to placental consumption by the parent. The placental capsules contained the identical strain identified in both episodes of neonatal sepsis in the infant. Ingestion by the birth parent was believed to increase that individual's colonization and, hence, increase risk of horizontal transmission of GBS.

For families that practice placentophagy despite medical recommendations, practices for food safety should be emphasized. Out of an abundance of caution, these practices may include those recommended at the level of handling raw meat. Careful hand hygiene, separating placental products from other food sources, and meticulous cleaning of cutting boards, utensils, and countertops may limit bacterial cross-contamination. Any remaining placental product should be provided for bacterial testing in the event of illness suspected to be secondary to placentophagy.

Clinical assessment and management of a febrile and/or ill-appearing newborn infant whose family member(s) practiced placentophagy should proceed as they would in any febrile and/or ill-appearing newborn infant. If available, any remaining capsules or tissue should be examined to determine whether the placenta is the source of neonatal illness.

NONMEDICAL DEFERRAL OF THE HEPATITIS B VACCINE BIRTH DOSE

HBV is a sexually transmitted and blood-borne pathogen that is transmitted perinatally from birth parent to infant in a highly efficient manner. Infants exposed to HBV perinatally have a high likelihood (5%–20% for infants born to hepatitis B surface antigen [HBsAg]-positive, hepatitis B e-antigen [HBeAg]-negative birth parents; 90% for infants born to HBeAg-positive birth parents) of developing infection.[30] Among those infected, 90% will go on to have chronic infection.[31–34] Untreated, about 25% of infants with chronic infection will die of hepatocellular carcinoma or liver cirrhosis later in life. A safe and effective HBV vaccine has been available in the United States since 1982.[35] Routine vaccination of newborns is highly effective at preventing perinatal acquisition of HBV infection and its sequelae.[36–38] A single dose of HBV vaccine given within 24 hours of birth is 75% to 95% effective at preventing infection of infants born to infected mothers.[39] Vaccination of newborns with HBV vaccine is safe and well tolerated.[40] Receipt of an HBV vaccine dose before hospital discharge is associated with increased likelihood of completion of the full hepatitis B vaccine (HepB) series at 19 to 35 months of age, compared with receipt of the first dose at 6 to 12 weeks of age,[41] and is also associated with an increased likelihood of being up to date on other childhood vaccines by 19 to 35 months.[42]

The Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention (CDC) and the AAP recommend that all medically stable infants weighing ≥2000 g receive a birth dose of HepB before 24 hours of age.[43,44] Testing all pregnant persons for HBsAg and providing appropriate and timely prophylaxis to all newborn infants are also recommended. Prophylaxis includes HepB, with or without HBIG depending on the mother's HBsAg status and the infant's weight.[45]

The birth dose of HepB serves as a critical safety net for prevention of HBV infection in situations in which the records of the pregnant person are never obtained, ignored, incorrectly transcribed, misinterpreted, or falsely negative, such as may occur with acquisition of HBV infection late in pregnancy after a negative initial test result. The Immunization Action Coalition documented more than 500 transmissions of HBV in these types of situations from 1999 to 2002.[46] There are an estimated 1000 new cases of perinatally acquired HBV infection every year in the United States.[47]

Rates of uptake of the birth dose of HepB are suboptimal,[48] even in birthing facilities (including both hospitals and stand-alone birthing centers), with HepB birth dose "opt out" or standing order policies,[49,50] suggesting that refusal of the birth dose by parents is common. Pediatricians and others caring for these newborn infants may suggest delaying or agree to delaying the birth dose of HepB until an office visit under the assumption that the infant is at low risk for acquiring perinatal HBV infection.[51] Although providers may assume their patient populations are at low risk for HBV infection, low risk is not the same as zero risk. There are between 850 000 and 2.2 million people in the United States living with chronic HBV,[52–54] and risk factors for HBV infection cannot be identified in more than 30% of infected people. Mothers may be from countries where HBV is hyperendemic. Acquisition of HBV infection late in pregnancy can occur (after the HBsAg screen performed in the first trimester).[55] Receipt of the birth dose of HepB for all infants is, thus, very important.

