

The Risks of Not Breastfeeding for Mothers and Infants

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Health outcomes in developed countries differ substantially for mothers and infants who formula feed compared with those who breastfeed. For infants, not being breastfed is associated with an increased incidence of infectious morbidity, as well as elevated risks of childhood obesity, type 1 and type 2 diabetes, leukemia, and sudden infant death syndrome. For mothers, failure to breastfeed is associated with an increased incidence of premenopausal breast cancer, ovarian cancer, retained gestational weight gain, type 2 diabetes, myocardial infarction, and the metabolic syndrome. Obstetricians are uniquely positioned to counsel mothers about the health impact of breastfeeding and to ensure that mothers and infants receive appropriate, evidence-based care, starting at birth.

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Health outcomes differ substantially for mothers and infants who formula feed compared with those who breastfeed, even in developed countries such as the United States. A recent meta-analysis by the Agency for Healthcare Research and Quality reviewed this evidence in detail¹:

- For infants, not being breastfed is associated with an increased incidence of infectious morbidity, including otitis media, gastroenteritis, and pneumonia, as well as elevated risks of childhood obesity, type 1 and type 2 diabetes, leukemia, and sudden infant death syndrome (SIDS).
- Among premature infants, not receiving breast milk is associated with an increased risk of necrotizing enterocolitis (NEC).
- For mothers, failure to breastfeed is associated with an increased incidence of premenopausal breast cancer, ovarian cancer, retained gestational weight gain, type 2 diabetes, and the metabolic syndrome.

These findings suggest that infant feeding is an important modifiable risk factor for disease for both mothers and infants. The American College of Obstetricians and Gynecologists (ACOG) therefore recommends 6 months of exclusive breastfeeding for all infants.² The American Academy of Pediatrics (AAP)³ and the American Academy of Family Physicians (AAFP)⁴ similarly recommend exclusive breastfeeding for the first 6 months of life, continuing at least through the infant's first birthday,

infant feeding and ensuring an optimal start for breastfeeding at birth.

The Risks of Formula Feeding Versus the Benefits of Breastfeeding

Public health campaigns and medical literature have traditionally described the "benefits of breastfeeding," comparing health outcomes among breastfed infants against a reference group of formula-fed infants. Although mathematically synonymous with reporting the "risk of not breast-

feeding" they found that women who were advised about the "benefits of breastfeeding" viewed lactation as a "bonus," like a multivitamin, that was helpful but not essential for infant health. Women responded differently when the same data were presented as the "risk of not breastfeeding," and they were far more likely to say that they would breastfeed their infants. Given these findings, this review will present differences in health outcomes as risks of formula feeding, using breastfeeding mother-infant dyads as the referent group.

In the United States, breastfeeding durations fall far short of ACOG, AAP, and AAFP guidelines. In 2005, 74.2% of US infants were breastfed at least once after delivery, but only 31.5% were exclusively breastfed at age 3 months, and just 11.9% were exclusively breastfed at age 6 months.

and as long thereafter as is mutually desired. The World Health Organization (WHO) recommends at least 2 years of breastfeeding for all infants.

In the United States, breastfeeding durations fall far short of these guidelines.⁵ In 2005, 74.2% of US infants were breastfed at least once after delivery, but only 31.5% were exclusively breastfed at age 3 months, and just 11.9% were exclusively breastfed at age 6 months. These rates show considerable regional variation, with the highest rates in the Pacific Northwest and the lowest rates in the Southeast. Although some of this variation reflects cultural differences, recent data suggest that variations in hospital practices account for a considerable proportion of disparities in breastfeeding duration.⁶ This suggests that improvements in the quality of antenatal and perinatal support for breastfeeding could have a substantial impact on the health of mothers and infants.

This article reviews the health risks of not breastfeeding, for infants and for mothers, as well as the obstetrician's role in counseling women regarding

feeding," this approach implicitly defines formula feeding as the norm. As several authors have noted,⁷⁻⁹ this subtle distinction impacts public perceptions of infant feeding. If "breast is best," then formula is implicitly "good" or "normal." This distinction was underscored by national survey data showing that, in 2003, whereas 74.3% of US residents disagreed with the statement: "Infant formula is as good as breast milk," just 24.4% agreed with the statement: "Feeding a baby formula instead of breast milk

Infant Feeding and Child Health Outcomes

Infectious Morbidity

Compared with breastfed infants, formula-fed infants face higher risks of infectious morbidity in the first year of life. These differences in health outcomes can be explained, in part, by specific and innate immune factors present in human milk.¹¹ Plasma cells in the mother's bronchial tree and intestine migrate to the mammary epithelium and produce IgA antibodies specific to antigens in the mother-infant dyad's immediate surroundings, providing specific protection against pathogens in the mother's environment.¹² In addition, innate immune factors in milk provide protection

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increases the chance the baby will get sick."¹⁰

These distinctions appear to influence parents' feeding decisions. In 2002, the Ad Council conducted focus groups to develop the National Breastfeeding Awareness Campaign, targeted at reproductive-aged women who would not normally breastfeed.

against infection. Oligosaccharides prevent attachment of common respiratory pathogens, such as *Haemophilus influenzae* and *Streptococcus pneumoniae*, to respiratory epithelium, and glycoproteins prevent binding of intestinal pathogens such as *Vibrio cholerae*, *Escherichia coli*, and rotavirus.¹³

Glycosaminoglycans in milk prevent binding of HIV gp120 to the CD4 receptor, reducing risk of transmission, and human milk lipids contribute to innate immunity, with activity against *Giardia lamblia*, *H influenzae*, group B streptococci, *S epidermidis*, respiratory syncytial virus (RSV), and herpes simplex virus type 1 (HSV-1).¹⁴

Otitis Media

Approximately 44% of infants will have at least 1 episode of otitis media

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in the first year of life, and the risk among formula-fed infants is doubled (95% confidence interval [CI], 1.4-2.8) compared with infants who are exclusively breastfed for more than 3 months.¹ Human milk oligosaccharides and antibodies to common respiratory pathogens in the infant's environment are thought to provide protection from infection.

Lower Respiratory Tract Infection

In a meta-analysis of 7 cohort studies of healthy term infants in affluent regions, Bachrach and associates¹⁵ found that infants who were not breastfed faced a 3.6-fold increased risk (95% CI, 1.9-7.1) of hospitalization for lower respiratory tract infection in the first year of life, compared with infants who were exclusively breastfed for more than 4 months. These studies included adjustment for parental smoking and socioeconomic status. The majority of respiratory hospitalizations for infants result from infection with RSV. Lipids in human milk appear to have antiviral activity against RSV.

Gastrointestinal Infections

Multiple studies suggest that formula-fed infants face an increased risk of gastroenteritis and diarrhea. In a meta-analysis of 14 cohort studies, Chien and Howie¹⁶ found that infants who were formula fed or fed a mixture of formula and human milk were 2.8 times (95% CI, 2.4-3.1) more likely to develop gastrointestinal (GI) infection than those who were exclusively breastfed. Data from the Promotion of Breastfeeding Intervention Trial (PROBIT) found that infants in the

control group were 1.7 times (95% CI, 1.1-2.5) more likely to develop GI illness than those in the intervention group. In this study, Kramer and colleagues¹⁷ randomized 31 maternity hospitals to the Baby Friendly Hospital Initiative (BFHI), a set of evidence-based practices supportive of breastfeeding, versus usual care. All 17,046 infants in the PROBIT study were breastfed, but at 3 months, only 6.4% of control infants were exclusively breastfed compared with 43.3% of intervention infants.