To increase uptake of the HepB birth dose, pediatricians should advocate in the birthing facilities in which they practice for adoption of policies as recommended by the CDC and AAP, such as implementation of standing orders

or opt outs for HBV vaccine within 24 hours of birth. In the event of individual parent refusal, pediatricians should assess the birth parent's HBsAg status and document it in the medical record, and also identify potential risk factors for acquisition of HBV during pregnancy. If HBsAg is confirmed to be negative and no risk factors are identified, the risk to the newborn infant of perinatal acquisition is likely low, although the precise risk has not been quantified. Pediatricians should then inform parents of the potential benefits of HepB for the newborn infant, such as early protection against HBV infection if there is risk of transmission from an infected close contact. In infants born to persons whose HBsAg status is unknown but in whom there are risk factors for HBV infection (eg, by sexual or percutaneous exposure and travelers to certain countries), and particularly in infants of individuals who are HBsAg-positive, pediatricians should strongly advocate for early administration of both HBIG and HepB within 12 hours of delivery, as recommended. Ninety-five percent of infants born to persons identified as being infected with HBV receive the recommended prophylaxis within 12 hours of birth, suggesting that refusal of neonatal prophylaxis by HBV-infected mothers is uncommon.[56] However, in certain cases, such as infants born to HBsAg-positive mothers (particularly those born to HBeAg-positive mothers, which confers a much higher likelihood of perinatal transmission), if parents resist this recommendation, the provider should consider seeking state intervention through child protective services, given that the parent's refusal puts the infant at significant risk of serious harm compared with the alternative of vaccinating the infant.

DEFERRAL OF OCULAR PROPHYLAXIS

Ophthalmia neonatorum is defined as conjunctivitis presenting in the first 4 weeks of life.[57] Although there are numerous potential etiologies, historically, the most important has been *Neisseria gonorrheae* because of the potential for corneal scarring and blindness as a result of infection. The overall rate of gonococcal conjunctivitis cases in infants <12 months of age in the United States was estimated to be 0.4 cases per 100 000 live births in 2018.[58] In general, the rate of gonococcal ophthalmia neonatorum is directly related to the rates of reported cases of gonorrhea in persons of reproductive age, in whom the highest rates are among persons 24 years and younger. Among pregnant persons who are infected, are not adequately treated, and whose infants do not receive ocular prophylaxis, transmission of infection occurs in 30% to 50% of infants.[59–62] Of infected infants, an estimated 20% will develop corneal involvement and 3% will be blind.[63]

Ocular prophylaxis with 0.5% erythromycin ointment is recommended for the prevention of gonococcal ophthalmia neonatorum by the AAP and the US Preventive Services Task Force (USPSTF) on the basis of evidence showing that administration can prevent gonococcal ophthalmia neonatorum and that use of erythromycin ointment is not associated with any serious harm.[64] It is required by law in most states in the United States.[65]

Parents of newborn infants have questioned the necessity of several routine perinatal practices, including ocular prophylaxis, more frequently in recent years.[66,67] Some medical experts have advocated against the use of universal topical ocular prophylaxis for prevention of ophthalmia neonatorum, and the Canadian Pediatric Society has advocated against routine use of ocular prophylaxis for a variety of reasons.[68] First, ocular prophylaxis prevents ophthalmia neonatorum caused by *Neisseria gonorrheae*, but not other common pathogens, such as *Chlamydia* species. Second, globally, there is increasing resistance to erythromycin among gonococci.[69] Finally, if ophthalmia neonatorum develops, there are effective therapies. In countries that have eliminated ocular prophylaxis, there have been no reported increases in cases of ophthalmia neonatorum or subsequent blindness.[70]

If universal screening and treatment in pregnancy are performed for *Chlamydia* and gonorrhea, the burden of neonatal disease would be expected to be low. The USPSTF, CDC, ACOG, and AAP recommend routine first trimester screening for *Chlamydia* and gonorrhea for all high-risk pregnant persons, defined as being 24 years and younger, having new or multiple sex partners, having a sex partner with concurrent partners, having a sex partner with a sexually transmitted infection, or living in an area with a high prevalence of *Chlamydia* and/or gonorrhea.[71] Because assessment of these risk factors may be difficult, universal screening for these infections is reasonable, particularly in areas of high prevalence. Pregnant persons who have not been tested before labor and delivery should be tested during labor/delivery or immediately postpartum. If positive, then infants born to untreated persons with gonorrhea should receive treatment with intramuscular ceftriaxone, and those born to untreated mothers with *Chlamydia* would be observed and treated if symptoms develop.[72]