Necrotizing Enterocolitis

Among preterm infants, not being breastfed is associated with a 2.4-fold risk (95% CI, 1.04-5.6) of NEC with an absolute risk difference of 5%.¹ Because the case-fatality rate for NEC is 15%,¹⁸ this difference in absolute risk is clinically significant.

Obesity and Metabolic Disease

Epidemiologic studies suggest that children who are formula fed in infancy are more likely to become obese or develop type 2 diabetes.^{1,19,20}

In meta-analyses, children formula fed in infancy were 1.1 (95% CI, 1.0-1.1)²¹ to 1.3 (95% CI, 1.2-1.5)²² times as likely to become obese as children who had ever been breastfed. Being formula fed in infancy is also associated with a 1.6-fold risk (95% CI, 1.2-2.3) of type 2 diabetes, compared with being breastfed.^{1,19,23} Some studies have also suggested an increase in risk for cardiovascular disease, including higher blood pressure^{19,24,25} and less favorable lipid profiles,²⁶ but the literature is mixed. Researchers have proposed several mechanisms to explain these associations, including differences in composition of human milk versus formula, feeding practices, associated lifestyle factors, and self-regulation of intake by the infant.²⁷ Moreover, human milk contains adipokines, which may play a role in regulating energy intake and long-term obesity risk.²⁸ Several authors have postulated that long-chain polyunsaturated fatty acids in breast milk may affect blood pressure and insulin resistance in later life.¹⁹ Nevertheless, observational data must be interpreted with caution because of potential confounding by other lifestyle behaviors in families with long durations of breastfeeding versus formula feeding.

Neurodevelopment

Multiple authors have examined associations between infant feeding and cognitive development, with mixed results.²⁹⁻³¹ Several studies reported modestly lower IQ scores in formula-fed children compared with breastfed children, whereas others reported no association between infant feeding and intelligence. Observational data should be interpreted with caution due to confounding by socioeconomic status and maternal intelligence. Nevertheless, data from 2 randomized controlled trials provides evidence of developmental differences with

shorter durations of breastfeeding. Dewey and associates³² randomized mothers in Honduras to introduction of complementary foods at 4 months versus continued exclusive breastfeeding until 6 months postpartum. Infants in the complementary food group crawled later than those that were exclusively breastfed from 4 to 6 months ($P = .007$). Among normal birth weight infants, those who were randomized to complementary foods before 6 months were less likely to be walking at 12 months (39 vs 60%; $P = .02$). Kramer and colleagues³³ similarly found differences in neurodevelopment with shorter breastfeeding in the PROBIT study. At age 6.5 years, verbal IQ scores were 7.5 points lower (95% CI, -0.8 to -14.3) among children in the usual care group than among children in the breastfeeding support group. Kramer's results suggest that hospital policies that support breastfeeding can impact neurodevelopment at school age.

These studies were conducted prior to use of formula supplemented with long-chain polyunsaturated fatty acids (LCPUFA), which had been added to infant formula with the goal of improving neurocognitive outcomes. However, a recent Cochrane meta-analysis concluded that most well-conducted randomized trials showed no benefit of LCPUFA versus control formula on visual acuity or neurodevelopment among term infants.³⁴ These findings make it unlikely that LCPUFA-supplemented formula would reduce the differences in outcomes between children in intervention and control groups in these studies.

SIDS

Case-control studies suggest that formula feeding is associated with a 1.6- (95% CI, 1.2-2.3)¹ to 2.1-fold (95% CI, 1.7-2.7)³⁵ increased odds of SIDS compared with breastfeeding. These

associations persisted after adjustment for sleeping position, maternal smoking, and socioeconomic status. In reviewing the evidence, the American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome concluded that factors associated with breastfeeding, but not breastfeeding per se, were associated with a lower incidence of SIDS.³⁶

Infant Mortality

After adjusting for maternal age, education, smoking status, infant race, gender, birth weight, congenital malformation, birth order, plurality, and Women, Infants and Children Nutrition Program status, formula feeding is associated with a 1.3-fold (95% CI, 1.1-1.5) higher risk of infant mortality in the United States compared with ever breastfeeding.³⁷ In a subgroup analysis, the association was limited to SIDS and injury-related death.

Role of Exclusive Breastfeeding in Infant Health Outcomes

Early feeding plays a central role in development and maturation of the infant immune system. Compared with human milk-fed infants, formula-fed infants have higher pH stools and greater colonization with pathogenic bacteria, including *E coli*, *Clostridium difficile*, and *Bacteroides fragilis*.³⁸ Bioactive factors in human milk appear to facilitate the more favorable gut colonization in breastfed infants. These oligosaccharides, cytokines, and immunoglobulins regulate gut colonization and development of gut-associated lymphoid tissue and govern differentiation of T cells that play a role in host defense and tolerance.³⁹ Formula-fed infants also have a smaller thymus than breastfed infants.⁴⁰ These differences in immune system differentiation may underlie the higher incidence of allergic disease observed in formula-fed

children. Not breastfeeding may also affect disease risk through exposure to foreign antigens in formula.

Asthma

Multiple studies have examined the association between infant feeding and development of asthma, with mixed results. In a meta-analysis, Ip and colleagues¹ found a 1.7-fold risk (95% CI, 1.2-2.3) of developing asthma among formula-fed children with a positive family history of asthma or atopy and a 1.4-fold risk (95% CI, 1.1-1.7) among those without a family history, compared with those who were breastfed for 3 months or more. Gdalevich and associates⁴¹ compared less than 3 months of exclusive breastfeeding with greater than or equal to 3 months of exclusive breastfeeding and found a 1.9-fold risk (95% CI, 1.3-2.9) among those with a family history of asthma or atopy.

Atopic Dermatitis

Infants with a family history of atopy who were exclusively breastfed for less than 3 months have a 1.7-fold risk of atopic dermatitis (95% CI, 1.1-2.4) compared with infants who are exclusively breastfed.⁴² Similar findings were reported in the PROBIT randomized trial of breastfeeding support,¹⁷ where infants who delivered in control hospitals were 1.9 times as likely (95% CI, 1.1-3.2) to develop atopic dermatitis as those who delivered in breastfeeding support intervention hospitals.

Type 1 Diabetes

Epidemiologic studies have reported an association between exposure to cow's milk antigen and development of type 1 diabetes, although results have been mixed.⁴³ Less than 3 months of breastfeeding has been associated with a 1.2- (95% CI, 1.1-1.4)⁴⁴ to 1.4-fold (95% CI, 1.2-1.5)⁴⁵ increased risk

of developing type 1 diabetes compared with more than 3 months of breastfeeding. There is some evidence that differential recall between cases and controls may have biased results.⁴⁴ A randomized, controlled trial is currently underway to test whether cow's milk formula increases development of islet-cell antibodies. Infants at high risk of type 1 diabetes

who do not breastfeed face higher risk of breast cancer and ovarian cancer, as well as obesity, type 2 diabetes, metabolic syndrome, and cardiovascular disease. As in the pediatric literature, most evidence arises from observational studies, which are subject to confounding by other health behaviors. For maternal health outcomes, associations are generally

2.9-5.8) reduction in risk of invasive breast cancer.⁵⁶ In the Nurses' Health Study II, the association was stronger among women with a first-degree relative with breast cancer.⁵⁷ In this group, never breastfeeding was associated with a 2.4-fold increase (95% CI, 1.3-4.5) in incidence of premenopausal breast cancer, compared with ever having breastfed.

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have been randomized to supplementation with hydrolysed formula versus cow's milk formula. In a pilot study,⁴⁶ exposure to cow's milk-based formula was associated with higher prevalence of islet cell auto-antibodies, providing tentative evidence for a causal association between cow's milk exposure and type 1 diabetes.