The AAP has taken the position that the need for legal mandates for

ocular prophylaxis should be reexamined and instead advocates for states to adopt strategies to prevent ophthalmia neonatorum, such as compliance with CDC recommendations for prenatal screening and treatment of *N gonorrheae* and *Chlamydia trachomatis*. In 2019, however, the USPSTF reaffirmed a previous recommendation for prophylactic ocular topical medication for all newborn infants to prevent gonococcal ophthalmia neonatorum on the basis of convincing evidence that topical ocular prophylaxis for all newborn infants provides substantial benefit and is not associated with serious harm.[64] The USPSTF acknowledged that screening during pregnancy is also important, but pointed out that 6.2% of births in the United States occur in persons who received no prenatal care, with rates as high as 20% in certain locales.[73] Given the recent USPSTF recommendation and that ocular prophylaxis is mandated by law in most US states, it is likely that routine prophylaxis of all newborn infants will remain the standard of care in the United States for the foreseeable future.

The risk of developing gonococcal ophthalmia neonatorum when parents have refused prophylaxis has not been quantified. In the setting of a person with no identifiable risk factors who has tested negative for gonorrhea during pregnancy, the risk is likely very low. When confronted with a parent who is refusing ocular prophylaxis for a newborn infant, pediatricians should assess the parent for potential risk factors, documenting negative test results for gonorrhea in pregnancy in the infant's medical record, and counsel the family to seek immediate medical attention for conjunctival discharge and inflammation in the infant.

Ophthalmia neonatorum has numerous etiologies, with *N gonorrheae* being one of the rarer causes. The other causes most important to identify and treat are *C. trachomatis*, *Pseudomonas aeruginosa*, and HSV. Chlamydial ophthalmia neonatorum, the development of which is not prevented by ocular prophylaxis, tends to be a less severe conjunctivitis than gonococcal, but can be a harbinger of chlamydial pneumonia. Infection with *P. aeruginosa*, although rare, can mimic gonococcal conjunctivitis in its presentation and severity. HSV, also a rare etiology for ophthalmia neonatorum, can be associated with eye damage, meningoencephalitis, or disseminated infection.

National shortages of erythromycin (0.5%) ophthalmic ointment have occurred. Other topical medications are not recommended for prophylaxis. In the absence of erythromycin ophthalmic ointment, persons without prenatal care or who are at high risk for gonococcal infection should be tested in the immediate peripartum setting. If the parent's test is positive for gonorrheal infection or if the test result is pending at time of discharge with concerns for lack of follow-up, neonates should receive ceftriaxone, 25 to 50 mg/kg, intravenously or intramuscularly, not to exceed 125 mg in a single dose. Further details on this shortage can be found at https://www.cdc.gov/std/treatment/drugnotices/erythromycin-ophthalmic.htm.

DELAYED BATHING

Delayed bathing is the practice of not performing the first bath for several hours after birth. This practice has been integrated into many hospital programs to improve rates of breastfeeding initiation and exclusivity.

The World Health Organization (WHO) recommends that bathing be delayed until after 24 hours after birth.[74] If cultural reasons prohibit this 24-hour delay, then the delay should be a minimum of 6 hours. The WHO did not present a rationale or summary of evidence to address this recommendation. Outside of a general recommendation for delayed bathing, no other organizations apart from the WHO have explicit recommendations on timing. The optimal time for delaying bathing is not clear.

The practice of delayed bathing has increased since the recommendation by the WHO in 1993.[74] In the United States, frequency can be extrapolated by the rising number of maternity wards that are designated as "Baby-Friendly" since the early 2000s.[75] The Baby-Friendly Hospital Initiative is a global effort developed by the United Nations International Children's Emergency Fund and the WHO to encourage and recognize facilities that promote breastfeeding.[75]

Many publications since the early 2000s have noted increased implementation of delayed bathing practices in less industrialized countries. Awareness of cultural differences in perceiving the necessity of early newborn bathing (reduction of odor; removal of the vernix, meconium, or excess blood because of concern of appearance) has allowed targeted training in populations that traditionally have not adopted delayed bathing.