Childhood Cancer

Several studies have examined associations between formula feeding and childhood leukemia based on the hypothesis that immunoreactive factors in breast milk may prevent viral infections implicated in the leukemia pathogenesis.⁴⁷ Two meta-analyses^{1,48} found a 1.3-fold higher risk of acute lymphoblastic leukemia (95% CI, 1.1-1.4) among formula-fed children compared with children who were breastfed less than 6 months. Kwan and colleagues⁴⁸ also found a 1.2-fold higher risk of acute myeloid leukemia (95% CI, 1.0-1.4) among formula-fed infants compared with infants breastfed more than 6 months.

Infant Feeding and Maternal Health Outcomes

Not breastfeeding or weaning prematurely is associated with health risks for mothers as well as for infants. Epidemiologic data suggest that women

reported according to lifetime duration across all pregnancies, rather than duration of feeding for each pregnancy.

Lactation and Malignancy

Lactation suppresses ovulation, leading to lactation amenorrhea. In addition, lactogenesis leads to terminal differentiation of breast tissue with potential long-term effects on malignant transformation. These effects may mediate associations between breastfeeding and breast and ovarian cancer.

Breast Cancer

Some studies have suggested that breastfeeding reduces breast cancer risk, but evidence has been mixed. Observational studies relating lactation and breast cancer among postmenopausal women have largely failed to identify an association.^{49,50} Reports from case-control studies suggest a modest inverse association between breastfeeding and premenopausal breast cancer risk, but findings have been inconsistent and limited by potential recall bias.^{51,52} Longitudinal studies have similarly produced conflicting results.^{49,53-55} A meta-analysis of 47 studies found that each year of breastfeeding was associated with a 4.3% (95% CI,

Ovarian Cancer

In case-control studies,¹ never breastfeeding is associated with a 1.3-fold higher (95% CI, 1.1-1.5) risk of ovarian cancer, compared with ever having breastfed. Danforth and colleagues⁵⁸ prospectively examined risk of ovarian cancer in the Nurses' Health Studies and found that women who had never breastfed faced a 1.5-fold risk (95% CI, 1.0-2.2) of ovarian cancer, compared with women who breastfed for greater than 18 months. These associations may be mediated by antibodies to MUC-1 antigen, which are thought to develop during mastitis.⁵⁹

Lactation and Maternal Metabolism

Breastfeeding poses a substantial metabolic burden on mothers, requiring 500 kcal per day to supply milk for an exclusively breastfed infant. This metabolic load may help mobilize weight gained during pregnancy. In addition, breastfeeding is associated with more favorable glucose levels, lipid metabolism, and blood pressure. Epidemiologic studies suggest that these differences may persist after weaning with significant long-term benefits for mothers.⁶⁰

Dewey and associates⁶¹ compared weight loss during the first year postpartum between 2 groups of women: those breastfeeding less than 3 months and those continuing for more than 1 year. Women who were intentionally dieting to lose weight were excluded from the study. Women

in the prolonged breastfeeding group lost 4.4 lbs more than women who weaned at 3 months, and this difference in weight persisted at 2 years postpartum ($P < .05$). Other studies have found mixed results,¹ suggesting that differences in caloric intake and physical activity may play a greater role in postpartum weight change than breastfeeding.

A randomized, controlled trial in Honduras provides evidence that breastfeeding can mobilize calories for weight loss.³² Women exclusively breastfeeding were randomized at 4 months postpartum to introduce complementary foods for their infants or continue to breastfeed exclusively. At 6 months, exclusively breastfeeding mothers had lost 600 g more than those in the complementary feeding group ($P < .05$), suggesting that more intense lactation mobilizes additional adipose stores.

Differences in metabolism between breastfeeding and formula-feeding women appear to persist into later life. Several authors have found a higher risk of diabetes and the metabolic syndrome among women who have never breastfed compared with those who breastfed for a prolonged period. In the Nurses' Health Studies, the risk of type 2 diabetes in the 15 years since their last birth was 1.7-fold higher (95% CI, 1.3-2.3) among parous women who never breastfed compared with those who breastfed for a lifetime total of 2 years or more.⁶² Never having breastfed was also linked with a 1.3-fold (95% CI, 1.1-1.6) risk of myocardial infarction compared with lifetime breastfeeding for 2 years or more in the Nurses' Health Study.⁶³ Ram and colleagues⁶⁴ assessed the prevalence of metabolic syndrome in a cohort of middle-aged women and found a 1.3-fold higher risk (95% CI, 1.0-1.6) among parous women who had never breastfed, compared with those who had ever

breastfed. Similarly, in the Women's Health Initiative, Schwarz and colleagues⁶⁵ found a 10% to 20% higher risk of diabetes, hyperlipidemia, and cardiovascular disease among parous women who had never breastfed compared with those who breastfed for 13 to 23 months (P for trend $< .001$ for all outcomes).

The Obstetrician's Role in Promoting and Supporting Breastfeeding

Multiple studies provide evidence that formula feeding is associated with increased risks for infants and mothers compared with breastfeeding. By supporting breastfeeding as the normative way to feed an infant, the obstetrician-gynecologist can play a powerful role in improving health outcomes across 2 generations.

Counseling During Antenatal Care

Most mothers make decisions about infant feeding early in pregnancy. Early in prenatal care, the obstetrician can educate mothers about the health impact of infant feeding and address potential obstacles to breastfeeding. However, many obstetricians underestimate the importance of their advice. In a study of obstetricians and

study of breastfeeding prevalence at 6 weeks postpartum, DiGirolamo and colleagues⁶⁷ found that 70% of women who thought their physician favored breastfeeding were still breastfeeding compared with 54% of those who thought their physician had no preference.

When counseling patients about breastfeeding, studies suggest asking open-ended questions such as: "What have you heard about breastfeeding?" followed by acknowledging the mother's concerns and targeting education to her specific needs. For the mother who elects to bottle feed, this approach allows for an open discussion of risks and benefits and ensures informed consent for the feeding decision. Such an approach is more effective than asking a closed-ended question such as: "Are you going to breast- or bottle-feed?"⁶⁸

Physician office participation in formula marketing programs is also a major predictor of breastfeeding outcomes. Howard and colleagues⁶⁹ conducted a randomized, controlled trial of promotional materials at the first prenatal visit. Mothers received either a formula company-sponsored information pack on infant feeding or a noncommercial pack of equal value. Among mothers who were uncertain

In a study of obstetricians and patients at a multispecialty group practice in Massachusetts, just 8% of physicians felt their advice on whether and how long to breastfeed was important, but more than one third of mothers reported that their provider's advice on these topics was very important.

patients at a multispecialty group practice in Massachusetts,⁶⁶ just 8% of physicians felt their advice on whether and how long to breastfeed was important, but more than one-third of mothers reported that their provider's advice on these topics was very important. Patient perception of clinicians' opinions is directly correlated with breastfeeding duration. In a

about their plans to breastfeed, those who received the formula marketing packet were 1.7 (95% CI, 1.2-2.6) times more likely to wean than those who received the noncommercial information. This randomized trial provides compelling evidence that obstetric care providers should not participate in formula marketing programs.

Physiology of Breastfeeding

Lactation begins with secretory differentiation of breast tissue during pregnancy.⁷⁰ Hormonal changes in estrogen, prolactin, progesterone, and IGF-1 cause differentiation of the mammary epithelium in preparation for milk production. Alveoli form by the end of the first trimester of pregnancy. Placental prolactin, placental growth hormone, and human placental lactogen support mammary differentiation and milk formation. Progesterone produced by the placenta

downregulate prolactin receptors in the mammary epithelium, leading to reduced milk production.⁷²