The most-oft cited benefit of delayed bathing is increased rates of breastfeeding, which has been observed in several retrospective studies.[76,77] Purported factors contributing to this benefit include

decreased separation time between birth parent and infant and a lower likelihood of hypothermia.[78] These factors may act in concert to affect the newborn infant's ability to latch onto the breast and initiate feeding. Delayed bathing may preserve the initial neonatal skin microbiome, and the presence of the vernix may confer protection against neonatal pathogens.[79,80]

In contrast to the number of studies on the benefits of delayed bathing, little has been published on risks. Many of the aforementioned studies had exclusion criteria for delayed bathing, namely prematurity (with poor skin integrity), asphyxia, and known history of bloodborne pathogens (primarily HIV) in the pregnant person. There are no studies regarding whether timing of the first bath increased risk of umbilical cord infection or delayed healing.

It seems biologically plausible that delayed skin bathing may allow heavier skin colonization by resident bacteria (including GBS), although it is unclear whether this translates to increased risk of early- or late-onset sepsis. Fluids from the birth canal may contain bloodborne pathogens, including HIV, HBV, hepatitis C virus, HSV, and syphilis. At this time, the only explicit AAP recommendation regarding bathing related to infectious risks is for infants exposed to HIV. For these infants, the *Red Book* recommends that the child be bathed and cleaned of secretions as soon as possible after birth. There is no mention of bathing for interruption of vertical transmission of other pathogens. Proper aseptic technique before any skin-breaking procedures should serve to reduce risk of transmission of pathogens to the neonate.

Parents contemplating breastfeeding should be counseled that delaying the first bath is beneficial for successful and sustained efforts. However, bathing should be initiated as soon as possible after delivery in cases in which newborn infants are exposed to active HSV genital lesions or when there is a known history of bloodborne pathogens (HIV, HBV, or hepatitis C virus).

Clinical assessment and management of an ill-appearing neonate does not change with regard to a history of delayed bathing. Additional research is needed on the impact of delayed bathing on the newborn microbiome, as well as any influence on rates of neonatal sepsis.

SUMMARY AND CONCLUSION

Awareness of emerging alternative peripartum and neonatal practices helps pediatricians provide counseling to families before birth and to appropriately evaluate and treat neonates who have been exposed to these practices.

- Water immersion for labor and birth has been shown to improve comfort of the pregnant person in the first stage of labor but has not shown benefit for the second stage of labor or delivery. Potential neonatal infections associated with this practice, such as with *Legionella* and *Pseudomonas* species, are rare but serious.
- Vaginal seeding may expose infants to vaginal pathogens such as GBS or HSV and has no known benefits. Evaluation of symptomatic infants born by cesarean section after exposure to vaginal seeding should be the same as for those who are delivered vaginally.
- Umbilical nonseverance has no clear benefit to date and may possibly increase risk of neonatal sepsis attributable to the presence of necrotic umbilical or placental tissue.
- Placentophagy should be avoided because there is no evidence of benefit to the caregiver, and one case report links this to recurrent GBS sepsis in a neonate. Evaluation of symptomatic infants exposed to this practice should not differ from other neonates.
- The birth dose of HepB serves as a critical safety net for prevention of HBV infection, and nonmedical deferral of the birth dose should be discouraged.
- Ocular prophylaxis is effective for treating some causes of ophthalmia neonatorum, particularly in high-risk situations, such as limited prenatal testing for causative organisms in high-risk populations and in areas with high endemicity. Adequate prenatal testing significantly reduces the risk of ophthalmia neonatorum. Deferral of ocular prophylaxis may be considered in low-risk situations but may be impacted by state legislation.
- Delayed bathing may have benefit in promoting initiation and exclusivity of breastfeeding. Delayed bathing in neonates exposed to active HSV genital lesions or with known history of HIV infection in the birth parent should be discouraged.

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ABBREVIATIONS

AAP: American Academy of Pediatrics
ACOG: American College of Obstetricians and Gynecologists
CDC: Centers for Disease Control and Prevention
GBS: group B *Streptococcus*
HBIG: hepatitis B immune globulin
HBV: hepatitis B virus
HBeAg: hepatitis B e-antigen
HBsAg: hepatitis B surface antigen
HepB: hepatitis B vaccine
HIV: human immunodeficiency virus
HSV: herpes simplex virus
USPSTF: US Preventive Services Task Force
WHO: World Health Organization

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