Successful establishment of lactation requires removal of progesterone and estrogen with delivery of the placenta, followed by a cycle of milk let down, successful latch, and removal of milk. Obstetricians can facilitate this process of “let down, latch, and moving milk” by encouraging immediate skin-to-skin contact after birth, followed by feeding on demand and “rooming in,” keeping the mother and

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prevents synthesis of mature milk until after birth. Secretory activation occurs as progesterone levels fall and milk production increases from 50 mL/d at birth to approximate 500 mL/d in the first 2 to 3 days after delivery. As production increases, mammary secretions change from colostrum, a clear fluid rich in secretory IgA and lactoferrin, to mature milk, which contains lactose, lipids, and proteins.

Milk synthesis occurs continuously, as lactocytes produce lipids, lactose, proteins, and immunoglobulins that comprise human milk. Milk secretion occurs intermittently, when oxytocin stimulates the milk ejection reflex, causing contraction of myoepithelial cells and secretion of milk. Milk let down is inhibited by stressful stimuli.⁷¹ For the infant to transfer milk, he or she must latch successfully. Infant suckling stimulates release of oxytocin and production of prolactin, and facilitates transfer of milk from the areola to the infant’s mouth. If the breast is not emptied regularly, engorgement occurs. This accumulation of milk in the alveoli appears to

infant together during the postpartum stay. Of note, in a small observational study, Keefe⁷³ found that mothers who kept infants in their rooms at night slept as much as those who send their infants to the nursery.

Hospital Practices and Breastfeeding Success

Data from randomized studies show that maternity care practices have a substantial impact on breastfeeding success and infant health outcomes. In the PROBIT trial,¹⁷ intervention hospitals implemented the BFHI. This set of evidence-based guidelines was developed by the WHO to increase initiation and duration of breastfeeding.⁷⁴ Kramer and colleagues³³ found that the intervention increased duration of exclusive and total breastfeed through the first year of life and resulted in improved health outcomes ranging from gastroenteritis to school-age verbal IQ.

The BFHI has been widely implemented around the world, reaching more than 15,000 maternity hospitals in 134 countries. However, in the

United States, fewer than 100 hospitals are certified as Baby Friendly. A recent study by the Centers for Disease Control and Prevention⁶ surveyed 2687 maternity centers to measure implementation of BFHI guidelines. The mean score was 63 out of 100 possible points. The authors found that routine practices in many maternity hospitals are not supportive of breastfeeding. For example, 65% of hospitals reported that staff advise mothers to limit duration of suckling at each feeding, and 70% distribute formula company marketing packs to breastfeeding mothers, despite evidence that both practices reduce breastfeeding success.

Obstetricians can help close this quality gap by supporting efforts to eliminate outdated practices and providing evidence-based support for breastfeeding. For example, a Cochrane review of randomized trials demonstrated that infants placed skin-to-skin at delivery breastfeed 42 days longer than infants who are swaddled in the first hour of life.⁷⁵ The obstetrician can directly impact this practice by placing the healthy infant on the mother’s chest at delivery and encouraging hospital staff to perform the initial assessment while the infant is with the mother, as recommended by the AAP (Table 1).

Conclusions

Formula feeding is associated with adverse health outcomes for both mothers and infants, ranging from infectious morbidity to chronic disease. Given the compelling evidence for differences in health outcomes, breastfeeding should be acknowledged as the biologic norm for infant feeding. Physician counseling, office, and hospital practices should be aligned to ensure that the breastfeeding mother-infant dyad has the best

Table 1
The Obstetrician's Role in Supporting Breastfeeding

American Academy of Pediatrics Section on Breastfeeding Recommendations for Skin-to-Skin Care at Delivery³

Healthy infants should be placed and remain in direct skin-to-skin contact with their mothers immediately after delivery until the first feeding is accomplished.

The alert, healthy newborn infant is capable of latching on to a breast without specific assistance within the first hour after birth. Dry the infant, assign Apgar scores, and perform the initial physical assessment while the infant is with the mother. The mother is an optimal heat source for the infant. Delay weighing, measuring, bathing, needle-sticks, and eye prophylaxis until after the first feeding is completed. Infants affected by maternal medications may require assistance for effective latch-on. Except under unusual circumstances, the newborn infant should remain with the mother throughout the recovery period.

The Obstetrician's Role in Supporting Breastfeeding

During Antenatal Care

- Do not participate in formula marketing programs.
- Ask the patient, "What have you heard about breastfeeding?" Respond to her concerns and educate her about medical recommendations for 6 months of exclusive breastfeeding.
- Provide anticipatory guidance about early initiation of breastfeeding, skin-to-skin care, feeding on demand, and rooming in.
- For women with a history of breast reduction surgery or a difficult feeding experience with a prior child, refer to a lactation consultant for an antenatal consult.

Intrapartum

- Provide anticipatory guidance about establishment of breastfeeding.
- For women undergoing cesarean deliveries, encourage skin-to-skin contact in the recovery room to facilitate establishment of breastfeeding.
- Educate labor floor staff about the importance of skin-to-skin contact.

During the Postpartum Hospitalization

- Ask "How is breastfeeding going?" Respond to specific concerns and emphasize recommendations for exclusive breastfeeding for the first 6 months.
- Encourage rooming in and feeding on demand.
- Ensure involvement of a lactation consultant if there is pain during feeding beyond the initial latch.
- Collaborate with pediatric providers regarding maternal medications that may be of concern during breastfeeding. Use LactMed as a reference for evidence-based reviews of medication safety.
- Provide referrals to breastfeeding resources in the community.

At the Postpartum Visit

- Ask "How is breastfeeding going?" Respond to specific concerns and emphasize recommendations for exclusive breastfeeding for the first 6 months.
- Provide guidance on expression of milk for return to school or work.
- Offer to sign a letter to her employer regarding the importance of accommodations to allow continued breastfeeding. (Sample available at <http://www.womenshealth.gov/breastfeeding/programs/business-case/outreach-marketing-resources.pdf>.)
- Work with lactation consultants in your community to manage pain, low milk supply, or other breastfeeding concerns.

At Annual Well-Woman Visits

- Assess whether patients are currently breastfeeding.
- Be aware that the World Health Organization recommends a minimum of 2 years of breastfeeding for each infant.

chance for a long, successful breastfeeding experience. ■

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Main Points

- Research suggests that breastfeeding is a key modifiable risk factor for disease for both mothers and infants. Current guidelines recommend exclusive breastfeeding for a minimum of 6 months up to the first 2 years of life, although breastfeeding in the United States falls far short of these recommendations. Data suggest that variations in hospital practices account for disparities in breastfeeding duration. Improvements in the quality of antenatal and perinatal support could have a substantial impact on mother and infant health.
- There are specific and innate immune factors present in human milk that provide specific protection against pathogens in the mother's environment. In addition, immune factors in milk provide protection against infections such as *H influenzae*, *S pneumoniae*, *V cholerae*, *E coli*, and rotavirus.
- Not breastfeeding is associated with health risks for both mothers and infants. Epidemiologic data suggest that women who do not breastfeed face higher risk of breast and ovarian cancer, obesity, type 2 diabetes, metabolic syndrome, and cardiovascular disease.
- Patient perception of clinician opinion is directly associated with breastfeeding duration. A Massachusetts study found that just 8% of physicians believed their advice on breastfeeding practices was important, but more than one-third of mothers reported that their provider's advice on this subject was important.
- The Baby Friendly Hospital Initiative has been widely implemented throughout the world, reaching more than 15,000 maternity hospitals in 134 countries, although routine practices in many maternity hospitals are not supportive of breastfeeding. Obstetricians who counsel on breastfeeding can help eliminate outdated practices and provide evidence-based support on behalf of breastfeeding.

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